7.1 INTRODUCTION

Water quality is an important component of Prescott Active Management Area (PRAMA) water supply management. ADWR's role in water quality relates to the impacts of water quality on available water supplies. Protecting and managing water quality maximizes the overall quantity of usable water, and matching the best use to the quality of water is a significant aspect of meeting ADWR's water management objectives. This chapter describes ADWR's role and authority in meeting groundwater quality management objectives during the fourth management period and addresses water quality impacts on the management of water supplies in the PRAMA.

ADWR's responsibilities in groundwater quality include enhancement of groundwater quality protection programs, assistance in the clean-up of contaminated areas, and assistance in matching water quality with the highest beneficial use. During the fourth management period, ADWR will continue to play a role in water quality issues.

In general, groundwater in the PRAMA is of acceptable quality for most uses. Most of the groundwater supplies in the PRAMA meet federal and state drinking water standards, though contaminant levels exceed primary safe drinking water standards in a few areas. Groundwater contamination in the PRAMA is generally associated with leaking underground storage tanks at gas stations. These sites are monitored to ensure that contaminants do not adversely impact nearby groundwater quality. The PRAMA contained no specific contaminated areas identified on the Water Quality Assurance Revolving Fund (WQARF) Registry or the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) National Priority List (NPL) until August 2008, when the United State Environmental Protection Agency (USEPA) added the Iron King Mine and Humboldt Smelter site to the NPL.

7.2 GOALS AND OBJECTIVES

The use of remediated groundwater has not been a prevalent issue in the PRAMA as it is in other AMAs; however, the PRAMA must be prepared to handle issues related to remediated water in the Fourth Management Plan. Spills and other accidental releases of contaminants cannot be predicted, putting greater pressures on water resources if the release were to impact groundwater. Increased development raises the likelihood for releases of contaminants to groundwater.

To implement its groundwater quality management responsibilities, ADWR will "coordinate and confer" with the Arizona Department of Environmental Quality (ADEQ) regarding "water plans, water resource planning, water management, wells, water rights and permits, and other appropriate provisions of Title 45 pertaining to remedial investigations, feasibility studies, site prioritization, selection of remedies and implementation of the WQARF program pursuant to title 49, chapter 2, article 5." A.R.S. § 45-105(B)(4)(c).

ADWR's goals and objectives for groundwater quality management for the fourth management period are the following:

- to ensure that remediation of contaminated groundwater uses the minimal amount of groundwater necessary to facilitate the objectives of each remedial action project.

- to ensure that end uses of remediated groundwater minimize groundwater withdrawals and are consistent with the safe-yield goal. Toward this end, ADWR will favor end uses that minimize changes in groundwater storage, such as reinjection and recharge, over those that reduce groundwater in storage. Where remediated groundwater cannot be practicably or cost-effectively re-injected or recharged, ADWR will emphasize replacing existing groundwater uses with

remediated water and discourage new permanent uses which would not have occurred without the poor quality groundwater accounting and which would continue to rely on groundwater after the poor quality groundwater is no longer available.

ADWR's objectives are designed to ensure that remedial action projects are not an impediment to achieving the safe-yield management goal for the PRAMA and that cleanups are performed in a prudent and efficient manner from a water management perspective.

7.3 STATUTORY PROVISIONS

ADEQ is the agency primarily responsible for regulating water quality in Arizona. ADWR also has certain limited responsibilities in this area. Statutory provisions pertaining to ADWR's limited authority to regulate groundwater quality are discussed below.

The Code grants ADWR authority to regulate groundwater. Under the Code, ADWR has the following authority and responsibilities relating to water quality:

- "[T]he director may ... [f]ormulate plans and develop programs for the practical and economical development, management, conservation and use of surface water, groundwater and the watersheds in this state, including the management of water quantity and quality." A.R.S. § 45-105(A)(1).

- "[T]he director may ... [c]onduct feasibility studies and remedial investigations relating to groundwater quality and enter into contracts and cooperative agreements under § 104 of the comprehensive environmental response, compensation, and liability act [CERCLA] of 1980 (P.L. 96-510) to conduct such studies and investigations." A.R.S. § 45-105(A)(15).

- For the fourth management period, the director "[m]ay include in each plan, if feasible, in cooperation with the department of environmental quality, an assessment of groundwater quality in the active management area and any proposed program for groundwater quality protection." A.R.S. § 45-567(A)(6).

- "[T]he director shall consult with the department of environmental quality on water quality considerations in developing and implementing management plans under this article." A.R.S. § 45-573.

WQARF legislation, revised in 1997, expanded ADWR's role in water quality management. ADWR's responsibilities and authority under WQARF are as follows:

- "[T]he director of water resources, in consultation with the director of environmental quality, may inspect wells for vertical cross-contamination of groundwater by hazardous substances and may take appropriate remedial actions to prevent or mitigate the cross-contamination ...." A.R.S. § 45-605(A).

- "[T]he director [of water resources] shall notify an applicant for a permit or a person who files a notice of intent to drill a new or replacement well if the location of the proposed well is within a sub-basin where there is a site on the registry [with existing or anticipated future groundwater contamination presenting a risk of vertical cross-contamination by the well]." The director is also required to adopt rules relating to vertical cross-contamination for new and replacement wells. A.R.S. § 45-605(E).

- "[T]he director of environmental quality and the director of water resources shall coordinate their efforts to expedite remedial actions, including obtaining information pertinent to site investigations, remedial investigations, site management and beneficial use of remediated water." A.R.S. § 49-290.01(C).

- The director of water resources may waive permits, approvals or authorizations if they "unreasonably limit the completion of a remedial action." A.R.S. § 49-290.01(A). The director of water resources may also waive any regulatory requirement under title 45 if the requirement conflicts with the selected remedy in a remedial action as long as the waiver does not "result in adverse impacts to other land and water users." A.R.S. § 49-290.01(D).

- "The department of water resources shall include in its management plans ...provisions to encourage the beneficial use of groundwater that is withdrawn pursuant to approved remedial action projects ...." Laws 1997, Ch. 287, § 51(A). In order to encourage the beneficial use of remediated groundwater, "the department of water resources shall account for groundwater withdrawn pursuant to approved remedial action projects under CERCLA or title 49, Arizona Revised Statutes, consistent with the accounting for surface water" for purposes of determining compliance with management plan conservation requirements. Laws 1997, Ch. 287, § 51(B).

- "For each calendar year until 2025, the use of up to an aggregate of sixty-five thousand acre-feet of groundwater withdrawn within all active management areas pursuant to approved remedial action projects under CERCLA or title 49, Arizona Revised Statutes, shall be considered consistent with the management goal of the active management area as prescribed in section § 45-576 subsection I, paragraph 2, Arizona Revised Statutes." Laws 1997, Ch. 287, § 52(A). Additionally, in the fourth management period, twenty-five percent (25%) of the total volume of groundwater withdrawn pursuant to remedial action projects and in excess of the aggregate volume of sixty-five thousand acre-feet shall be considered consistent with the management goal of the AMA. Laws 1997, Ch. 287, § 52(B).

- "The department of environmental quality and the department of water resources shall develop a method of sharing data, including cooperative data base development and integration between the departments, that will provide the departments with the information necessary to protect the resources of the state." Laws 1997, Ch. 287, § 53.

- "The directors of environmental quality and water resources shall enter into an agreement to coordinate the well inspection and remediation programs and to rank wells within an area of contamination according to each well's potential to act as a conduit to spread contamination and to determine the appropriate remedial action regarding the wells with a potential to act as a conduit, including well reconstruction, well abandonment or no action." Laws 1997, Ch. 287, § 54.

7.4 THE REGULATION OF GROUNDWATER QUALITY IN ARIZONA

To understand ADWR's role in regulating groundwater quality, it is important to understand the broad framework of laws and programs impacting both groundwater and surface water quality. Since groundwater quantity and quality issues are so interrelated, ADEQ and ADWR work together to prevent and mitigate groundwater quality and quantity problems. ADEQ has primary responsibility for protecting the State's groundwater and surface water quality, while ADWR secondarily manages groundwater quality concerns. This section will discuss the regulatory agencies responsible for administering laws impacting groundwater and surface water quality as well as the federal laws and state programs impacting groundwater quality and secondarily surface water quality.

7.4.1 Water Quality Regulatory Agencies

Water quality protection programs in Arizona are based on both federal and state law and are primarily administered by either ADEQ or the United States Environmental Protection Agency (EPA) Region IX. ADEQ has the responsibility to administer state water quality programs pursuant to state statutes and to administer federal water quality programs for which the EPA has delegated its authority to the state, referred to as state primacy. EPA has the responsibility to administer federal water quality programs pursuant to federal statutes. The EPA delegates its authority to states where the state demonstrates that it can adequately administer the program and the federal statute allows delegation of the authority.

ADEQ has authority pursuant to the Environmental Quality Act (EQA) of 1986 (A.R.S. § 49-101 *et seq*.) to set water quality standards and to regulate discharges that have the potential to impact the quality of groundwater by requiring that discharges are subject to aquifer protection permits (APP). ADEQ has authority under the Clean Water Act (CWA) to set Arizona's surface water quality standards and to certify that discharges subject to federal permits do not violate state water quality standards.

EPA Region IX delegated authority to administer the CWA National Pollutant Discharge Elimination System (NPDES) permit and the pretreatment program to Arizona in 2002. The ADEQ program is called the Arizona Pollutant Discharge Elimination System (AZPDES).The United States Army Corps of Engineers (Corps), Los Angeles District, retains authority to administer CWA permits for the discharge of dredge or fill materials in Arizona's waters. EPA Region IX also has authority to require groundwater monitoring and remediation in accordance with CERCLA.

7.4.2 Federal Laws Impacting Groundwater Quality

The Safe Drinking Water Act (SDWA) is the primary federal law regulating drinking water quality which including groundwater. The CWA, which regulates surface water, also impacts groundwater quality. CERCLA and the Resource Conservation and Recovery Act (RCRA) impact groundwater management through the regulation of hazardous waste and sites contaminated by hazardous waste. The following is a brief overview of these federal laws and their impacts on ADWR's water quality management.

7.4.2.1 Safe Drinking Water Act

The SDWA was enacted in 1974 to regulate drinking water. ADEQ has been delegated authority by the EPA to implement the SDWA and "to ensure that all potable water distributed or sold to the public through public and semi-public water systems is free from unwholesome, poisonous, deleterious, or other foreign substances and filth or disease causing substances or organisms."
A.R.S. § 49-351(A).

Although ADWR does not regulate drinking water quality, the presence of contaminants in groundwater does negatively impact water quality for municipal providers and poses significant water management issues for drinking water systems.

7.4.2.2 Clean Water Act

The CWA, first passed in 1972, is the comprehensive federal statute regulating surface water quality. It provides for area-wide, long-range planning processes to mitigate water quality control problems in selected areas which result from urban and industrial wastewater. Because such planning processes provide a comprehensive review of wastewater treatment and reuse options, ADWR participates in such planning and provides technical assistance to local councils of government who administer the plans.

7.4.2.3 Comprehensive Environmental Response, Compensation and Liability Act

CERCLA and the Superfund Amendments and Reauthorization Act, commonly referred to as the federal Superfund program, authorize investigation and remediation of groundwater contaminated by releases of hazardous substances. In Arizona, CERCLA establishes a comprehensive response program which is administered by ADEQ in cooperation with the EPA. ADWR also plays an advisory role in this process.

ADWR regularly participates in CERCLA program activities. ADWR's concern regarding CERCLA sites is that any groundwater that is withdrawn and remediated must be put to reasonable and beneficial use. ADWR may participate on CERCLA technical committees and serve in an advisory capacity for monitoring and extraction well installation, source control projects, and permitting.

7.4.2.4 Resource Conservation and Recovery Act

RCRA established a national hazardous waste management program in 1976. Under RCRA, hazardous waste permits are issued for the treatment, storage, and disposal (TSD) of hazardous wastes. Individual permits issued to these facilities specify design, performance, and operational standards which include groundwater monitoring. Hazardous waste facilities also undergo a closure process once operations are reduced or terminated. Moreover, corrective action may be required at TSD facilities and may include groundwater monitoring and remediation.

ADEQ has been delegated authority for the implementation of RCRA requirements in Arizona. ADWR's participation at RCRA sites is important for water management activities, particularly in regard to well siting, use permits, and end use issues.

7.4.3 ADEQ Programs that Impact ADWR Groundwater Quality Activities

The EQA established the ADEQ and created a strong and comprehensive water quality management structure. ADEQ's programs that protect groundwater resources include water quality assessments, groundwater monitoring, pollutant discharge, permitting activities, and remediation activities. The following are selected water quality protection programs which fall under the jurisdiction of ADEQ and have a direct impact on ADWR activities.

7.4.3.2 Aquifer Protection Program

The most comprehensive ADEQ groundwater protection program is the Aquifer Protection Program (APP), established by the EQA in 1986 and implemented by rule in 1989. An individual or general permit is required for any person who discharges or who owns or operates a facility that discharges a pollutant from a facility either directly into an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer. A.R.S. §§ 49-201(11), 49-241. ADWR may coordinate with ADEQ to review APP applications for potential harmful water quality impacts on groundwater conditions. ADEQ advises ADWR of each APP application received for a facility that is an underground storage and recovery project. One of the conditions for the issuance of an underground storage facility permit is that ADEQ must determine that the facility is not in a location which will result in pollutants being leached to the groundwater table so as to cause unreasonable harm. A.R.S. § 45-811.01(C). Facilities exempt from APP provisions may be required by ADWR, in consultation with ADEQ, to meet other requirements to mitigate harmful water quality impacts to the aquifer.

7.4.3.3 Wellhead Protection Program

An important addition to Arizona's groundwater protection program has been the development of the Wellhead Protection Program which fulfills federal requirements of section 1428 of the SDWA by designating Wellhead Protection Areas around public drinking water systems. The Wellhead Protection Program is a voluntary program which encourages the protection of all wells, not just public drinking water system wells. Local entities that have the authority to control land use and exercise other management options can implement wellhead protection, therefore encouraging the creation of local programs.

7.4.3.4 Reuse Permits

Reuse permits are issued by ADEQ to facilities which provide wastewater for reuse. A reuse permit specifies the amount of reclaimed water to be reused and its chemical quality. ADEQ wastewater reuse rules (A.A.C. R18-9-701 *et seq*.) set the criteria for the use of treated reclaimed water, or reclaimed water, for purposes such as agricultural irrigation, turf irrigation, and recharge. The current reuse rules prescribe numeric reclaimed water quality criteria and monitoring requirements for specific reuse applications. In

general, these rules prescribe allowable limits for pH, total fecal coliform, turbidity, enteric viruses, and certain parasites. Reuse may be limited depending on the quality of source water and the intended use.

Wastewater reuse rules undergo periodic updating through ADEQ's rule making process. ADWR reviews any proposed changes to the wastewater reuse rules to ensure the protection of public health and groundwater supplies while maximizing the use of a significant renewable water supply. ADWR evaluates reclaimed water reuse permits issued by ADEQ and encourages the use of treated reclaimed water where appropriate.

7.4.3.5 Underground Storage Tanks

ADEQ's Underground Storage Tank (UST) program was developed to ensure the proper operation of underground storage tanks and to prevent and remediate releases. Under state regulation and RCRA amendments, the UST program consists of notification requirements, technical standards for new and existing USTs, leak detection and closure criteria, corrective actions for remediation, and financial responsibility demonstrations. Leaking USTs in a concentrated area can present detrimental impacts on groundwater quality and supplies.

ADWR has the authority to issue poor quality groundwater withdrawal permits for water contaminated by leaking USTs. ADWR can provide guidance for leaking UST site remediation projects to ensure the beneficial use of remediated water.

7.4.3.6 Water Quality Assurance Revolving Fund

The WQARF Program, sometimes referred to as the state Superfund program, was created as part of the EQA. WQARF monies are used to protect the waters of our state against hazardous substances, and may be used in conjunction with federal funds. Funds can be used for statewide water quality monitoring, health and risk assessment studies, and remediating hazardous substances which threaten the waters of the state. Mitigation of non-hazardous substances is also allowed under specified conditions. A.R.S. § 49-286. ADEQ has developed a list of environmentally threatened sites which qualify for WQARF monies. Funds are used at those sites to mitigate existing contamination or to prevent further spread of pollutants which may threaten Arizona's water supplies. A registry of sites is maintained by ADEQ. Sites are added to the registry based on criteria such as the degree of risk to the environment and other available funding sources.

ADEQ follows a process for management and cleanup of WQARF sites that consists of site identification and characterization, site prioritization, remedy selection, identification of end uses, implementation and monitoring, and closure. ADWR will coordinate with ADEQ in the planning and implementation of any groundwater cleanup actions under WQARF in the PRAMA.

7.4.3.7 Water Infrastructure Finance Authority

In 1989, the Arizona Legislature created the Wastewater Management Authority to administer funds granted to the state pursuant to the federal CWA. These funds, which required a 20 percent state match, are loaned to wastewater treatment systems in the state for assistance in meeting requirements of the CWA. ADEQ made loans for this purpose from monies in the ADEQ wastewater treatment revolving fund. In 1997, this administrative body was amended by the Legislature and renamed the Water Infrastructure Finance Authority (WIFA).

The authority for WIFA was expanded to make loans available to drinking water systems in addition to wastewater treatment systems for assistance in meeting requirements of the SDWA. ADWR participates on the advisory board which oversees the WIFA and has an interest in viability of water systems and SDWA compliance.

7.4.4 ADWR Programs Related to Groundwater Quality

ADWR protects groundwater quality by considering groundwater quality issues in its permitting process and water quantity management programs. As a result of WQARF reform legislation of 1997, ADWR has increased its responsibility in its program to coordinate and provide assistance with WQARF activities. Among other things, the legislation provides for:

- annual funding for ADWR WQARF activities;
- database development and coordination with ADEQ;
- groundwater withdrawn pursuant to certain cleanups to be accounted for in the same manner as surface water for the purpose of determining compliance with conservation requirements;
- amendment of the Assured Water Supply (AWS) Rules;
- advisory participation by ADWR in site assessment, remediation, management, operation, and planning strategies;
- a WQARF Advisory Board on which ADWR has a seat; and
- a well inspection program through which wells that are contributing to vertical cross-contamination may be identified and modified.

ADWR's existing permits and programs which consider groundwater quality protection are discussed in the following section.

7.4.4.1 Poor Quality Groundwater Withdrawal Permits

Appropriate use of poor quality groundwater conserves the existing supply of potable groundwater. ADWR issues poor quality groundwater withdrawal permits to allow the withdrawal of groundwater which, because of its quality, has no other beneficial use at the present time. A.R.S. § 45-516. Withdrawal permits are issued by ADWR, and the withdrawal must be consistent with the AMA management plans. Permits are usually issued in conjunction with CERCLA, WQARF, or leaking UST sites for pump and treat operations. To increase the appropriate uses of poor quality groundwater during the fourth management period, ADWR will continue to encourage matching poor quality groundwater with beneficial uses within the AMA.

As of 2012, no poor quality groundwater withdrawal permits have been issued in the PRAMA.

7.4.4.2 Assured Water Supply

The AWS Program is a consumer protection program that ensures that new subdivisions have a secure supply of water with adequate quality for at least 100 years. Pursuant to A.R.S. § 45-576, before land may be subdivided, the developer of the property must either obtain a Certificate of Assured Water Supply for the subdivision from ADWR, or a written commitment of water service for the subdivision from a city, town, or private water company with a Designation of Assured Water Supply (DAWS).

Pursuant to rules governing the AWS Program set forth at A.A.C. R12-15-701 *et seq.*, in order to establish an AWS, the applicant must prove that a supply of water is physically, legally, and continuously available for the 100-year period to meet the demands of the development that will be the subject of the certificate, or in the case of a designation, to meet current and committed demands of the water provider for the 100-year period. The applicant must also establish that projected water use will be consistent with achievement of the management goal for the active management area and that the applicant has the financial capability to construct the physical facilities necessary to serve the development. In addition, the applicant must establish that the water supply pledged for AWS purposes is of adequate quality.

In assessing the quality of a groundwater supply pledged for AWS purposes, ADWR works closely with ADEQ to determine whether the groundwater supply meets ADEQ standards for the purposes for which the water is pledged. If the groundwater is not of adequate quality, the applicant may need to find

alternative water sources or to expend additional resources treating the groundwater to meet the ADEQ standards.

As of 2012, the City of Prescott is the only entity that has a DAWS in the PRAMA.

7.4.4.3 Underground Water Storage and Recovery

Underground water storage, commonly referred to as artificial recharge, plays an important role in achieving the PRAMA's goal of safe-yield. Recharge projects store surface water that is currently not used directly. Credits for recharged surface water will then be available to water providers and developers to establish an AWS. In addition, recharge of reclaimed water is used as a tool to allow more complete use of that resource.

The underground water storage program is administered by ADWR. Permits must be obtained from ADWR prior to undertaking recharge activities. ADWR coordinates closely with ADEQ to ensure that underground water storage does not adversely impact existing aquifer water quality and does not cause movement of existing groundwater contamination. If reclaimed water is stored underground, the applicant must obtain an APP from ADEQ, in addition to the underground storage permits required from ADWR. APPs specify monitoring requirements to assure that recharge waters are not negatively impacting the native groundwater.

As of 2012, the PRAMA has four permitted underground storage facilities with permitted volumes totaling up to 17,670 acre-feet per year. The facilities are Prescott's Reclaimed Water Recharge Facility at the Prescott Airport, the Town of Prescott Valley's Upper Agua Fria Constructed Facility and Upper Agua Fria Facilities, and Chino Valley's Old Manor Home Facility. Five entities have long-term storage accounts with total recoverable balances totaling more than 30,000 acre-feet as of 2011. The potential volume recoverable per year pursuant to recovery well permits is variable.

7.4.4.4 Well Spacing/Impact Analysis

A.R.S. § 45-598 and ADWR's Well Spacing Rules [R12-15-1301 *et.* seq.] are in place to prevent unreasonable increasing damage to surrounding land or other water users due to the concentration of wells in an AMA. Specifically, these Rules require well impact studies to evaluate the potential for new non-exempt wells and new withdrawals to cause damage to land and other water users due to drawdown, additional regional land subsidence, and migration of poor quality groundwater from a remedial action site. An applicant may submit a hydrologic report to demonstrate the proposed wells impact on surrounding well, but is not automatically required to do so. The director may require the applicant to submit a hydrologic report if it is needed for the director to make a determination under the Rules. The well permit application may be denied if ADWR determines that the proposed well will cause an unreasonable increasing damage on surrounding wells, additional regional land subsidence, or migration of poor quality groundwater.

The Notice of Intention to Drill statute [A.R.S. 45-596] was modified in 2006 to allow the director to deny the drilling of a well if the director determines that withdrawals from the well will cause the migration of contaminated groundwater from a remedial action site to another well, resulting in unreasonably increasing damage to the owner of the well, or persons using water from the well. The statute specifies that the director shall use the same applicable criteria in the Well Spacing Rules used for wells inside of the AMA in making this determination.

7.4.4.5 Well Construction and Abandonment Requirements and Licensing of Well Drillers

If wells are not constructed, sealed, or abandoned properly they may act as conduits for contaminant flow from the surface to groundwater or between aquifers. ADWR's Rules governing well construction, abandonment, and driller licensing, set forth at A.A.C. R12-15-801 *et. seq.*, are summarized below.

- Minimum well construction and abandonment requirements prevent entry of fluids at and near the surface and minimize the possibilities of migration and inadvertent withdrawal of poor quality groundwater. These requirements also prohibit the use of hazardous materials in the construction of wells.

- Installation, modification, abandonment, or repair of all wells in Arizona must be performed by a driller licensed by ADWR. The licensing procedure includes the administration of written examinations to test the applicant's knowledge of state regulations, hydrologic concepts, and well construction principles and practices.

- Disposal site restriction prevents the use of wells as disposal facilities for any material that may pollute groundwater.

- Special standards may be required by ADWR if the minimum well construction requirements do not adequately protect the aquifer or other water users.

- Open wells must be capped with a water-tight steel plate.

- Except for monitor and piezometer wells, no well shall be drilled within 100 feet of any septic tank system, sewage disposal area, landfill, hazardous waste facility or storage area, or petroleum storage areas and tanks, unless authorized by the director.

Wells drilled prior to the enactment of the Well Construction Rules (effective March 5, 1984) were not required to be constructed in accordance with minimum well construction standards. If a pre-rule well is replaced or modified, however, the new or modified well must meet the current well construction standards. *See A.R.S. § 45-594*.

7.4.4.6 ADWR's Role in the WQARF Program

ADWR's involvement in groundwater remediation has been redefined as a result of a stakeholder process conducted during the second management period, designed to promote groundwater cleanup and groundwater quality management activities at remedial action sites.

Department Activities in the WQARF Site Cleanup and Management Process

ADEQ's WQARF site cleanup and management process and ADWR's role in that process are described in the following discussion.

Site Identification, Prioritization, and Characterization

Existing WQARF sites have been identified and are being managed by ADEQ. Additional sites may be identified in the future based on a preliminary investigation by ADEQ to determine the potential risk to public health, welfare, or the environment. The results of the preliminary investigation will be used by ADEQ for site scoring using a method to be established in rules adopted by the director of ADEQ. The completed preliminary investigation will be used by ADEQ to either make a determination of no further action on a site, or to prepare the site for inclusion on the Site Registry. In this latter case, a Site Registry report is prepared containing a description of the site, with its geographical boundaries indicated, and the site score.

After a site is added to the Registry, characterization is important because the nature and extent of contamination must be understood before remedies can be selected and implemented. An important part of site characterization is an evaluation of how contamination impacts current and future groundwater uses.

ADWR will assist ADEQ by providing resource data such as well location and groundwater withdrawal records, water rights information, and any other appropriate data recorded by ADWR. Other ADWR roles may include activities such as site inspections and evaluations, review of investigations, field work such as well inspection, identification of potential water management issues, and any other characterization as appropriate. Department computer models may be useful in characterizing groundwater flow patterns.

Remedy Selection
ADEQ has established a list of response actions to be considered when managing a site. Based on the potential impact on current and future water uses, a potential remedy must be evaluated and designed. Each remedy is site-specific. ADWR may assist in defining potential remedies to ensure that the remedy is consistent with ADWR management plans and sound groundwater management practices that are publicly acceptable. Ultimately, ADWR's level of assistance will vary based on the remedy selected.

ADWR is committed to the beneficial use of groundwater withdrawn and treated at WQARF sites, along with other areas that have degraded groundwater quality, and will assist ADEQ with the identification and facilitation of designated end uses for remedial projects. These end uses should be consistent with those determined for existing sites as well as the development of new end uses to match the intended use.

Implementation and Monitoring
The implementation and monitoring phase of a site activity includes construction, startup, monitoring, operation and maintenance, and any other appropriate activities. ADWR will assist ADEQ in this phase through the following activities where appropriate: field work, review of groundwater analyses, appropriate accounting for AWS determinations and for determining compliance with conservation requirements, and any other appropriate activities.

Site Closure
ADEQ must certify that site goals have been attained in order to discontinue cleanup activities. ADWR staff assists in evaluation of sites and certification of site closure. ADWR assists and may need to identify alternative water sources to replace remediated water when sites are closed.

Department Policies for WQARF Site Cleanup and Management
In general, site plans should be consistent with the management goal of the AMA in which the site is located. A.R.S. §§ 49-282.06(F); 45-105(B)(4)(c). Therefore, ADWR will implement policies during the fourth management period for the management and cleanup of remedial sites in cooperation with the ADEQ. These policies will ensure that AMA goals are addressed when remedial actions are planned. ADWR supports proposed remedial projects when they are appropriate, but believes that remedies must make sense from a groundwater management perspective. The principles which will be used to formulate these policies are described below.

Water should be used consistent with water allocation concepts in Title 45
This policy requires that entities using water withdrawn pursuant to cleanups, whether under CERCLA, WQARF, RCRA, voluntary, or other sites, possess appropriate authorities for the use of groundwater (such as permits or water rights).

ADWR supports source control cleanups to protect water sources
Source control, which controls pollution at its source, can be a cost effective and practicable approach to cleanups. Many wells have been rendered unsuitable for potable use due to migrating contamination. Source control projects to protect wells that are threatened by contaminant migration are generally supported by ADWR.

Any groundwater withdrawn must be put to reasonable and beneficial use
Reasonable and beneficial use of groundwater withdrawn is a policy that applies to all cleanups. Any withdrawals of 100 acre-feet or less annually may qualify for *de minimis* status and be exempted from beneficial use requirements, but ADWR will evaluate *de minimis* exemptions from this policy on a case-by-case basis. In the case of leaking UST sites, ADWR generally exempts sites that annually pump less than 10 or 15 acre-feet.

Contaminated groundwater represents a resource that will be important
Even if groundwater is contaminated, it represents a resource that can be used for both potable and non-potable uses. Potable uses must meet the state AWQS and federal drinking water standards which govern public consumption of potable water. ADEQ and the Arizona Department of Health Services intend to develop end use standards for non-potable uses that, if implemented, will make large volumes of groundwater usable again. ADWR will cooperate in the development of non-potable end use standards and will develop policies for appropriate end uses based on the new standards.

Containment remedies that involve massive groundwater withdrawals to achieve regional groundwater flow control are generally inappropriate and will not be supported by ADWR.

Statutory Mandates for ADWR's Participation in the WQARF Program
The 1997 WQARF reform legislation mandates that ADWR implement certain water quality programs and provides for expanded Department involvement in water quality management. ADWR programs and responsibilities based on the 1997 WQARF reform legislation include the following:

- Coordination with ADEQ in Evaluating Proposed Remedial Actions - Pursuant to A.R.S. § 45-105(B)(4)(c), ADWR is required to coordinate and confer with ADEQ in evaluating proposed remedial actions to provide ADEQ with information regarding water resource considerations. ADWR will coordinate and confer with ADEQ prior to ADEQ's approval or denial of a proposed remedial action plans. Once a remedial action plan is approved by ADEQ or the EPA pursuant to CERCLA or Title 49, Arizona Revised Statutes, ADWR will account for remediated groundwater in accordance with Laws 1997, Ch. 287, §§ 51 and 52. Among other things, ADWR will consider the following factors relating to proposed remedial actions in its recommendations to ADEQ:

- Volume of remediated groundwater to be withdrawn - ADWR will encourage remedial actions that use the least amount of groundwater necessary to facilitate a project's remedial goal and will discourage remedial actions that are not prudent and efficient from a groundwater management perspective.

- End uses to which remediated groundwater will be put - ADWR will encourage end uses that minimize groundwater withdrawals and that are consistent with the safe-yield goal because they will result in no change in groundwater storage. Where remediated groundwater cannot be practicably or cost-effectively re-injected or recharged, ADWR will encourage replacing existing groundwater uses with remediated groundwater and discourage new permanent uses which would not have occurred without the incentive to use remediated groundwater and which would continue to rely on groundwater after the remediated groundwater is no longer available.

While circumstances will be evaluated on a case-by-case basis, generally, ADWR's beneficial end use preferences are the following, listed in order from most to least preferred based on the impact on the active management area's management goal and the amount of groundwater in storage:

<u>Neutral to local aquifer</u>
a. Re-inject or recharge in the same local area.

b. Replace existing groundwater uses in the same local area.

Neutral to groundwater basin

c. Re-inject or recharge in the same active management area.
d. Replace existing groundwater uses in the same active management area.

Reduce groundwater in storage

e. Replace existing non-groundwater use in the same active management area.
f. Beneficial uses of water for new purposes.
g. Artificial wetlands or artificial lakes.
h. Dispose to the sewer (unless the resulting reclaimed water is re-injected, recharged or replaces an existing groundwater use).

- Achievement of maximum beneficial use of waters and viability of proposed remedial action

- Remedial actions must assure the protection of public health and welfare and the environment; to the extent practicable, provide for the control, management or cleanup of hazardous substances so as to allow the maximum beneficial use of the waters of the state; and be reasonable, necessary, cost-effective, and technically feasible. A.R.S. § 49-282.06(A).

- Consistency with Title 45 - Groundwater withdrawn pursuant to an approved remedial action must be withdrawn and used consistent with Title 45, Arizona Revised Statutes.

Construction of New Wells in and Near Remedial Action Sites
ADWR will ensure that new or replacement wells in areas of known groundwater contamination are constructed in such a manner that cross-contamination does not occur. ADWR staff will screen Notices of Intent to Drill that are submitted to ensure that wells are properly constructed. ADWR will establish policies and procedures to implement this directive, including procedures to effectively communicate with well owners and drillers. ADWR will coordinate review of these notices of intent with ADEQ.

Abandonment of Wells In and Near WQARF Sites
ADWR staff will review and evaluate Notices of Intent to Abandon to ensure that abandonment of wells is done in accordance with Department rules and that potential for cross-contamination is minimized. ADWR will coordinate review of these notices of intent with ADEQ.

7.5 WATER QUALITY ASSESSMENT

A comprehensive water quality assessment was included in the third management plans. The assessment provided detailed characterization of water quality and an overview of water quality concerns in the PRAMA. A water quality assessment for the 4MP will be qualitative. The following sections discuss goals and objectives of the assessment for the fourth management period and water quality of renewable and groundwater supplies in the PRAMA.

7.5.1 Assessment Goals and Objectives

The primary goal of this Water Quality Assessment is to provide a qualitative evaluation of groundwater and surface water quality conditions in the PRAMA based on the comprehensive assessment performed during the third management period and to identify potential threats to groundwater quality and its link with the regional water supply. The impact of water quality on water resource management has become more important in recent years as water quality standards become more stringent and due to such factors as conjunctive use of water supplies, groundwater management at remediation sites, and increasing levels of public concern.

The municipal, agricultural, and industrial sectors have distinctive demand patterns and water quality requirements. For example, state law prohibits direct use of treated reclaimed water for potable use, but treated reclaimed water is used for turf irrigation, agricultural irrigation, cooling towers, and groundwater recharge. Water high in total dissolved solids (TDS) may be inappropriate for agricultural irrigation but may be usable for some industrial applications. Conversely, water that is high in nitrate could provide a good end use for agriculture, but does not meet potable standards. During the fourth management period, ADWR will continue to encourage matching of water quality characteristics with appropriate end uses while ensuring compliance with applicable laws and rules for each end use.

7.5.2 Renewable Water Supplies

Renewable water supplies include surface water and reclaimed water. All CAP water allocations within the PRAMA have been sold to the City of Scottsdale and are no longer available to the AMA. The quality of renewable water supplies in the PRAMA is discussed in this section.

7.5.2.1 Surface Water

Surface water quality in the PRAMA is generally good. Most surface water is stored at Watson and Willow Lakes, where it has been historically diverted downstream from Granite Creek to the Chino Valley Irrigation District for agricultural irrigation. Surface water throughout the PRAMA contains total dissolved solids (TDS) levels below 500 mg/l (milligrams per liter). TDS concentrations are generally a good indicator of overall water quality. Other constituent parameters of surface water generally meet applicable water quality standards with appropriate treatment.

7.5.2.2 Reclaimed water

A.R.S. § 45-101(4) provides the following definition for ‘reclaimed water’ (effluent):

> water that has been collected in a sanitary sewer for subsequent treatment in a facility that is regulated pursuant to title 49, chapter 2. Such water remains reclaimed water until it acquires the characteristics of groundwater or surface water.

Sanitary sewers are comprised of any pipe or other enclosed conduit that carries any waterborne human wastes from residential, commercial, and industrial facilities. A.R.S. § 45-101(8).

Reclaimed water treated at municipal wastewater treatment plants is a significant source of renewable water supply in the PRAMA. Although not suitable for human consumption without advanced treatment, reclaimed water is suitable for turf irrigation, some agricultural irrigation, sand and gravel washing, and several other industrial applications. Wastewater reuse rules are developed by ADEQ and establish parameters for wastewater reuse options. Wastewater discharges require a NPDES permit to ensure that water quality parameters are being met.

The City of Prescott operates two treatment facilities in the Little Chino Subbasin, the Sundog and Prescott Airport wastewater treatment plants. Treated reclaimed water from the Sundog facility was originally discharged into Watson Lake. This practice was discontinued in 1985, because at that time, NPDES standards would have required further treatment of the reclaimed water prior to discharge that was considered cost-prohibitive. Subsequently, reclaimed water from both facilities is either delivered for irrigation purposes to Antelope Hills Golf Course, or is recharged on-site at the Prescott Airport facility through infiltration basins. Another wastewater treatment plant is operated by the Town of Prescott Valley in the Agua Fria Subbasin, where treated reclaimed water is discharged into the Agua Fria River pursuant to a NPDES permit issued by the Corps of Engineers, and a constructed underground storage facility permit issued by ADWR.

7.5.3 Groundwater Supplies

Groundwater is one of the most important sources of water in Arizona and in the PRAMA. Groundwater in the PRAMA is generally of acceptable quality for most uses; however, in some areas, it has been degraded due to contamination, and potentially threatening public health and the environment. Contaminants can migrate into areas of potable groundwater due to natural regional groundwater flow patterns, and may be facilitated by groundwater pumping. Many areas of the PRAMA are projected to remain dependent on groundwater pumping, thereby potentially causing migration of contaminants. ADWR's role in managing potential contaminant migration is through involvement in site-specific and non-site-specific water quality management.

Naturally occurring radon has caused the closure of some domestic wells which produce groundwater from granitic aquifers. These instances are primarily confined to individual dry lots located along the mountain front regions of the PRAMA. The EPA is currently in the process of developing a Maximum Contaminant Level (MCL) standard for radon, which could require more domestic well closures. Since radon is a naturally occurring substance within the granitic formations, a remedial response is not possible. Although no major groundwater well fields are threatened by radon exposure, the proliferation of dry lot developments in threatened areas may be impacted to some extent by the adoption of a radon MCL.

Another potential limitation stems from the presence of a large number of septic systems within the PRAMA. In some areas, municipal actions have been taken to help address potential water quality concerns from septic systems. For example, during the last decade the Town of Chino Valley developed new regulations on the installation of septic systems within the Town's municipal service area and also extended septic leachate collection lines and built a new waste water treatment plant. However, there are many areas within the AMA where no municipal water system or waste water treatment facilities exist, and the concentration of individual septic systems which overlap areas of where shallow groundwater pumping from domestic wells also occurs, can pose a health hazard.

The most significant threats to groundwater quality in the PRAMA come from leaking underground storage tanks (USTs) at gas stations and other industrial facilities and from other remedial action sites such as the Iron King Mine-Humboldt smelter CERCLA site near Humboldt-Dewey.

USTs leak volatile organic compounds (VOCs) which could cause a water quality problem if they were to contaminate local aquifers. Prescott's current source of municipal water supply is situated near Chino Valley, which is located a considerable distance away from any leaking UST sources.

According to the ADEQ, ninety-eight UST facilities are in the PRAMA. Of those, 21 facilities had experienced leaks that have impacted groundwater. Twelve cases have been closed, but 9 facilities are still active leaking UST sites. Most of the sites are within the boundaries of the city of Prescott.

The Iron King Mine and Humboldt Smelter Superfund Sites is a 335-acre site near Dewey-Humboldt. The site was placed on the National Priority List in 2008. At that time, EPA initiated a Remedial Investigation (RI) to determine the nature and extent of contamination and to gather sufficient information to select a remedy. Areas of concern at the Site include tailings, rock piles, retention ponds, mine shafts, smelter ash, and slag. The contaminants of concern are arsenic, lead, and sulfate in site waste piles and soils.

EPA conducted extensive air, soil, and groundwater sampling as part of the RI. Groundwater sampling results indicated that levels of contaminants of concern in public water supplies are below federal drinking water standards of 10 parts per billion (10 ppb), although some private wells have arsenic levels above the federal drinking water standard. The levels of arsenic found in the private wells were similar to those found in groundwater across Arizona and were not indicative of contamination from the site. Nevertheless, a human health and ecological risk assessment indicated that the site could pose health risks to the nearby community and many plant and groups.

The results of the RI indicate that a cleanup action is necessary to protect human health and the environment. As an interim measure, EPA has engaged in a residential yard cleanup at a number of parcels near the site, as well as other cleanup activities on the site. The site cleanup is ongoing and additional investigation work is planned, including groundwater sampling (EPA website, Pacific Southwest, Region 9, Superfund Sites, http://www.epa.gov/region09/superfund/superfundsites.html, April 11, 2012).

7.6 FUTURE DIRECTIONS

ADWR's long range plans for groundwater quality management will focus on two areas: (1) evaluation of groundwater quality issues on a non-site-specific level in order to understand the impact of groundwater quality issues on water resource management on a broader level and (2) preservation of AMA management goals with emphasis on implementing incentives to use remediated groundwater.

7.6.1 Non-Site-Specific Water Quality Management

Non-site-specific groundwater quality management refers to groundwater quality management activities which may occur in general areas located outside of an identified WQARF or CERCLA boundary.

Significant volumes of groundwater in Arizona have been contaminated or degraded to varying degrees due to human activities. Groundwater with high TDS or contaminated with substances such as nitrate and sulfate, generally result from non-point source pollution and can cause significant service problems for water providers and other water users. For example, groundwater containing high TDS can cause scaling problems in cooling towers, is unsuitable for use on some crops, and can cause aesthetic problems in drinking water.

The cessation or decrease of groundwater withdrawals in some areas due to groundwater quality concerns can cause water tables to rise, exposing groundwater to contaminated soils or plume migration to other wells. For example, this condition can exist when soil contaminated by a leaking underground storage tank comes in contact with rising groundwater levels. Contaminated soils associated with landfills may also be inundated by rising water tables. These conditions need to be monitored for impacts on groundwater quality. Ultimately, proper planning will ensure that the impacts of groundwater recharge projects do not contribute to the degradation of aquifer conditions.

To address and mitigate dispersed contamination over large areas, a broader management strategy is needed. Areas which may need more intensive management can include those where public supply wells have been or may be affected by contamination. For instance, areas that are in the vicinity of major population centers or agricultural areas can be affected by contamination, especially if large volumes of groundwater are pumped, creating cones of depression.

The concept of groundwater quality management on a non-site-specific scale (general areas outside of identified site boundaries) will be developed to enhance water management activities in critical areas. The identification of source groundwater quality and the development of area-specific plans to match groundwater quality with the intended use will become an important aspect in the fourth management period. ADWR intends to study the development of area-specific plans that could employ a combination of strategies to evaluate and mitigate the effects of contamination in critical areas. These plans should be developed in coordination with ADEQ and with affected stakeholders. Any contaminant management on a non-site-specific scale will be voluntary and will not affect rights to groundwater, well ownership, delivery responsibilities, or existing permits.

7.6.2 Preservation of AMA Management Goals

In the fourth management period, ADWR will monitor water levels, subsidence, and effects on local water providers at remedial project sites in areas of intensive pumping, which generally are concentrated within

the major urban centers of Arizona. While ADWR supports the remediation of contaminated groundwater, it also seeks to preserve the management goals of each AMA. Water quality management is a lengthy process which will likely continue far beyond the scope of the fourth management period. Long-term continued remedial activities are likely to result in considerable volumes of groundwater being pumped, treated, and subsequently used.

The net effect of continued remediated groundwater withdrawals could result in a substantial increase in the overall volume of groundwater put to use within an Active Management Area (AMA). Without proper coordination in both water resource and groundwater quality management, these actions could seriously jeopardize the goal of safe-yield by creating new groundwater uses. Consequently, ADWR will seek to preserve the intent of the Code and the PRAMA management goals to protect water resources while collaborating with ADEQ to promote groundwater quality management.

7.7 SUMMARY

Groundwater quality has not historically been a significant problem within the PRAMA. Increasing demands on water resources and expanding development, however, could raise the risk of possible future groundwater contamination.

During the fourth management period, ADWR will enact and implement the following provisions as outlined in this chapter, specifically:

- Integration of groundwater quality management into recharge planning and permitting, and the development of incentives to use remediated groundwater where appropriate.

- Evaluation of the need for additional incentives to withdraw and use remediated groundwater within the AMAs throughout the fourth management period in an effort to match quality with beneficial use. This evaluation will include treated groundwater that was contaminated with hazardous, non-hazardous, and naturally occurring substances. Incentives may involve amendments to Arizona Revised Statutes, Title 45, Department rules and policies, or a modification of the management plans.

- ADWR and ADEQ will continue to enter into an Interagency Service Agreement as necessary to establish the responsibilities of ADWR for implementation of the WQARF program, as well as database development and exchange.

ADWR, through its Groundwater Permitting and Wells Section, will work closely with ADEQ to resolve groundwater quantity and quality issues.

ADWR will continue to be involved in other remedial activities such as those associated with Superfund sites. This will ensure that remedial activities meet ADWR's water management objectives and are consistent with the AMA's safe-yield goal.