

Industrial Conservation Program



6.1 INTRODUCTION

This chapter contains the Arizona Department of Water Resources' (Department) conservation program for industrial users within the Santa Cruz Active Management Area (AMA). The purpose of the Industrial Conservation Program is to move industrial water users within the AMA to the greatest level of efficiency economically attainable given use of the latest available water conservation technology. In addition to conservation, the degree to which any new industrial users can directly reuse wastewater generated from new subdivisions will assist in maintaining safe-yield conditions and preventing long-term declines in local water table levels in the AMA.

The Groundwater Code (Code) defines industrial use of water as “a non-irrigation use of water not supplied by a city, town, or private water company, including animal industry use and expanded animal industry use.” A.R.S. § 45-561(5). An industrial user is a person who uses water withdrawn from a well for an industrial use. In many cases industrial users withdraw water from their own wells pursuant to Type 1 or Type 2 non-irrigation grandfathered rights or a groundwater withdrawal permit. These rights and permits (collectively referred to in this chapter as “industrial rights”) have annual volumetric water allotments. The total volume of Type 2 rights in the AMA was set at the time the Code was enacted. The total volume of water associated with Type 1 rights can increase over time as agricultural land with irrigation grandfathered rights is retired from production and the rights are converted to Type 1 non-irrigation grandfathered rights. General Industrial Use (GIU) permits are issued by the Department if water service cannot be secured from a municipal provider and if the use of surface water or effluent, or the purchase or lease of a grandfathered right, is not economically feasible. Permits expire after a specified period of years.

There are also types of water users that, although served by a municipal water provider, are subject to industrial program conservation requirements through the Municipal Conservation Program. These users include turf-related facilities and are referred to in the Municipal Conservation Program as “individual users.”

Conservation is an important tool for maintaining safe-yield conditions and preventing long-term declines in local water table levels. Industrial facilities generally use water efficiently due to pumping costs and industrial discharge limitations that require them to recycle water and contain water on-site. The allotment-based conservation requirements for the turf industry have required turf-related facilities to comply with declining application rates per acre since the First Management Plan became effective. This program has resulted in significant conservation savings through efficient use of water.

Industrial users have the legal authority to withdraw water from wells up to the annual allotment of their rights or permits subject to management plan conservation requirements. In the Santa Cruz AMA, adding new demands within the Younger Alluvium of the Santa Cruz River could result in a long-term decline in local water table levels unless the withdrawals are offset by recharge or the water to meet the new demands is brought in from another location, such as direct use of effluent from a wastewater treatment pond or small local wastewater treatment plant. The logistics, cost, and Arizona Department of Environmental Quality (ADEQ) reuse standards that apply in using this source of water make it unattractive and in some cases infeasible as an alternative source of supply. Therefore, nearly all water users in the Santa Cruz AMA, including industrial users, rely on water withdrawn from the Younger Alluvium of the Santa Cruz River. There are no industrial users within the AMA who are currently using effluent to meet their water demands.

In all the AMAs, significant amounts of industrial right allocations are unused. These unused allocations represent a potential increase in water withdrawals allowable under statute. Depending on the location of water withdrawals associated with these rights, an increase in withdrawals up to the total allocation could affect local water table levels in the long term. Because of the volume of industrial right allocations that

are not currently being used, there is significant potential for the industrial sector in the Santa Cruz AMA to expand.

For the third management period, there are general conservation requirements that apply to all industrial users. In addition to these requirements, there are specific conservation requirements that apply to the following industrial users in the Santa Cruz AMA:

- Turf-Related Facilities (≥ 10 acres)
- Sand and Gravel Facilities (> 100 acre-feet/year)
- New Large Landscape Users ($> 10,000$ square feet of water intensive landscape)
- New Large Industrial Users (> 100 acre-feet/year)

Industrial water uses in the Santa Cruz AMA consist primarily of landscape watering and sand and gravel operations. Industrial demand as a percentage of overall water use in the Santa Cruz AMA has remained fairly stable over the last 15 years. Industrial users with water rights or permits accounted for about 7 percent of the AMA water use in 1995 or about 1,400 acre-feet. It is difficult to project industrial water use in the Santa Cruz AMA since less than 15 percent of the industrial water allocations are being used, and future developments that may include golf courses are not known. If the current ratio of industrial demand to AMA population is used to project use, industrial water demand could be close to 3,000 acre-feet by the year 2025. If this increase in demand occurs within the Younger Alluvium of the Santa Cruz River, alternatives to withdrawing water from wells will need to be developed in order to protect water table levels from long-term declines.

This chapter is organized as shown below. Following the Introduction, each Industrial Conservation Program is discussed under a separate subsection. In general, each of the subsections contain all or some of the following: (1) an introduction, (2) water use by the subsector, (3) First and Second Management Plan program development, (4) issues and Third Management Plan development, (5) program description, (6) non-regulatory efforts, (7) future directions, and (8) subsector conservation requirements.

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- All Industrial Users
- Turf-Related Facilities
- Sand and Gravel Facilities
- New Large Landscape Users
- New Large Industrial Users

6.1.1 Statutory Provisions

6.1.1.1 Conservation Requirements

The Code requires that the management plan contain a conservation program for industrial users. For the third management period the director is required to establish for the Santa Cruz AMA:

additional conservation requirements for all non-irrigation uses of water, other than stored water, withdrawn from a well to be achieved by the end of the third management period and may establish intermediate conservation requirements to be achieved at specified intervals during the third management period. . . . For industrial uses including industrial uses within the exterior

boundaries of the service area of a city, town, private water company or irrigation district, the program in each plan shall require the use of or establish conservation requirements based on the use of the latest commercially available conservation technology consistent with reasonable economic return. A.R.S. § 45-566(A)(2).

6.1.1.2 Individual User Requirements

The Code also requires the establishment of additional conservation requirements for municipal uses in the Third Management Plan including “use of such other conservation measures as may be appropriate for individual users.” A.R.S. § 45-566(A)(2). (See Chapter 5.) In the First Management Plan, only turf-related facilities receiving water from municipal providers were regulated as individual users. These facilities were subject to the requirements of the Industrial Program as if they were industrial users. Thus, regardless of the source of water, whether from a municipal provider or from the facility’s own wells, all turf-related facilities were subject to the turf-related facility conservation requirements in the Industrial Program chapter of the First Management Plan.

Similarly, in the Second Management Plan, turf-related facilities receiving water from a municipal provider were regulated as individual users and were subject to the Second Management Plan’s industrial program conservation requirements for turf-related facilities. In addition, new large cooling tower users, which are typically served by water providers, were also regulated as individual users in the Second Management Plan. These facilities were required to comply with the conservation requirements established for new large cooling tower users in the Industrial Program chapter.

6.1.2 Industrial Program Development

The Industrial Conservation Program has evolved into a more technically sophisticated program since the First Management Plan. This has been the result of considerable input and cooperation by the regulated community, as well as investigative efforts by the Department.

The First Management Plan requirements stressed water use efficiency and contained other general requirements. There were specific conservation programs only for metal mines, turf-related facilities, electric power plants, sand and gravel facilities, and other industrial users. As a result of consultant studies done for the Second Management Plan, additional conservation requirements were added for new large-scale cooling users, dairies, cattle feedlots, new large industrial users, and new large landscape users. In addition, there was a more specific effluent incentive provision for turf-related facilities.

Development of the Third Management Plan conservation requirements included extensive participation by a wide cross-section of industry representatives, including facility managers, consultants, municipal representatives, vendors, land developers, and academic research specialists. Technical Advisory Committees (TACs) were formed for the development of specific conservation requirements for turf-related and sand and gravel facilities found in the Industrial Conservation Program in this plan. Although there was no industry representation from the Santa Cruz AMA included in the TACs, representatives from the turf and sand and gravel sectors held a wide range of opinions and brought significant technical knowledge to the Department allowing for the development of a program that considers industry needs and addresses water conservation objectives.

Collectively, over 30 meetings were held with the committees over a one and one-half year period. Committee members had an opportunity to help formulate and suggest conservation requirement alternatives, provide industry expertise, and review final programs. In the Santa Cruz AMA, the developing conservation program components were presented and discussed at Groundwater Users Advisory Council (GUAC) meetings and comments were requested and received during this process.

In the Third Management Plan, separate industrial program categories have been created for new large landscape users and new large industrial user subsectors. These two industrial water use groups were included in the “all industrial users” category in the Second Management Plan but have been separated out to more clearly present the water use characteristics and specific conservation requirements for the third management period. This results in a total of four industrial program subsectors in the Third Management Plan for the Santa Cruz AMA: (1) turf-related facilities, (2) sand and gravel facilities, (3) new large landscape users, and (4) new large industrial users. There are industrial users in all of these categories in the Santa Cruz AMA except for new large landscape users and new large industrial users. Some AMA management plans have a conservation program for metal mining facilities, large-scale power plants, large-scale cooling facilities, dairy operations, and cattle feedlot operations. If any of these facilities should come into existence in the Santa Cruz AMA during the third management period, the management plan may be modified to include the conservation program for that subsector.

Industrial subsector requirements vary from allotment-based requirements to the implementation of specific conservation measures. In all cases, the requirements have been developed consistent with the statutory requirement to establish conservation requirements that require the use of, or are based on the use of, “the latest commercially available conservation technology consistent with reasonable economic return.” A.R.S. § 45-566(A)(2).

For the Third Management Plan, the Department reviewed the existing subsector programs and tried to address any existing problems or deficiencies. In most instances, specific conservation requirements for the third management period are not significantly different from those in the Second Management Plan. Conservation requirements in the First and Second Management Plans have been effective in improving water use efficiency for certain industrial subsectors. In the Third Management Plan, a number of technical corrections have been made, requirements have been added, additional program alternatives have been included, and renewable supply use incentives have been added or adjusted to be more effective. The specific changes, issues, and renewable supply incentives that were considered in subsector program development are discussed in the subsector sections of this chapter.

6.1.3 Industrial Program Issues

The Department considered a number of issues associated with the Industrial Program as it developed the Third Management Plan. Several issues emerged that have long-term implications for industrial water use. Some issues can be addressed using existing statutory and regulatory mechanisms while others may require a statutory amendment. The Department will continue to pursue opportunities to address these issues. The sections below provide additional detail on industrial program issues.

6.1.3.1 Use of Renewable Supplies by Industrial Users

Effluent is currently a consistently available renewable supply to water users in the Santa Cruz AMA. Physical access to this supply is limited for most industrial users. Potential users are often far removed from the effluent source and the cost of constructing delivery systems constrains utilization. Since industrial users have legal authority to withdraw water from their own wells at a cost composed primarily of relatively low energy costs, there is no economic incentive to incur the additional expense associated with the purchase, delivery, and possible treatment of effluent.

Incentives for effluent use were considered in the development of specific programs for the industrial categories and are discussed under the following sections. Additional opportunities need to be identified during the third management period with consideration given to the impact of the sector on attainment of safe-yield and maintenance of water table levels that support current and future water users.

6.1.3.2 Matching Water Quality and Uses

Each industrial user category has its own water quality requirements related to the particular product or process involved. Although some users may require high quality water, others do not. For example, turf facilities are able to use effluent without any significant adverse impact and sand and gravel facilities can use effluent for aggregate washing. Poor quality groundwater may be acceptable for certain industrial uses. The Palo Duro golf course may use water from the United Musical Instruments Resource Conservation Recovery Act (RCRA) cleanup project that has been treated to almost drinking water quality. Obvious constraints on use include location of the supply in relation to the facility, cost and pre-treatment needs.

In 1997, the Legislature enacted legislation significantly revising the Water Quality Assurance Revolving Fund (WQARF) Program to provide incentives for the use of remediated groundwater to facilitate the treatment of contaminated groundwater. Among other things, the WQARF legislation provides that when determining compliance with management plan conservation requirements, the Department shall account for groundwater withdrawn pursuant to approved remedial action projects under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Title 49, Arizona Revised Statutes, consistent with the accounting for surface water. Laws 1997, Ch. 287, § 51(B). See Chapter 7, section 7.4.4.6.3. Groundwater withdrawn pursuant to an approved remedial action project retains its legal character as groundwater for all other purposes under Title 45, Arizona Revised Statutes, including all other laws regulating groundwater withdrawal and use such as the assessment of withdrawal fees pursuant to A.R.S. § 45-611, *et seq.*, as well as laws regulating water exchanges as set forth in A.R.S. § 45-1001, *et seq.*; the transportation of groundwater as set forth in A.R.S. § 45-541, *et seq.*; withdrawals of groundwater for transportation to active management areas as set forth in A.R.S. § 45-551, *et seq.*; and underground water storage, savings, and replenishment as set forth in Title 45, Chapter 3.1, Arizona Revised Statutes.

For each approved remedial action project, the annual amount of groundwater that is eligible for the remediated groundwater accounting incentive is the maximum annual volume of groundwater that may be withdrawn pursuant to the project, as specified in the consent decree or other document approved by the Environmental Protection Agency (EPA) or ADEQ. However, if the project was approved prior to June 15, 1999 and the maximum annual volume of groundwater that may be withdrawn pursuant to the project is not specified in a consent decree or other document approved by the EPA or ADEQ, the annual amount of groundwater that is eligible for the remediated groundwater accounting incentive is the highest annual use of groundwater withdrawn pursuant to the project prior to January 1, 1999. The director may modify the annual amount of groundwater that is eligible for the accounting incentive if an increase in withdrawals is necessary to further the purpose of the project or if a change is made to the consent decree or other document approved by the EPA or ADEQ. For the Santa Cruz AMA, contaminated water that is treated that qualifies under this provision will be considered surface water not withdrawn from a well, as opposed to water withdrawn from a well, for the purposes of determining compliance. This means that in determining compliance, remediated water will be included in the total water use of a facility, but it will be counted first so that any water used by the facility above the allotment will only be comprised of water withdrawn from a well. Also, if a facility uses 100 percent remediated water, the conservation requirement will not apply. See Chapter 10 for more details regarding the determination of compliance with conservation requirements.

In order to qualify for the remediated groundwater accounting incentive, a person must notify the director in writing of the anticipated withdrawal of the remediated water prior to its withdrawal. The notification must include a copy of a document approved by ADEQ or the EPA such as the Remedial Action Plan (RAP), a Record of Decision (ROD), or consent decree. Unless specified in the document, the notification must include the volume of groundwater that will be pumped annually pursuant to the project, the time period to which the document applies, and the annual authorized volume of groundwater that may be withdrawn pursuant to the project. The notification must also include the purpose for which the

remediated groundwater will be used and the name and telephone number of a contact person. Additionally, at the time the notice is given, the person must be using remediated groundwater pursuant to the approved remedial action or must have agreed to do so through a consent decree or other document approved by ADEQ or EPA. Remediated groundwater which qualifies for the accounting must be metered and reported separately from water withdrawn from wells that does not qualify for the accounting. (See section 6-204 of the Conservation Requirements for All Industrial Users).

6.1.3.3 Unused Allotment

There is a large volume of unused water right and permit allocations associated with the industrial sector. Rights and permits held by industrial users total nearly 9,000 acre-feet. In 1995, the unused portion was more than 7,500 acre-feet. If the entire unused allotment volume were pumped, it would be a serious hindrance to maintaining safe-yield conditions and preventing long-term declines in local water table levels. Similarly, if this unused allotment were allowed to be extinguished for credits in proving an assured water supply, the net result would be an increase in withdrawals over current demand levels and the AMA goals might still be jeopardized unless the demand were offset through replenishment. Extinguishment of the rights that are currently in use would maintain the balance of demands and supplies within the AMA, but this would require the industrial use to be permanently eliminated and replaced with an equal volume of municipal demand. This is extremely unlikely to occur.

6.1.3.4 General Industrial Use and Mineral Extraction Permits

GIU permits are issued under A.R.S. § 45-515 for industrial uses located outside of water provider service area boundaries pursuant to certain conditions and are valid for a specified period of time. Permits may also be issued for mineral extraction and metallurgical processing under A.R.S. § 45-514. These permits allow groundwater pumping in addition to withdrawals pursuant to existing industrial rights. The total volume of water permitted in the Santa Cruz AMA in 1995 was 853 acre-feet, including GIU permits, mineral extraction permits and poor quality water withdrawal permits. The amount of water withdrawn pursuant to these permits in 1995 was only 156 acre-feet.

6.1.4 Non-Regulatory Efforts

During the second management period, it became apparent that water use by small schools in the AMA was increasing and, due to steady population growth in the area, could continue to increase as more schools were opened to accommodate new students. Therefore, it would benefit all water users in the AMA if small schools were able to incorporate conservation measures into their daily interior and exterior water use. Voluntary participation in a conservation program could include staff education and student projects pertaining to audits of turf and landscape plant water needs, irrigation system design and efficiency, the potential for removal of high water use landscaping in entry and non-sporting areas and even audit of interior water use, and retrofit of fixtures and changes in use habits. Education could be provided covering the installation and efficient use of automatic irrigation systems where only manual systems are presently used. Information on the proper timing, length of watering, and frequency of watering of turf and landscaped areas could be included in the education program. The detection and repair of broken and leaking sprinkler heads, pipes, and valves should be of primary concern in a program dedicated to water conservation. Similar attention could be placed on interior uses of water; however, the majority of water use at schools is for landscape watering. The AMA could set aside water management assistance funds to implement conservation measures. These activities could be included as part of a water conservation program curriculum. The AMA could potentially sponsor a water conservation competition among schools that would honor the school with the greatest water savings obtained through conservation efforts.

The Department is committed to continuing its efforts to assist regulated industrial users in meeting their conservation requirements through direct staff assistance and through its water management assistance program during the third management period. This effort could be in the form of technical assistance or the funding of research on new water conservation technologies.

6.1.5 Future Directions

The Santa Cruz AMA has the potential for future growth in the industrial sector. Maintaining water use efficiency, providing conservation and technical assistance, and developing opportunities for the direct use of effluent generated by new subdivisions and treated at small, local treatment plants or ponds could be the likely future directions for the industrial sector. The future of industrial users in relation to the management goals is largely shaped by the potential for growth in the water use and existing constraints on replacing water use with the direct use of effluent.

There are a number of Type 1 non-irrigation grandfathered rights presently unused in the AMA. If these rights are put to use by future industrial water users, the goals of achieving safe-yield and maintaining local water table levels will become more and more difficult to meet. Apart from the water right retirement provision in the Code, and the water right extinguishment provisions in the current Assured Water Supply Rules (AWS Rules), there is no regulatory authority in place to reduce water right withdrawals. The Department has decided not to include a grandfathered right purchase and retirement program in the Third Management Plan. The extent to which the extinguishment provisions in the AWS Rules will limit industrial use is not possible to predict. It might be necessary to examine replenishment approaches to offset a portion of industrial withdrawals to meet the AMA goals.

Two mechanisms for water management in the AMA are increased use of effluent for industrial purposes and implementation of maximum water conservation measures. Conservation technologies and practices could be further evaluated, while an increase in funding for conservation and education could assist industrial water users with water management practices, evaluation of effective water conservation technology, and construction of conveyance infrastructure for the use of effluent. Additional incentive programs designed to promote increased use of effluent could be developed by the Department during the third management period.

Industrial water uses may change as new technologies are developed. Research may need to be conducted during the third management period to investigate water conserving opportunities associated with use of these technologies by certain industrial users. This research could be used to develop conservation requirements for the Fourth Management Plan, possibly for different sub-sectors of industrial users than those included in the Third Management Plan.

6.2 ALL INDUSTRIAL USERS

6.2.1 Introduction

The conservation requirements in this section apply to all industrial water users. In addition to these requirements, certain industrial users are also required to comply with conservation requirements specific to their type of water use under other sections of this chapter. For example, a sand and gravel facility must comply with the requirement in this section to use low-flow plumbing devices at the facility to the maximum extent possible and, in addition, must comply with the conservation requirements in section 6.4.6 of this chapter.

The following industrial users are required to comply with the conservation requirements for all industrial users in this section, as well as conservation requirements for their specific type of water use in other sections of this chapter: turf-related facilities, sand and gravel facilities, new large landscape users, and

new large industrial users. All remaining industrial users are referred to in this section as “other industrial users” and are required to comply only with the conservation requirements for all industrial users in this section.

6.2.2 Water Use by “Other Industrial Users”

“Other industrial users” in the Santa Cruz AMA used approximately 160 acre-feet of water in 1995, which accounted for about 12 percent of the total industrial water withdrawals in the AMA in that year. None of this amount was used by “large” users (more than 100 acre-feet per year). Many different types of commercial and manufacturing uses may be included in this category.

There are about 45 water rights and permits associated with the “other industrial user” category in the Santa Cruz AMA. The total annual water right allotment associated with these rights is more than 7,000 acre-feet. Of that amount, over 5,500 acre-feet consists of Type 1 rights that have used less than 15 acre-feet in sum during the period from 1984 through 1997. Type 2 rights make up an additional 514 acre-feet of allotment of “other industrial use.” In 1995, about 110 acre-feet of water was withdrawn for other industrial uses pursuant to Type 2 rights.

6.2.3 Program Development and Issues

In the First Management Plan, “other industrial users” were required to avoid waste and make efforts to recycle water. In addition, they were prohibited from using single-pass cooling or heating. These requirements and others were also included in the Second Management Plan for all industrial users.

Consultant studies done in preparation of the Second Management Plan investigated water use associated with landscaping, heating and cooling, and sanitary and kitchen water use practices. These studies identified areas of water conservation potential and appropriate water conservation techniques. The Department has determined that the findings from these studies still apply to current industrial use and practices.

The following techniques are recommended for achieving water conservation in the industrial sector:

- reusing or recycling water
- avoiding single-pass cooling unless the water is reused
- use of low flow plumbing fixtures
- use of low water use landscaping with efficient irrigation systems
- developing site-specific water conservation plans for large facilities

Most of these techniques are included in the conservation requirements for all industrial users detailed in section 6.2.5 and apply to “other industrial users” as well as industrial users subject to conservation requirements for their specific type of water use. The Third Management Plan requirements are intended to send a strong conservation message to all industrial users to use water efficiently.

The Department also inventoried the “other industrial user” category during the planning process for the Third Management Plan to determine if there were any user groups with sufficient usage and conservation potential to warrant specific conservation requirements. The diverse nature of water uses within this category make it difficult to formulate volumetric conservation requirements which address the various types of industries. There are, however, some opportunities for water conservation.

The greatest conservation potential within the “other industrial users” category is in cooling and landscape watering which are uses common to most facilities. Commercial landscapes may not be well maintained and automatic irrigation controller clocks may not be adjusted to match weather conditions.

6.2.4 All Industrial Users Conservation Program

The Third Management Plan conservation program for all industrial users is similar to the Second Management Plan program. All industrial users are required to avoid waste and make diligent efforts to recycle water. Single-pass cooling or heating is not allowed unless the water is reused, and low-flow plumbing fixtures must be used as required by the state or local plumbing code. Since January 1, 1994, the Arizona Statewide Plumbing Code has required the use of low-flow fixtures in new construction throughout the state and some local plumbing ordinances have even more stringent standards.

There are two new landscaping requirements in the Third Management Plan. Industrial users that are not regulated as a turf-related facility or as a new large landscape user are required to use low water use landscape plants where feasible and water with efficient irrigation systems. Improving irrigation efficiency can be a source of major water savings whether the plants have high or low water needs. The Department encourages all facilities to irrigate efficiently regardless of the type of vegetation planted. In addition, industrial users are prohibited from serving water withdrawn from wells, other than stored water, to vegetation planted in a public rights-of-way after January 1, 2002 unless the plants are on the low water use plant list for the AMA and are prohibited from serving water withdrawn from wells, other than stored water, to a water feature, such as a fountain, waterfall, pond, water course, or other artificial water structure, in the rights-of-way if installed after January 1, 2002.

6.2.5 Industrial Conservation Requirements and Monitoring and Reporting Requirements for All Industrial Users

6-201. *Definitions*

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes, unless the context otherwise requires, the following words and phrases used in sections 6-202 through 6-203 of this chapter shall have the following meanings:

1. *“Existing facility” means an industrial facility or individual user that was constructed and substantially commenced operation by December 31, 1999.*
2. *“Industrial process purposes” means water which is used by an industrial user directly in the creation or manufacture of a product.*
3. *“Industrial use” means a non-irrigation use of water not supplied by a city, town, or private water company, including animal industry use and expanded animal industry use.*
4. *“Industrial user” means a person who uses water for industrial uses.*
5. *“Low-flow plumbing fixture” means a lavatory faucet, lavatory faucet replacement aerator, kitchen faucet, kitchen faucet replacement aerator, shower head, urinal, water closet, or evaporative cooler designed to meet the use rates specified in A.R.S. §§ 45-312 and 313 or the applicable county or city code, whichever is more restrictive.*
6. *“Single-pass cooling and heating” means the use of water without recirculation to increase or decrease the temperature of equipment, a stored liquid or a confined air space.*
7. *“Wastewater” means water that is discharged after an industrial or municipal use, excluding effluent.*

6-202. *Conservation Requirements*

Beginning on January 1, 2002 or upon commencement of water use, whichever is later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the Fourth Management Plan, an industrial user shall comply with the following requirements:

1. *Avoid waste; use only the amount of water from any source, including effluent, reasonably required for each industrial use; and make diligent efforts to recycle water.*
2. *Do not use water for non-residential single-pass cooling or heating purposes unless the water is reused for other purposes.*
3. *Use low-flow plumbing fixtures as required by Title 45, Chapter 1, Article 12, Arizona Revised Statutes, or any applicable county or city code, whichever is more restrictive.*
4. *Use plants listed in Appendix 5B, Low Water Use/Drought Tolerant Plant List or any modifications to the list, for landscaping to the maximum extent feasible, and water with a water-efficient irrigation system. An industrial user regulated as a turf-related facility*

under sections 6-301, et seq., or as a new large landscape user under section 6-501, et seq., is exempt from this requirement.

5. *Do not serve or use water for the purpose of watering landscaping plants planted on or after January 1, 2002 within any publicly owned rights-of-way of a highway, street, road, sidewalk, curb, or shoulder which is used for travel in any ordinary mode, including pedestrian travel, unless the plants are listed in Appendix 5B, Low Water Use/Drought Tolerant Plant List or any modifications to the list. The director may waive this requirement upon request from the industrial user if a waiver is in the public interest. This requirement does not apply to any portion of a residential lot that extends into a publicly owned rights-of-way.*
6. *Do not serve or use water for the purpose of maintaining a water feature installed after January 1, 2002 within any publicly owned rights-of-way of a highway, street, road, sidewalk, curb, or shoulder which is used for travel in any ordinary mode, including pedestrian travel. The director may waive this requirement upon request from the industrial user if a waiver is in the public interest. This requirement does not apply to any portion of a residential lot that extends into a publicly owned rights-of-way.*

6-203. Monitoring and Reporting Requirements

A. Requirements

For calendar year 2002 or the calendar year in which the facility first begins to use water, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the Fourth Management Plan, an industrial user shall, except as provided for in subsection B of this section, include the following information in its annual report required by A.R.S. § 45-632:

1. *The total quantity of water by source, including effluent, withdrawn, diverted, or received during the reporting year for industrial process purposes, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
2. *The total quantity of water by source, including effluent, withdrawn, diverted, or received during the reporting year for purposes other than industrial process purposes, listed in paragraph 1 of this subsection, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
3. *An estimate of the quantity of wastewater generated during the reporting year.*
4. *An estimate of the quantity of wastewater recycled during the reporting year.*
5. *A description of the primary purposes for which water from any source, including effluent, is used.*
6. *The number of acres of land that were planted with low water use plants during the calendar year as a result of removal of plants not on the low water use plant list for the Santa Cruz AMA, if more than one acre, and the method of irrigation for those acres. An industrial user regulated as a turf-related facility under sections 6-301, et seq., or as a new large landscape user under section 6-501, et seq., is exempt from this requirement.*

B. Exemption

An industrial user who holds a Type 1 or Type 2 non-irrigation grandfathered right or a groundwater withdrawal permit in the amount of 10 or fewer acre-feet per year is exempt from the requirements set forth in subsection A of this section, unless the industrial user holds more than one such right or permit in the aggregate amount of more than 10 acre-feet per year and withdraws more than 10 acre-feet of water during the calendar year pursuant to those rights or permits.

6-204. Remediated Groundwater Accounting for Conservation Requirements

A. Accounting

Groundwater withdrawn pursuant to an approved remedial action project under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or Title 49, Arizona Revised Statutes, and used by a person subject to a conservation requirement established under this chapter shall be accounted for consistent with the accounting for surface water for purposes of determining the person's compliance with the conservation requirement, subject to the provisions of subsections B through D of this section.

B. Amount of Groundwater Eligible for Accounting

For each approved remedial action project, the annual amount of groundwater that is eligible for the remediated groundwater accounting provided in subsection A of this section is the project's annual authorized volume. The annual authorized volume for a remedial action project approved on or after June 15, 1999 is the maximum annual volume of groundwater that may be withdrawn pursuant to the project, as specified in a consent decree or other document approved by the United States Environmental Protection Agency (EPA) or the Arizona Department of Environmental Quality (ADEQ). The annual authorized volume for a project approved after June 15, 1999 is the highest annual use of groundwater withdrawn pursuant to the project prior to January 1, 1999, except that if a consent decree or other document approved by the EPA or ADEQ specifies the maximum annual volume of groundwater that may be withdrawn pursuant to the project, the project's annual authorized volume is the maximum annual volume of groundwater specified in that document. The director may modify the annual authorized volume for a remedial action project as follows:

- 1. For an approved remedial action project associated with a treatment plant that was in operation prior to June 15, 1999, a person may request an increase in the annual authorized volume at the same time the notice is submitted pursuant to subsection C of this section. The director shall increase the annual authorized volume up to the maximum treatment capacity of the treatment plant if adequate documentation is submitted to the director demonstrating that an increase is necessary to further the purpose of the remedial action project and the increase is not in violation of the consent decree or other document approved by the EPA or ADEQ.*
- 2. A person may request an increase in the annual authorized volume of an approved remedial action project at any time if it is necessary to withdraw groundwater in excess of the annual authorized volume to further the purpose of the project. The director shall increase the annual authorized volume up to the maximum volume needed to further the purpose of the project if adequate documentation justifying the increase is submitted to the director and the increase is not in violation of the consent decree or other document approved by the EPA or ADEQ.*

3. *The director shall modify the annual authorized volume of an approved remedial action project to conform to any change in the consent decree or other document approved by the EPA or ADEQ if the person desiring the modification gives the director written notice of the change within thirty days after the change. The notice shall include a copy of the legally binding agreement changing the consent decree or other document approved by the EPA or ADEQ.*

C. Notification

To qualify for the remediated groundwater accounting provided in subsection A of this section, the person desiring the accounting must notify the director in writing of the anticipated withdrawal of groundwater pursuant to an approved remedial action project under CERCLA or Title 49, Arizona Revised Statutes, prior to the withdrawal. At the time the notice is given, the person desiring the accounting must be using remediated groundwater pursuant to the approved remedial action project or must have agreed to do so through a consent decree or other document approved by the EPA or ADEQ. The notice required by this subsection shall include all of the following:

1. *A copy of a document approved by ADEQ or the EPA, such as the Remedial Action Plan (RAP), Record of Decision (ROD) or consent decree, authorizing the remediated groundwater project. Unless expressly specified in the document, the person shall include in the notice the volume of groundwater that will be pumped annually pursuant to the project, the time period to which the document applies, and the annual authorized volume of groundwater that may be withdrawn pursuant to the project.*
2. *The purpose for which the remediated groundwater will be used.*
3. *The name and telephone number of a contact person.*
4. *Any other information required by the director.*

D. Monitoring and Reporting Requirements

To qualify for the remediated groundwater accounting for conservation requirements as provided in subsection A of this section, groundwater withdrawn pursuant to the approved remedial action project must be metered separately from groundwater withdrawn in association with another groundwater withdrawal authority for the same or other end use. A person desiring the remediated groundwater accounting for conservation requirements shall indicate in its annual report under A.R.S. § 45-632 the volume of water withdrawn and used during the previous calendar year that qualifies for the accounting.

6.3 TURF-RELATED FACILITIES

6.3.1 Introduction

A turf-related facility is a facility with 10 or more acres of water-intensive landscaped area. Golf courses, parks, schools, cemeteries, and common areas within residential developments are examples of facilities that often qualify as turf-related facilities. Because “irrigation” is defined in the Code as water applied for the purpose of growing crops for sale or consumption, turf-related watering for recreational and aesthetic purposes is considered a non-irrigation water use rather than an irrigation use.

Turf-related facilities regulated under the Industrial Conservation Program obtain water pursuant to Type 1 or Type 2 non-irrigation grandfathered rights or groundwater withdrawal permits. In addition, a large number of turf-related facilities are served water by municipal water providers and are also subject to the conservation requirements set forth in this section through provisions of the Municipal Conservation Program (see Chapter 5). These municipally-served facilities are called individual users.

Second Management Plan conservation requirements and other factors have led to changes in turf-related facilities. New facilities are typically designed with less water-intensive acreage, both existing and new facilities employ technology that applies water more efficiently, and facility management has become more cognizant of the need for water conservation.

6.3.2 Water Use by Turf-Related Facilities

Turf-related facilities apply water for growing turfgrass and other landscaping plants and for filling and maintaining water levels in bodies of water. Water application efficiency is determined by the type of water application system that is utilized, maintenance of the system, water application scheduling, site topography, soil type, weather conditions, and water quality. There are four turf-related facilities in the Santa Cruz AMA, all of which are golf courses.

There is a direct relationship between the number of acres of water-intensive landscaping maintained within a facility and the facility’s water use. In 1995, turf-related facilities in the Santa Cruz AMA encompassed a total of 460 acres of turf and just under 10 acres of water surface area. From 1987 through 1995, the average annual water use per acre of turf within turf-related facilities has ranged between 2.2 and 4.9 acre-feet per acre. This range is indicative of the broad spectrum of water management practices, changes in application rates based on weather patterns and changes in facility design, including removing or installing additional turf, low water use and water surface acres.

The water use rate for maintaining bodies of water is higher than for turf and low water use landscaping because evaporation from the water surface (between 5 and 6 acre-feet per acre year) is higher than the consumptive use and evaporation rates for plants. Unlined or inadequately sealed water holding basins can lose significant volumes of water through seepage. The bodies of water associated with golf courses are generally used as an integral part of the course design and as a holding basin for water used for turf-related watering.

Turf-related facility water use in the Santa Cruz AMA has fluctuated over time probably mostly due to increased or decreased watering based on weather conditions. In 1992, a year that was cooler and wetter than average, the four turf-related facilities in the AMA used a total of 1,338 acre-feet. In contrast, about 2,244 acre-feet were used by these facilities in 1989, a year that was hotter and drier than average.

Turf-related facility water demand in the Santa Cruz AMA is met either through a non-irrigation grandfathered right or service from a municipal water provider. Two golf courses, Palo Duro (previously

called Meadow Hills) and Kino Springs, are served water from the City of Nogales. The other two courses, Rio Rico and Tubac Ranch Resort, are served using their own non-irrigation grandfathered rights.

Annual water demand by turf-related facilities will increase if new golf courses are constructed within the AMA, and demand will continue to fluctuate with weather conditions even if no new courses are built. Golf courses are the most likely kind of turf-related facility that may be constructed. Most schools that are built in the AMA have less than 10 acres of turf, and it is unlikely that a park will be built in this AMA containing more than 10 acres of turf. The Santa Cruz AMA has no information on whether a new cemetery may be constructed, but it is unlikely that this will occur for some time.

The gallons per capita per day rate of a municipal water provider usually increases if it begins serving a new turf-related facility. This may cause a conservation requirement compliance problem for the provider. A new turf-related facility could use some of the unused non-irrigation grandfathered right allotment in the AMA. Increased volume of water withdrawn from wells to serve a new turf-related facility that is not offset with replenishment could result in a long-term decline in local water table levels and impact the AMA's ability to maintain safe-yield conditions.

6.3.2.1 Golf Courses

In the Santa Cruz AMA, golf courses include 18-hole facilities. Golf courses are composed of tees, greens, fairways, and roughs. The most frequently used types of warm season grass are common or hybrid bermuda grass (*Cynodon*) with hybrid bermuda or bent grass (*Agrostis*) used primarily on greens. Rio Rico and Tubac Ranch Resort golf courses routinely overseed in winter months. Typically golf courses overseed their tees and greens with rye grass (*Lolium*) in winter unless they have bentgrass greens. Palo Duro and Kino Springs have not extensively overseeded their courses in the past.

Statewide, a high proportion of resort golf courses overseed at least the fairways during the winter months. There is a great deal of variability in overseeding patterns on public and private courses. Some courses prefer to avoid the expense, maintenance problems and stress to the turf associated with overseeding fairways. Some golfers appreciate the better playability associated with dormant bermuda grass. Other facility managers feel strongly that a green appearance during the winter months is required to attract visitors to golf courses in Arizona. There is strong interest in turf appearance for all golf courses, particularly resort courses and courses associated with housing developments which emphasize aesthetics rather than maximum playability and water conservation during the winter.

Golf course water application systems are often more sophisticated than those at parks, schools or cemeteries. Many golf courses have a system with a control panel and field satellites that can override the central controller. Computer-controlled watering systems and pump stations with flexibility in operating sprinkler heads are commonplace; newer systems provide much greater savings in energy and water costs than water delivery systems of 10 years ago. Most of the newer systems can incorporate weather stations which assist in scheduling water application to more accurately replace the amount of water lost through evaporation and transpiration. Most courses apply water to greens and tees with spray heads; larger turf areas are watered with large radius heads. Water is typically pumped into the watering system from a reservoir or a storage tank.

Turf managers who are knowledgeable of water conservation technologies and practices are critical to program effectiveness. Taking advantage of a computerized system's ability for field-adjusting water distribution uniformity or the percentage of points within the area being watered which receive equivalent amounts of water, routine leveling of heads, and frequent verification of proper operation of all controllers and heads are examples of prudent management.

The four golf courses in the Santa Cruz AMA used just under 1,600 acre-feet of water in 1995. Almost 1,100 acre-feet of this was withdrawn pursuant to non-irrigation grandfathered rights. This use was 78 percent of the total water withdrawn pursuant to non-irrigation rights and permits within the Santa Cruz AMA in 1995.

6.3.2.2 Schools

Although there are no schools in the Santa Cruz AMA currently that have more than 10 acres of turf, there are two schools in the AMA that withdraw water from a right or permit for turf-related watering. These schools used a total of 14.6 acre-feet of water in 1995 in the Santa Cruz AMA. The main function of turf in school yards is to provide an appropriate surface for active play. Turf appearance is not as major a concern for schools and parks as it is for cemeteries and golf courses. Many school managers have determined that using low water application rates can save money without adversely impacting turf use.

Water application systems at schools are usually relatively inflexible. In older schools, outdated equipment, including quick coupler systems, is common. Newer facilities have in-place heads with manual or electromechanical control. Some schools have converted non-play areas to drip irrigation. Due to budget constraints, it is difficult for schools to install computerized controllers and systems are frequently manually operated.

In the Santa Cruz AMA, several schools that have less than 10 acres of turf are believed to be using water inefficiently and may become involved in non-regulatory efforts aimed at improving efficiency during the third management period. Since these schools are too small to be regulated, their water use has not been separated out from total municipal use. These schools are served by municipal providers and therefore are not included in total industrial water use for the AMA.

6.3.3 First and Second Management Plan Program Development

The First Management Plan established a maximum annual water allotment for each turf-related facility and stressed water use efficiency. This was the first time golf course water use was regulated, and water management practices such as evapotranspiration-based water application scheduling was uncommon. The First Management Plan provided for adjustment of turf application rates if effluent was used.

The allotment approach permitted turf managers to consider characteristics of the facility, evaluate conservation alternatives, and decide how to most effectively apply the allotment to meet the facility's needs. A golf course requiring a lush, green appearance during the winter season could choose to reduce the amount of water applied to bermuda grass through the summer season, making a larger portion of the allotment available for extensive cool-season overseeding. Conversely, a golf course could emphasize the playability and lower maintenance of dormant bermuda grass and apply more of the allotment and maximize bermuda grass appearance during the summer season. A golf course which demanded a year-round lush appearance received sufficient allotment to do so if state-of-the-art water application technologies and water management practices were employed.

Development of the Second Management Plan conservation requirements involved extensive data collection regarding water use patterns in Arizona and the conservation options available to turf-related facility managers. The Department relied heavily on input from the Turf Advisory Committees in the Tucson and Phoenix AMAs, which consisted of golf course, park, cemetery, and school turf managers, turf irrigation specialists, extension agents, and golf course designers.

The Department used consulting services to analyze the water conservation practices in use in the turf industry and the potential for future water conservation. The study evaluated technologies, including management practices and design alternatives associated with water conservation. A primary finding of

the study was that management of the water application system, rather than the use of specific water application systems, is the most important factor in efficient landscape watering. The consultant and advisory committees concluded that a combination of good management and use of the latest water application systems was very effective in reducing water use.

For the Second Management Plan, the Department chose not to require specific conservation techniques wherever possible due to the widely varied nature of turf-related facilities. Instead, turf-related facilities continued to receive a maximum annual water allotment based on the use of conservation techniques. The allotment approaches of the First and Second Management Plans permitted turf managers to consider characteristics of the facility, evaluate conservation alternatives, and decide how to most effectively apply the allotment to meet each facility's needs.

The Second Management Plan included an overall decrease in application rates for all turf-related facilities, caps on maximum annual water allotments for new golf courses, and a limitation on the water-intensive landscaped area within new cemeteries, plus a more specific effluent incentive. In setting the annual water allotments, factors considered included actual water use figures collected from over 400 turf-related facilities in all AMAs. Data on the consumptive use of the grass species most frequently used; water application efficiency achievable with available technologies; evaporative losses from bodies of water based on pond evaporation data; management practices and technologies currently in place; conservation potential associated with additional technologies, practices, and design alternatives; and germination requirements for establishing new turf were compiled and analyzed.

Based on these factors, the Department established final annual application rates in the Tucson AMA, which the Santa Cruz AMA was part of at that time, of 4.6 acre-feet per acre for turf acres, 5.8 acre-feet per acre for bodies of water and 1.5 acre-feet per acre for low water use landscaping. For golf courses that came into existence after 1984 the maximum annual water allotment could not exceed 23.8 acre-feet per hole. Adjustments to the application rates were provided for establishing new turf, using high salinity water, filling or refilling bodies of water, and revegetating acreage disturbed during construction.

The Department continued to encourage the use of effluent in the Second Management Plan. As an incentive, effluent use, if 50 percent or more of total water use, was discounted when determining a facility's compliance with its maximum annual water allotment.

A review of short-term weather data in the 1980s indicated that a three-year averaging method would adequately compensate for weather fluctuations when determining a facility's compliance with its allotment. A provision for finding a facility in compliance on either an annual or a three-year average basis was included in the Second Management Plan.

6.3.4 Issues and Third Management Plan Development

The Code provides that the conservation program for industrial users shall require the use of or establish conservation requirements based on the use of the latest commercially available and economically feasible water conservation technologies. For turf-related facilities, such technologies include: (1) the use of weather-based water application scheduling and water budgeting; (2) accurate, well-designed water application systems and computerized control mechanisms; (3) golf course design which concentrates water-intensive landscaping in areas which come into play; and (4) PVC liners for bodies of water. Using new low water use and drought tolerant turfgrasses, improving conservation knowledge and awareness by facility management, and converting industrial users to renewable supplies are ways turf-related facilities could reduce their water demand and assist in maintaining safe-yield conditions and preventing long-term declines in local water table levels.

TACs, consisting of golf course, park, school, and cemetery turf managers, golf course directors, golf course architects, industry association representatives, and land developers, have contributed to the development of the Third Management Plan conservation program for turf-related facilities. The committees aided the Department in identifying second management period water use efficiency, water supply and conservation program effectiveness issues, provided and reviewed data and information relevant to the issues, and participated in developing program alternatives for the third management period. The committees worked with the Department to review the merits of all alternatives and to strive for consensus on the program for the third management period. In some cases, subcommittees were formed to address a specific issue and to make a program recommendation to the committee as a whole. In the Santa Cruz AMA, the GUAC was briefed periodically on the development of the plan and issues identified. These committees and the Department identified the following issues of relevance:

- the allotment methodology
- application rates for turf
- weather adjustment
- renewable supply incentives

6.3.4.1 Allotment Methodology and Application Rates

The Second Management Plan final annual application rates of 4.6 acre-feet per acre for turf acreage, 5.8 acre-feet per acre for bodies of water, and 1.5 acre-feet per acre for low-water use landscaping applied to all turf-related facilities. However, for most golf courses constructed after 1984, the maximum annual water allotment was limited to 23.8 acre-feet per hole.

During Third Management Plan development, some representatives of the golf industry argued that the Second Management Plan application rates for turf and the cap on the allotment for golf courses constructed after 1984 denied golf courses their legal right to sufficient water to meet their actual needs consistent with their selected business practices. They felt that the Department's program unreasonably prevented the complete overseeding of golf courses, interfered with reasonable management of longer courses needed to attract high-visibility tournaments, and resulted in target-style courses which imposed unreasonable skill demands on inexperienced and older golfers. They asserted that the allocations were not supported by sufficient data. Other TAC members felt that Second Management Plan application rates and allotment limitations were supported by scientific research and, that while potentially challenging to superintendents and designers, the allotments were adequate assuming the use of high-quality water application systems and conscientious water management practices.

Factors influencing turf watering needs include temperature, solar radiation, humidity, wind, and soil moisture. Based on research conducted at the University of Arizona Desert Turf Research Center (Brown, Gilbert, and Kopec, 1996) and 1988 to 1996 weather data from the Arizona Meteorological Network (AZMET) Tucson Station, high-quality turf with winter overseeding would need 4.5 to 5.2 acre-feet per acre per year of applied water depending upon the weather conditions of that year, not including rainfall. This research supports the adequacy of the Second Management Plan's 4.6 acre-feet per acre per year application rate for maintaining overseeded turf.

The parameters assumed in the research are conditions that may lead to a long-term root zone salt accumulation, depending upon the quality of the water applied to turf. Additional investigation is needed to determine if typical rainfall distribution will adequately flush accumulated salts beyond the turfgrasses' root zone, if rainfall is not sufficient, or if continuous water application at a slightly higher rate or periodic flushing at a much higher application rate would best balance salt management and water application efficiency.

Because regional variation in rainfall, wind speed during watering times, soil type, root zone depth, and course topography can all have potential negative impacts on turf water demand, application rates deemed sufficient for the majority of facilities may not be appropriate for all facilities. Individual facilities with special circumstances which could render these application rates unreasonable may seek relief through administrative review. A.R.S. § 45-575.

While the maximum annual water allotment provisions do not directly limit water-intensive acreage of new golf courses, acreage limitations are incorporated into the derivation of the 23.8 acre-foot per hole allotment cap. Among the conservation technologies currently available to golf course developers, minimizing water-intensive acreage is one of the most effective means of reducing water demand. Both the turf-related facility study conducted by the Department during development of the Second Management Plan and numerous articles in golf industry trade journals during the past 15 years point to smaller turfed areas as an effective means for golf courses to save water and reduce operating costs. Eighteen-hole golf courses with about 90 acres of turf were found to be more manageable while still being around 7,200 yards in length. Bodies of water with two to three acres of surface area allow for sufficient storage capacity to hold three to five days worth of peak facility water demand. The allotment cap is based on these acreage guidelines for an 18-hole course multiplied by the application rates for turfed and water surface area, expressed on a per hole basis.

Historic water use and research in California indicates that the higher unirrigated perimeter to turfed acre ratios typical of target-style courses may result in higher water demand per acre than that of more traditionally-designed courses. Increased evapotranspiration may occur within 200 feet of perimeters adjacent to unwatered or low water use areas. On narrow fairways these zones may coincide, and water demand for the entire turfed area may increase on the order of 5 percent. In order to quantify this effect for possible inclusion in management plan requirements, additional research needs to be conducted in the desert regions of Arizona.

6.3.4.2 Weather Adjustment

Long-term weather data indicate that the mid-1980s and early 1990s represented a comparatively “wet” period. Historically, rainfall in the Santa Cruz AMA tends to be cyclic with “dry” or “wet” periods that may last as long as four or five years. Wet years early in the second management period were followed by a protracted period of hot summer weather combined with sparse or late summer rains.

Alternatives were considered to the three-year averaging approach for determining compliance used in the Second Management Plan in order to compensate for weather fluctuations more effectively. These alternatives included a flexibility account and a five-year averaging provision. For the Third Management Plan, the Department chose not to extend the three-year averaging provision to five years. The length of a five-year averaging provision would result in a considerable lag between the time the annual allotment was exceeded and when corrective action could be taken. Instead, the Department opted for a flexibility account that contains both credit and debit limits. Credit and debit limits for the flexibility account have been set at 20 percent of the maximum annual water allotment based on an analysis of the 1988 through 1997 weather variations. The account will encourage and reward careful management through the accrual of credits.

6.3.4.3 Renewable Supply Incentives

Existing industrial users continue to pump water. Conservation requirements strive for efficient use, but do not address the balance that must be maintained between water demands and supplies, nor local water table levels. The availability of Type 2 non-irrigation grandfathered rights through sale or lease, the conversion of irrigation rights to Type 1 non-irrigation grandfathered rights, the issuance of groundwater withdrawal permits, and the delivery of water by municipal water providers are all prospects which could

increase water withdrawn from wells by turf-related facilities in the future. This situation could potentially have a negative impact on the maintenance of safe-yield and the prevention of long-term declines in local water table levels unless water management programs provide a mechanism to offset these increases in demand.

In the Second Management Plan, the effluent use incentive was structured so that if at least 50 percent of a facility's applied water was effluent, the volume of effluent used was discounted. The amount of the discount was 5 percent if up to 89 percent of the total water use was effluent and 10 percent if 90 percent or more of the total water use was effluent. Also, the cap placed on the allocation given for bodies of water within new golf courses did not apply to bodies of water filled entirely with effluent.

The Department and the Third Management Plan Turf TACs discussed several incentives that would further encourage effluent utilization by both municipally provided facilities and industrial users in the Third Management Plan. Because effluent is an underutilized supply, the Department chose to discount all direct effluent use by 30 percent. The discount provides an increased incentive to encourage effluent use where supplies are expensive and may encourage the construction of wastewater treatment plants to produce effluent in new developments, where supplies may be limited until residential development nears completion. The incentive acknowledges the need for efficient use of all water supplies, while providing a higher potential application rate to facilities using higher percentages of effluent. Agronomic research has shown that high quality turfgrass can be maintained through application of approximately 75 percent of the measured evapotranspiration rate. As effluent use approaches 100 percent of a facility's total water use, the 30 percent effluent discount will allow a typical golf course to apply the full amount of water lost by turfgrass through evaporation and transpiration.

The Department and the TACs also explored options to allow a turf-related facility to mitigate water use in excess of the annual water conservation allotment. If a turf-related facility exceeds its maximum debit limit, it could be asked to replenish more than the excess without earning credits (known as storing "non-recoverable" water) or extinguishing any existing recharge credits at a higher rate than the excess water used at the facility. Issues considered included the rates of recharge required, conditions that would apply to ensure no wasteful practices are condoned, the effect on water conservation efforts, and the effect of excessive pumping upon localized hydrologic conditions. For the Santa Cruz AMA, the option of replenishing more than the excess will need to be further evaluated for benefits to the AMA and its affects on water users.

The Department determined that the replenishment option will not be included as a part of the conservation requirements for turf-related facilities during the third management period. In the meantime, the option of extinguishing recharge credits or storing non-recoverable water in particular areas as a compliance mechanism will be considered during the third management period, even in advance of a violation. Owners and operators of turf-related facilities who anticipate an allotment violation are encouraged to develop a proactive response program in cooperation with the Department (see Chapter 10).

6.3.5 Turf-Related Facilities Program

6.3.5.1 Maximum Annual Water Allotment

6.3.5.1.1 Base Allotment

The core of the conservation program for turf-related facilities is the maximum annual water allotment. The allotment is calculated differently for different types of facilities, but generally there is a direct relationship between the number of acres to which water is applied and the volume of the allotment. For all turf-related facilities, the annual application rate for turf acres is 4.6 acre-feet per acre, the application

rate for water surface acres is 5.8 acre-feet per acre, and the application rate for low water use landscaped area is 1.5 acre-feet per acre.

For turf-related facilities other than golf courses, the allotment is calculated by determining the actual acreage within the facility in each of the three landscaping categories and then multiplying the number of acres by the appropriate application rate. The approach used for these facilities allows expansion of landscaped area. Beginning with the First Management Plan, the Department recognized that the latest conservation technology for golf courses includes course design which concentrates water-intensive landscaping into areas which come into play and water management practices which adjust water application schedules for weather conditions and seasons of highest play. The allotment for golf course acreage which came into existence after December 31, 1984 is therefore capped to encourage efficient design, construction, water application, and overseeding practices. These caps are described below.

Golf course acreage that came into existence from January 1, 1985 through December 31, 1991- For golf courses, the allotment for any turf acres that came into existence from January 1, 1985 through December 31, 1991 is limited to an amount calculated by multiplying the number of holes within those acres by 23 acre-feet of water per hole, plus any allotment additions described later in this section. This cap is sufficient to water 5 acres of turf at 4.6 acre-feet per acre. If the turf acres planted during that period are in fact limited to 5 acres per hole, there is no cap on the allotment for any bodies of water that came into existence within the facility from January 1, 1985 through December 31, 1991. However, if the turf acres planted from January 1, 1985 through December 31, 1991 exceed 5 acres per hole, the allotment for any bodies of water that came into existence during that period and that are not filled and refilled entirely with direct use effluent is limited to an amount calculated by multiplying the number of holes within those turf acres by 0.8 acre-feet of water, plus any allotment additions described later in this section.

Golf course acreage that came into existence after December 31, 1991 - For golf courses, the total allotment for turf acres, and low water use landscaped area that came into existence after December 31, 1991 is limited to an amount calculated by multiplying the number of holes within those acres by 23 acre-feet of water, plus any allotment additions described later in this section. This cap is sufficient to water 5 acres of turf at 4.6 acre-feet per acre. If less than five acres of turf are planted per hole, the cap allows sufficient water for approximately 3 acres of low water use landscaping in place of each acre of turf not planted. The allotment for all bodies of water that came into existence after December 31, 1991 and that are not filled and refilled entirely with effluent is limited to an amount calculated by multiplying the number of holes within the turf acres that came into existence during that period by 0.8 acre-feet of water. This cap limits the allotment for such bodies of water to 0.14 acre of water surface per hole.

Golf courses may expand or develop any number of water-intensive landscaped acres and low water use landscaped area. However, water use must not exceed the maximum annual water allotment, which assumes acreage restrictions. Although the allotment is calculated on a per acre basis, the facility manager has discretion on how to apply the allotment within the facility.

6.3.5.1.2 Allotment Additions

Under certain circumstances, a turf-related facility is entitled to an addition to its base allotment. In some cases, the allotment addition is effective only for one year; in other cases, the allotment addition is effective for a longer period. The following are the allotment additions allowed in the Third Management Plan.

Reduction of Turfed Acreage

Conservation requirements for the third management period continue to provide an incentive to reduce landscaped area. When calculating the maximum annual water allotment for a turf-related facility, the amount of water allotted to pre-1985 turf, water surface acres, and low water use landscaping is based on

the highest number of those acres in existence at the facility during the period from 1980 through 1984. Thus, removal of acreage planted during that period will not decrease the facility's allotment. All turf-related facilities are encouraged to minimize the water-intensive landscaping to areas consistent with the intended use and enjoyment of the facility.

Allotment Addition for Establishment of Newly Turfed Area

An allotment addition is given to turf-related facilities for the establishment of newly planted turf. The allotment addition is equal to 1.0 acre-feet per acre of newly turfed area, and is limited to the year in which the turf is planted. For golf courses, the allotment addition is limited to an amount calculated by multiplying the number of holes present within the newly turfed area by 5 acre-feet of water.

Allotment Addition for Revegetation

A revegetation allotment addition is available to facilities that want to establish low water use or other site-adapted landscaping plants which will need only temporary supplemental water application after construction of a new or renovated facility. This allotment addition of up to 1.5 acre-feet per acre for up to a maximum of three calendar years, is quantified and granted on an individual basis through an application process. The quantity and duration of the allotment adjustment is determined through the Department's evaluation of each application. This adjustment is separate from the low water use landscaping component included in the maximum annual water allotment calculation and is not included in the allotment cap for new landscaped areas within golf courses.

Allotment Addition for Filling Bodies of Water

New turf-related facilities receive a one-time allotment addition to fill bodies of water within the facility. The allotment addition is equal to the volume used for initial filling of the body of water and is given only for the year in which the body of water is filled. Any facility may also apply for an allotment addition to refill a body of water which has been emptied for maintenance work to eliminate or reduce seepage losses. The allotment addition may be given only for the year in which the body of water is refilled.

Allotment Addition for Leaching

When high levels of total dissolved solids are present in the water supply, a turf-related facility may need an additional amount of water for leaching or deep percolation to prevent salts from accumulating in the root zone. If salts are allowed to accumulate in the soil, salinity may eventually reach levels toxic to turfgrass. Since most water supplies in the Santa Cruz AMA are of a quality which does not require an additional leaching allowance, a leaching allowance was not included in the maximum annual water allotment calculation. However, if a facility's water supply has a concentration of 1,000 milligrams per liter of total dissolved solids (approximately 1.5 millimhos per centimeter of electrical conductivity) or greater, the turf-related facility may apply to the Department for an allotment addition for leaching.

6.3.5.2 Additional Conservation Requirements

All turf-related facilities are required to prepare and maintain a water conservation plan. The plan must outline the water management practices and technologies the facility will utilize to maximize water use efficiency. All turf-related facilities that are not golf courses are required to design, construct, and maintain grounds in a manner which will minimize water-intensive landscaped areas consistent with reasonable use and enjoyment of the facility. Golf courses have a capped maximum annual allotment which assumes water-efficient design and management.

A turf-related facility that is a cemetery must limit the water intensive landscaped area within any portion of the cemetery that came into existence after December 31, 1991, so that no more than 75 percent of the total cemetery area within that portion of the cemetery is landscaped with plants not listed on the Low Water Use/Drought Tolerant Plant List for the Santa Cruz AMA (see Appendix 5B). This restriction does not apply to an expansion of a cemetery onto contiguous land that was under the same ownership as the cemetery as of December 31, 1984.

6.3.5.3 Effluent Use Adjustment

In the Santa Cruz AMA, effluent is the only water supply which is expected to increase in availability throughout the third management period. Effluent's high nutrient content makes it an excellent supply for turf-related watering, as long as the nutrient load is carefully matched to plant needs and over-application is avoided. Despite the availability and suitability of effluent for turf watering, effluent is currently underutilized as a source of water for turf-related facilities.

To encourage the maximum use of effluent on turf-related facilities during the third management period, the Department has modified the effluent incentive offered in the Second Management Plan. While the maximum annual water allotment will not change, each acre-foot of effluent will be counted as 0.7 acre-foot when compliance with the maximum annual water allotment is determined. This adjustment does not apply to effluent stored in a storage facility pursuant to a water storage permit and recovered outside the area of impact of the stored water. In addition to the effluent adjustment, facilities using effluent may apply to the Department for an allotment addition to allow for leaching of salts below the root zone.

6.3.5.4 Flexibility Account

In order to compensate for fluctuating weather conditions, each turf-related facility will have a flexibility account with credit and debit limits. In wetter years or through careful management, facilities will be able to accrue a credit balance up to 20 percent of a facility's annual allotment. When weather conditions or water management decisions cause a facility's water use to exceed its allotment in any year, accrued credits are expended. If all credits are exhausted, a facility may accrue a debit balance up to 20 percent of the allotment. A violation will occur only when all credits have been exhausted and the debit maximum is exceeded. Prudent facility managers will take advantage of wet years and the latest conservation technologies to accumulate as many credits as allowed in order to compensate for fluctuations in water demand during hot or dry years.

6.3.5.5 Monitoring and Reporting Requirements

The Third Management Plan includes monitoring and reporting requirements for all turf-related facilities. All turf-related facility water use will be assumed to be for landscape watering purposes unless other water uses are metered separately. For example, if water for a club house is not separated from water used for turf-related watering, it will count against the facility's allotment. This provision encourages facilities to install enough meters to ensure that turf-related watering is accurately measured and reported.

6.3.6 Non-Regulatory Efforts

In 1991, the Department initiated a grants program for conservation assistance and augmentation of water supplies in the AMAs. Individual AMA programs focus on the areas of highest water conservation potential in each water use sector (municipal, industrial, and agricultural) based on total water usage, current water usage practices, and potential for implementation of new conservation technologies. Funding for the program comes from an annual withdrawal fee levied and collected from all regulated water users in the AMAs. See Chapter 9 for a description of the Conservation Assistance Program for the third management period.

6.3.7 Future Directions

A significant increase in the volume of water withdrawn from wells, particularly in the Younger Alluvium of the Santa Cruz River, may prevent the maintenance of safe-yield conditions and result in long-term declines in local water table levels. The current Code provisions will probably need to be modified to allow the Santa Cruz AMA to manage for its dual goals. Management plan conservation requirements can reduce the withdrawal of water from wells only to the extent that the requirements are consistent with reasonable economic return. Absent additional legislation specifically addressing the appropriateness of using high-quality pumped water for turf-related watering, the management plans can only require water use efficiency that is economically justified. Direct utilization of effluent combined with efforts to maximize water application efficiency are currently the key factors in meeting the AMA water management goals. A management plan modification is anticipated in the Santa Cruz AMA. The modification is expected to provide additional water management tools including both demand and supply components.

The relationship of turf-related watering to the maintenance of safe-yield and the prevention of long-term declines in local water table levels must be evaluated and quantified. Some component of applied water may actually be incidentally recharged. Deep percolation of water which may contain fertilizers and other horticultural chemicals could reduce water quality.

Stronger conservation-oriented technology and water management practice requirements should be considered from both a regulatory and non-regulatory approach. From a regulatory perspective, application rates which determine the maximum annual water allotments need to be further scrutinized under actual field conditions. Conservation technologies and practices should be further evaluated as a regulatory alternative to enforceable allotments. From a non-regulatory approach, legislation that increases funding for conservation, education, and augmentation could assist turf managers with water management practices, evaluation of effective water conservation technology, and construction of effluent conveyance infrastructure.

6.3.8 Industrial Conservation Requirements and Monitoring and Reporting Requirements for Turf-Related Facilities

6-301. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes, and section 6-201 of this chapter, the following words and phrases used in sections 6-301 through 6-305 of this chapter, unless the context otherwise requires, shall have the following meanings:

1. *“Body of water” means a constructed body of water or interconnected bodies of water, including a lake, pond, lagoon, or swimming pool, that has a surface area greater than 12,320 square feet when full and that is filled or refilled primarily for landscape, scenic, recreational purposes, or regulatory storage.*
2. *“Common area” means an area or areas which is owned and operated as a single integrated facility and which is used for recreational or open space purposes. A common area is maintained for the benefit of the residents of a housing development.*
3. *“Contiguous” means in contact at any point, or part of the same master planned community. Two parcels of land are contiguous even if they are separated by one or more of the following: a road, easement or rights-of-way.*
4. *“Direct use effluent” means effluent transported directly from a facility regulated pursuant to Title 49, Chapter 2, Arizona Revised Statutes, to an end user. Direct use effluent does not include effluent that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes.*
5. *“Effluent recovered within the area of impact” means effluent that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes, and recovered within the stored effluent’s area of impact. For purposes of this definition, “area of impact” has the same meaning as prescribed by A.R.S. § 45-802.01.*
6. *“First management period new acres” means a water-intensive landscaped area or a low water use landscaped area which came into existence or was substantially commenced after December 31, 1984 and before January 1, 1992, but which was not substantially commenced prior to January 1, 1985.*
7. *“First management period new turf acres” means turf acres which came into existence or were substantially commenced after December 31, 1984 and before January 1, 1992, but which were not substantially commenced prior to January 1, 1985.*
8. *“Golf course” means a turf-related facility used for playing golf with a minimum of nine holes and including any practice areas.*
9. *“Hole” means a component of a golf course consisting at a minimum of a tee and a green. A practice area or driving range is not a hole.*
10. *“Landscape watering” means the application of water from any source, including effluent, to a water-intensive landscaped area, a low water use landscaped area, or revegetation acres within a turf-related facility.*

11. *“Low water use landscaped area” means an area of land of at least one acre in aggregate, which is an integral part of a turf-related facility, which is watered by a permanent water application system and which is planted primarily with plants listed in Appendix 5B, Low Water Use/Drought Tolerant Plant List, or any modifications to the list. Mature vegetation planted in a low water use landscaped area must cover at least 50 percent of the area.*
12. *“Newly turfed area” means, for a calendar year, an area of land planted with a warm-season grass species which was not planted with a warm-season grass species during the preceding calendar year.*
13. *“Overseeded area” means, for a calendar year, an area of land planted with any cool-season grass species that grows over a dormant warm-season grass species during the fall-winter period.*
14. *“Post-1991 acres” means a water-intensive landscaped area or a low water use landscaped area which was neither in existence nor was substantially commenced as of December 31, 1991.*
15. *“Pre-1985 acres” means a water-intensive landscaped area or a low water use landscaped area which was either in existence or was substantially commenced as of December 31, 1984.*
16. *“Substantially commenced” means that all pre-construction permits and approvals required by federal, state, or local governments have been obtained or substantial capital investment has been made in the physical on-site construction.*
17. *“Total cemetery area” means an area of land being used for cemetery-related purposes, including any area of land covered by grave markers or by cemetery-related buildings, walks, pathways, and landscaping, but not including roads, parking lots, and any areas of land being held for future expansion of the cemetery.*
18. *“Turf acres” means an area of land that is watered with permanent water application system and planted primarily with plants not listed in Appendix 5B, Low Water Use/Drought Tolerant Plant List, or any modifications to the list.*
19. *“Turf-related facility” means any facility, including cemeteries, golf courses, parks, schools, or common areas within housing developments, with a water-intensive landscaped area of 10 or more acres. Turf-related facilities include, but are not limited to, those facilities listed in Appendix 6.*
20. *“Water-intensive landscaped area” means, for a calendar year, the turf acres and the water surface acres within a turf-related facility.*
21. *“Water surface acres” means the total surface area of all bodies of water that are an integral part of the water-intensive landscaped area of a turf-related facility. Bodies of water used primarily for swimming purposes are not an integral part of the water-intensive landscaped area of a turf-related facility.*

6-302. Conservation Requirements for Turf-Related Facilities

A. Maximum Annual Water Allotment

Beginning with calendar year 2002 or the calendar year in which landscape watering commences, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute conservation requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility shall not withdraw, divert, or receive water for landscape watering purposes at the facility during a calendar year in an amount which exceeds the turf-related facility's maximum annual water allotment for the year as calculated in section 6-303 below.

B. Conservation Plan

No later than January 1, 2002 or 180 days after receiving official notice of conservation requirements, whichever occurs later, an industrial user who uses water at a turf-related facility shall have prepared a conservation plan for the facility which contains an accurate and detailed description of the conservation technologies, including management practices, that are applied at the facility when water is used for landscape watering purposes. The industrial user shall maintain the conservation plan until the first compliance date for any substitute requirement in the Fourth Management Plan.

C. Limiting Water-Intensive Landscaped Area

- 1. Beginning on January 1, 2002 or upon commencement of landscape watering, whichever occurs later, and continuing until the first compliance date for any substitute requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility that is not a golf course or a cemetery shall design, construct, and maintain the grounds of the facility in a manner which minimizes the water-intensive landscaped area of the facility consistent with the use of the facility. All of the facility's water-intensive landscaping shall be planted in those areas directly associated with the turf facility's primary purposes.*
- 2. Beginning on January 1, 2002 or upon commencement of landscape watering, whichever occurs later, and continuing until the first compliance date for any substitute requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility that is a cemetery shall limit the water-intensive landscaped area of post-1991 acres so that no more than 75 percent of the total cemetery area within the post-1991 acres is planted with plants not listed in Appendix 5B, Low Water Use/Drought Tolerant Plant List, or any modifications to the list, unless the post-1991 acres are an expansion of the cemetery onto contiguous land that was under the same ownership as the cemetery as of December 31, 1984.*

6-303. Calculation of Maximum Annual Water Allotment for Turf-Related Facilities

- A.** *For each calendar year, the maximum annual water allotment for a turf-related facility shall be calculated by multiplying the number of acres in existence within the facility during the calendar year in each of the categories listed in Table 6-1 by the application rates listed in Table 6-1 and then adding together the products plus any allotment additions as determined under subsection B of this section. The maximum annual water allotment is subject to the conditions and restrictions set forth in Table 6-1.*

TABLE 6-1
APPLICATION RATES, CONDITIONS, AND ALLOTMENT RESTRICTIONS
FOR TURF-RELATED FACILITIES
SANTA CRUZ ACTIVE MANAGEMENT AREA
From 2002 until the first compliance date for any substitute
conservation requirement in the Fourth Management Plan

<i>For All Facilities:</i>	<i>Application Rate: (acre-feet per acre per calendar year)</i>
<p>1. <i>Pre-1985 Acres</i></p> <p style="padding-left: 20px;"><i>Turf Acres</i></p> <p style="padding-left: 20px;"><i>Water Surface Acres</i></p> <p style="padding-left: 20px;"><i>Low Water Use Landscaped Area</i></p> <p><i>Conditions and Restrictions:</i> <i>The allotment shall be calculated using the highest number of Pre-1985 acres in existence within the facility during any single calendar year after 1979.</i></p>	<p>4.6</p> <p>5.8</p> <p>1.5</p>
<p>2. <i>First Management Period New Acres</i></p> <p style="padding-left: 20px;"><i>Turf Acres</i></p> <p style="padding-left: 20px;"><i>Water Surface Acres</i></p> <p style="padding-left: 20px;"><i>Low Water Use Landscaped Area</i></p> <p><i>Conditions and Restrictions:</i></p> <p>a. <i>For golf courses, the allotment for first management period new turf acres shall not exceed an amount calculated by multiplying the number of holes within those acres by 23 acre-feet of water, plus any allotment additions as determined under subsection B of this section.</i></p> <p>b. <i>For golf courses, if the first management period new turf acres exceed an area calculated by multiplying the number of holes within those acres by five acres, the allotment for all bodies of water within the first management period new acres not filled and refilled entirely with direct use effluent or effluent recovered within the area of impact shall not exceed an amount calculated by multiplying the number of holes within the first management period new turf acres by 0.8056 acre-foot of water, plus any allotment additions as determined under subsection B of this section. For purposes of this paragraph, any body of water allowed under an interim water use permit pursuant to A.R.S. § 45-133 shall be deemed to be filled and refilled entirely with direct use effluent or effluent recovered within the area of impact if the body of water will be filled and refilled entirely with direct use effluent or effluent recovered within the area of impact after the permit expires.</i></p>	<p>4.6</p> <p>5.8</p> <p>1.5</p>
<p>3. <i>Post-1991 Acres</i></p> <p style="padding-left: 20px;"><i>Turf Acres</i></p> <p style="padding-left: 20px;"><i>Total Water Surface Area</i></p> <p style="padding-left: 20px;"><i>Low Water Use Landscaped Area</i></p>	<p>4.6</p> <p>5.8</p> <p>1.5</p>

TABLE 6-1
APPLICATION RATES, CONDITIONS, AND ALLOTMENT RESTRICTIONS
FOR TURF-RELATED FACILITIES
SANTA CRUZ ACTIVE MANAGEMENT AREA
From 2002 until the first compliance date for any substitute
conservation requirement in the Fourth Management Plan

<i>For All Facilities:</i>	<i>Application Rate: (acre-feet per acre per calendar year)</i>
<i>Conditions and Restrictions:</i>	
<p>a. <i>For golf courses, the total allotment for post-1991 turf acres and post-1991 low water use landscaped area shall not exceed an amount calculated by multiplying the number of holes within the post-1991 acres by 23 acre-feet of water, plus any allotment additions as determined under subsection B of this section.</i></p> <p>b. <i>For golf courses, the allotment for all bodies of water within the post-1991 acres not filled and refilled entirely with direct use effluent or effluent recovered within the area of impact shall not exceed an amount calculated by multiplying the number of holes within the post-1991 acres by 0.8056 acre-foot of water, plus any allotment additions as determined under subsection B of this section. For purposes of this paragraph, any body of water allowed under an interim water use permit pursuant to A.R.S. § 45-133 shall be deemed to be filled and refilled entirely with direct use effluent or effluent recovered within the area of impact if the body of water will be filled and refilled entirely with direct use effluent or effluent recovered within the area of impact after the permit expires.</i></p>	

B. Allotment Additions

1. *Newly Turfed Area Establishment Addition*

For any year in which a warm-season turfgrass species is planted at a turf-related facility, the facility shall receive an allotment addition of 1.0 acre-foot of water per acre of newly turfed area. For golf courses, the newly turfed area establishment addition shall not exceed an amount calculated by multiplying the number of holes present within the newly turfed area by 5 acre-feet of water.

2. *Revegetation Addition*

The owner or operator of a turf-related facility may apply to the director for an allotment addition to revegetate areas within or around the facility after initial construction or renovation of new acres. The director may allow up to an additional 1.5 acre-feet of water per acre for up to three years if the following conditions apply to the acres for which the revegetation addition is sought:

- a. *The plants which are planted within the revegetation area are listed in Appendix 5B, Low Water Use/Drought Tolerant Plant List, or any modifications to the list, or were adapted to the site prior to construction;*

- b. *The aggregate area to be watered exceeds one acre and has at least 50 percent vegetative cover at maturity;*
- c. *An allotment is not provided for the revegetation area under section 6-303.A; and*
- d. *All of the water applied to the revegetation area is measured and reported as part of the total water use of the facility.*

3. *Body of Water Fill and Refill Addition*

- a. *A turf-related facility shall receive a one-time body of water fill allotment addition equal to the volume of water used for the initial filling of any new body of water added after January 1, 2002 within the facility. The facility shall receive the allotment addition only for the calendar year in which the body of water is filled.*
- b. *If a body of water at a turf-related facility is drained or partially drained to allow for repairs to reduce water losses the owner or operator of the facility may apply to the director for an addition to the facility's maximum annual water allotment in the amount of water necessary to refill the body of water. The director shall grant the allotment addition if the director determines that drainage of the body of water was necessary to allow for repairs to reduce water losses. The facility shall receive the allotment addition only for the calendar year in which the body of water is filled.*

4. *Leaching Allotment Addition*

The owner or operator of a turf-related facility may apply to the director for an allotment addition for leaching purposes. The director shall approve the application if the water supply used for landscape watering at the facility contains at least 1000 milligrams per liter of total dissolved solids. If the director approves an allotment addition for leaching purposes, the director shall calculate the additional allotment as follows:

$$\text{Leaching Allotment Addition} = \left(\frac{1}{1 - \left(\frac{EC_w}{5EC_e - EC_w} \right)} - 1 \right) \times \frac{CU}{0.85}$$

Where: EC_w = *Electrical conductivity of water used*

EC_e = *Tolerance of the grass species grown to the soil salinity in electrical conductivity of the soil saturation extract*

CU = *Consumptive use requirement for the grass species*

Any allotment addition granted under this subsection shall remain in effect until the water supply used for landscape watering at the facility contains less than 1,000 milligrams per liter of total dissolved solids or until the first compliance date for the facility's conservation requirements in the Fourth Management Plan, whichever occurs first.

C. Combined Allotments for Contiguous Facilities

The maximum annual water allotments for contiguous turf-related facilities under one ownership or operation may be combined. All or a portion of the combined maximum water allotment may be applied to any part of the contiguous facilities.

- D.** *Nothing in this section shall be construed as authorizing use of more groundwater or surface water than may be used pursuant to any groundwater or appropriable water rights or permits associated with the use. Nor shall this section be construed as authorizing the use groundwater or surface water in any manner that violates Chapter 1 or Chapter 2 of Title 45, Arizona Revised Statutes.*

6-304. Compliance with Maximum Annual Water Allotment

A. Effluent Use Adjustment

For purposes of determining compliance with the maximum annual water allotment requirement, the director shall count each acre-foot of direct use effluent or effluent recovered within the area of impact used at the facility for landscape watering purposes during the calendar year as 0.7 acre-foot of water.

B. Flexibility Account

The director shall determine if a turf-related facility is in compliance with the maximum annual water allotment requirement through the maintenance of a flexibility account for the facility according to the following:

- 1. Beginning with calendar year 2002 or the first full calendar year after the commencement of landscape watering, whichever is later, a flexibility account shall be established for a turf-related facility with a beginning balance of zero acre-feet.*
- 2. Following each calendar year in which water is withdrawn, diverted, or received for landscape watering purposes at the facility, the director shall adjust the turf-related facility's flexibility account as follows:*
 - a. Subtract the total volume of water from any source, including effluent, as adjusted under subsection A above, used by the facility for landscape watering purposes during that calendar year, from the facility's maximum annual water allotment for that year.*
 - b. If the result in subparagraph a of this paragraph is positive, credit the flexibility account by this volume.*
 - c. If the result in subparagraph a of this paragraph is negative, debit the flexibility account by this volume.*
- 3. The account balance existing in a turf-related facility's flexibility account after the adjustment provided for in paragraph 2 is made shall carry forward subject to the following limitations:*
 - a. The maximum positive account balance allowed in the flexibility account of a turf-related facility after any credits are registered pursuant to paragraph 2,*

subparagraph b of this subsection, shall be calculated by multiplying the facility's maximum annual water allotment for the year for which the credits are registered by 0.2. If the account balance exceeds the maximum positive account balance after the credits are registered, the balance carried forward shall be equal to the maximum positive account balance.

- b. The maximum negative account balance allowed in the flexibility account of a turf-related facility after any debits are registered pursuant to paragraph 2, subparagraph c of this subsection, shall be calculated by multiplying the facility's maximum annual water allotment for the year for which the debits are registered by -0.2. If the account balance is less than the maximum negative account balance after the debits are registered, the balance carried forward shall be equal to the maximum negative account balance.*

C. Compliance Status

If the adjustment to a turf-related facility's flexibility account following a calendar year as provided for in subsection B, paragraph 2, causes the account to have a negative account balance less than the maximum negative account balance allowed in the flexibility account for the calendar year as calculated in paragraph 3, subparagraph b, the industrial user who uses water at the facility is in violation of the facility's maximum annual water allotment for that year in an amount equal to the difference between the facility's flexibility account balance and the maximum negative balance allowed in the facility's flexibility account.

6-305. Monitoring and Reporting Requirements

- A. An industrial user who uses water at a turf-related facility that commences landscape watering within post-1991 acres after January 1, 2002 shall submit to the director documentation of the new acreage within the facility no later than 90 days after commencing landscape watering within the new acres or receiving notice of these conservation requirements, whichever is later. The scale of the submitted documents, extent of turf acres, water surface acres, and low water use landscaped area must clearly be shown. Documentation may consist of one or more of the following:
 - 1. As-built plans certified by a registered professional such a civil engineer, golf course designer, or landscape architect.*
 - 2. Aerial photography at a scale no smaller than 1"=200'.*
 - 3. A survey of the facility certified by a registered professional such a civil engineer or land surveyor.*
 - 4. Any other documentation upon approval by the director.**
- B. For calendar year 2002 or the calendar year in which landscape watering commences, whichever occurs later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the Fourth Management Plan, an industrial user who uses water at a turf-related facility shall include in the annual report required by A.R.S. 45-632 the following information:
 - 1. The total quantity of water by source, disaggregated by each source, withdrawn, diverted, or received during the calendar year for landscape watering purposes at the facility, as**

measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.

- 2. The amount of effluent, disaggregated by direct use effluent, effluent recovered within the area of impact, and effluent recovered outside the area of impact, that was withdrawn, diverted, or received during the calendar year for landscape watering purposes as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
- 3. The number of acres of turf acres within the facility during the calendar year, not including newly turfed area.*
- 4. The number of water surface acres within the facility during the calendar year.*
- 5. The number of acres of low water use landscaped area within the facility during the calendar year.*
- 6. The number of acres of newly turfed area within the facility during the calendar year.*
- 7. The number of turf acres removed within the facility during the calendar year.*
- 8. The number of water surface acres added or removed within the facility during the calendar year.*
- 9. The number of acres of low water use landscaped area added or removed within the facility during the calendar year.*
- 10. If the facility is a golf course, the length of the course as measured from the back of each tee ground furthest from the associated green, then down the center line of the hole to the center of the green.*
- 11. The number of acres approved by the director for a revegetation addition pursuant to section 6-303, subsection B, within the facility during the calendar year.*
- 12. The quantity of water used to fill or refill a body of water within the facility during the calendar year for which an allotment addition is sought pursuant to section 6-303, subsection B.*
- 13. The number of acres of overseeded area within the facility during the calendar year.*
- 14. If the facility is a golf course, the number of holes within the facility during the calendar year.*
- 15. If the facility is a golf course, the number of holes added within newly turfed area during the calendar year.*
- 16. An estimate of the quantity of water from any source, including effluent, used for each purpose other than landscape watering purposes at the facility during the reporting year. Any water used at the facility that is not measured separately from the water used for landscape watering shall be counted by the director as water used by the facility for landscape watering for purposes of calculating the compliance with the maximum annual water allotment.*

- C.** *A single annual report may be filed for contiguous turf-related facilities which are under the same ownership or operation if the allotments for the contiguous facilities are combined pursuant to section 6-303, subsection C. The annual report shall report water use and landscaped areas of the contiguous facilities as required in subsection B of this section.*

6.4 SAND AND GRAVEL FACILITIES

6.4.1 Introduction

Sand and gravel facilities regulated under the Third Management Plan are facilities that produce sand and gravel and use more than 100 acre-feet of water from any source in a calendar year. Sand and gravel facilities include the activities of mining aggregate, mixing concrete, and producing asphaltic concrete.

6.4.2 Water Use by Sand and Gravel Facilities

There is one sand and gravel facility in the Santa Cruz AMA that is large enough to be regulated. This facility withdraws water pursuant to a groundwater withdrawal permit. It is projected that water use by this facility will grow commensurate with economic activity in the AMA.

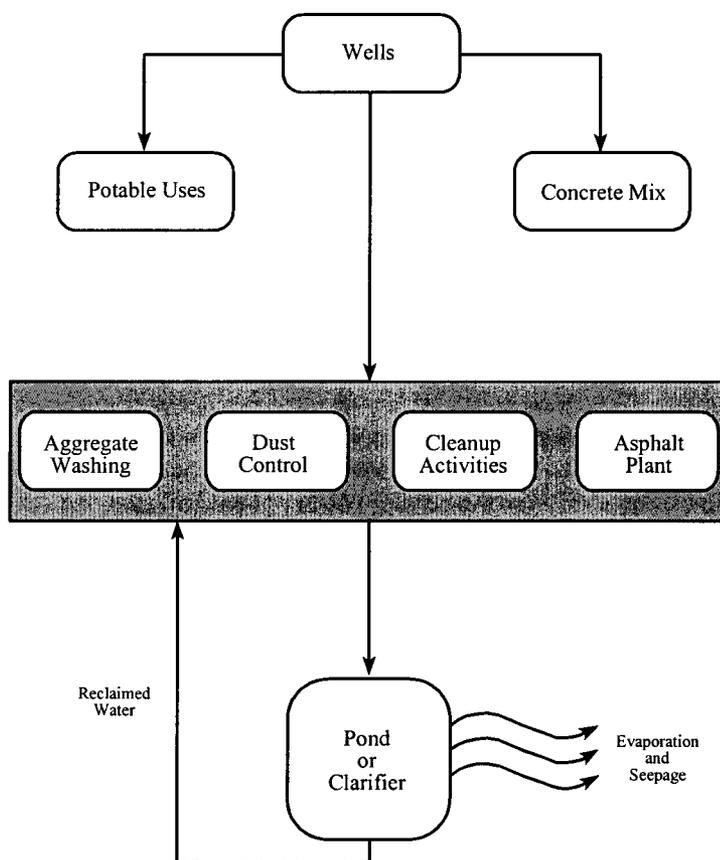
Sand and gravel facilities mine unconsolidated stream deposits to produce construction materials. The aggregate must be sorted according to grain size and washed to remove fine-grained particles. Aggregate washing accounts for the bulk of water use by sand and gravel facilities. In addition to using water for washing, water is used for the following purposes: (1) to produce ready-mix concrete, bricks, blocks, and asphaltic concrete; (2) to control dust; (3) to wash the outside of vehicles; (4) to wash the inside of mixer drums; (5) to wash other equipment; (6) to cool equipment; (7) to cool material; and (8) for domestic purposes. Figure 6-1 illustrates how water is cycled in a typical sand and gravel facility.

Most sand and gravel facilities recycle wash water using excavated pits called disposal ponds. Sediment-laden wash water is pumped or diverted into a pit or series of pits where sediment is allowed to settle out. After this sediment settles out, the water is recycled to the plant and used to wash more material. Water can also be pumped from the pond for dust control, truck washing, or other cleanup activities.

Geologic and hydrologic conditions at many facilities may result in a large amount of seepage loss incidentally returning to the aquifer from disposal ponds. Because most facilities are located along major riverbeds, depth to water is usually relatively shallow. Some facilities even require dewatering to lower the water table to allow excavation to occur. A large portion of seepage loss may become a component of the water pumped by sand and gravel facilities.

An alternative method of recycling wash water is the use of clarifiers. A clarifier is a device which accelerates the settling of sediment without creating the need for a large disposal pond. Chemical flocculants

**FIGURE 6-1
DIAGRAM OF WATER FLOW IN A TYPICAL SAND
AND GRAVEL FACILITY**



are usually used in conjunction with clarifiers to further enhance the removal of solid particles from the wash water.

Recycled water is not used for mixing concrete because the use of recycled water in the mixture may result in a product of inferior strength and quality. However, aggregate used in the concrete can be washed with recycled water without affecting concrete strength.

The ability of sand and gravel facilities to save water varies because of differences in geology, availability and cost of land and water, product demand and price, and other factors. It may therefore be economically feasible to use the latest commercially available conservation technology at some facilities but not at others.

Because recycled water can be used for most purposes at a sand and gravel facility, the maximum saving of water can occur in the recycling of wash water from aggregate washing and, to a lesser extent, the recycling of water used for wet scrubbers at asphalt plants.

There are a number of conservation techniques that may be employed to reduce the amount of water used to control dust raised by trucks traveling on haul roads. Binding agents, pavement, or other surface treatments may be used. Water uses for cleanup activities may be made more efficient by metering truck washing and by using alternative methods to clean truck mixer drums. Alternative methods can include the "rock out" method, which involves agitating rock inside the mixer drums for the purpose of cleaning excess concrete, or the use of chemical set-arresting agents, which prevent excess concrete from adhering to the mixer drums.

Sand and gravel facilities that have asphalt plants may have air emissions from the plant cleaned by either baghouses or wet scrubbers. Of these two methods, baghouses do not require water.

6.4.3 Program Development and Issues

The First Management Plan required sand and gravel facilities to recycle wash water using disposal ponds or clarifiers. This requirement ensures that sand and gravel facilities reduce their water use. The First Management Plan requirements were carried over into the second management period.

To identify the most economical conservation methods for each facility, sand and gravel facility operators were required during the second management period to evaluate specific water-saving methods and submit a conservation plan to the Department.

In addition to the conservation requirements identified in the First and Second Management Plans, there are a number of economically feasible ways water use for dust control and cleanup activities can be reduced. However, because conditions and characteristics at each facility vary, flexibility is needed to allow facility operators to select the requirements most appropriate for their facility.

6.4.4 Sand and Gravel Conservation Program

The First and Second Management Plan requirements for recycling wash water are included for the third management period because implementation of recycling improves water use efficiency. All sand and gravel operations can apply these techniques.

In addition to recycling wash water, sand and gravel facility operators must implement two additional conservation measures, one related to water used for dust control and the other related to cleanup activities. The facility operator must choose the conservation measure to be implemented in each category from a list

of approved measures. The measures chosen must be the most appropriate for the facility for the third management period.

Similar to the Second Management Plan, sand and gravel operators will be required to evaluate specific water-saving methods and submit a conservation plan to the Department during the third management period. The conservation plan must be submitted to the director by January 1, 2002 or within 180 days after notification of the conservation requirements, whichever is later.

Implementation of water conservation practices or technologies can result in increased profits. Sand and gravel facility operators should analyze conservation methods to identify those that will result in a positive economic return. Operators will be required to perform an economic feasibility analysis of three potential conservation practices: disposal pond surface area reduction, use of clarifiers, and the use of an alternative water supply to groundwater. The following potential costs and savings may be analyzed in the economic feasibility analysis:

- Labor (including planning, construction, operation, maintenance, and management time);
- Equipment (values amortized over the projected life of the equipment);
- Land value (including value of mineral reserves);
- Water costs (including pumping costs, well maintenance, and withdrawal taxes);
- Costs for chemicals and raw materials;
- Fuel or energy costs;
- Industrial wastewater disposal costs;
- Changes in revenue caused by changing production rate, minimizing “down-time,” or increasing the size of reserves; and
- Regulatory permitting costs.

6.4.5 Future Directions

Sand and gravel operations in the Santa Cruz AMA have essentially been limited to one facility. However, there are additional rights and permits within the AMA that could be used in the future for sand and gravel operations. Although the permits may expire before they are put to full use, the rights may become active during the third management period if industry economic conditions make extraction at these sites more viable.

Providing additional assistance and education for increased water management efficiency in the Sand and Gravel sector could facilitate the achievement of the Santa Cruz AMA goal.

6.4.6 Industrial Conservation Requirements and Monitoring and Reporting Requirements for Sand and Gravel Facilities

6-401. *Definitions*

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-201 of this chapter, the following words and phrases used in sections 6-402 through 6-404 of this chapter, unless the context otherwise requires, shall have the following meanings:

1. *“Alternative water supply” means a water source other than water of drinking water quality.*
2. *“Sand and gravel facility” means a facility that produces sand and gravel and that uses more than 100 acre-feet of water from any source per calendar year. For purposes of this definition, the annual water use shall include all water used by the facility regardless of the nature of the use.*
3. *“Rock out method” means agitating rock inside concrete truck mixer drums for the purpose of cleaning excess concrete from the drums.*
4. *“Wash water” means water used for washing or sorting sand, gravel, or other aggregates.*

6-402. *Conservation Requirements*

A. *Standard Conservation Requirements*

Beginning on January 1, 2002 or upon commencement of water use, whichever occurs later, and continuing thereafter until the first compliance date for any substitute conservation requirements in the Fourth Management Plan, an industrial user who uses water at a sand and gravel facility shall comply with the following conservation requirements:

1. *If sufficient land area for construction and operation of disposal ponds is available at a reasonable price, the industrial user shall construct disposal ponds at the sand and gravel facility. All wash water, all water used for wet scrubbers at asphalt plants, all runoff from cleanup operations and all drainage from sand and gravel piles shall be discharged or diverted into the disposal ponds unless prohibited by state or federal environmental regulations. The disposal ponds shall contain a barge pump or sump pump of sufficient capacity, together with any necessary additional equipment, to assure the maximum reclamation of the water. The water shall be reclaimed and reused at the sand and gravel facility unless prohibited by state or federal regulations.*
2. *If sufficient land area for the construction and operation of disposal ponds is not available at a reasonable price, clarifiers shall be used at the sand and gravel facility for reclaiming wash water, all water used for wet scrubbers at asphalt plants, runoff from cleanup operations and all drainage from sand and gravel piles. The clarifiers shall be designed and operated to assure the maximum reclamation of water. The water shall be reclaimed and reused at the sand and gravel facility unless prohibited by state or federal regulations.*

3. *At least one of the following techniques or technologies designed to reduce water use for dust control shall be implemented at the sand and gravel facility:*
 - a. *The placement of binding agents on all haul roads;*
 - b. *The paving of all haul roads;*
 - c. *The placement of recycled asphalt on all haul roads;*
 - d. *The placement of medium sized aggregate or “pea gravel” on all haul roads; or*
 - e. *A technology or technique designed to reduce water use for dust control not included in subparagraphs a through d of this paragraph, which demonstrates water savings equivalent to any of the technologies or techniques listed in subparagraphs a through d, and which has been approved by the director.*

The industrial user shall have sole discretion in determining whether to implement more than one of the above technologies.

4. *At least one of the following techniques or technologies designed to reduce water use for cleaning shall be implemented at the sand and gravel facility:*
 - a. *Use of metered timers for truck washing and other cleanup activities;*
 - b. *Use of the “rock out method” of cleaning concrete from truck mixer drums;*
 - c. *Use of concrete set-arresting agent chemical applications to clean concrete from truck mixer drums;*
 - d. *A technology or technique designed to reduce water use for cleaning that is not included in subparagraphs a through c of this paragraph, which demonstrates water savings equivalent to any of the measures listed in subparagraphs a through c, and which has been approved by the director.*

The industrial user shall have sole discretion in determining whether to implement more than one of the above technologies.

B. Substitute Conservation Requirements

1. *An industrial user who uses water at a sand and gravel facility may apply to the director to use conservation technologies other than the standard conservation requirements prescribed in subsection A of this section. The director may approve the use of substitute conservation technologies if both of the following apply:*
 - a. *The industrial user has submitted a detailed description of the proposed substitute technologies and the water savings that can be achieved by the use of those technologies, and;*
 - b. *The director determines that the proposed substitute conservation technologies will result in a water savings equal to or greater than the savings that would be achieved by the standard conservation requirements prescribed in section 6-402.*

2. *If the director approves an industrial user's request to use conservation technologies other than the standard conservation requirements prescribed in subsection A of this section, the industrial user shall comply with the substitute conservation technologies approved by the director beginning on the date determined by the director and continuing until the first compliance date for any substitute conservation requirement in the Fourth Management Plan.*

C. Conservation Plan

Not later than January 1, 2002 or within 180 days after receiving notice of these conservation requirements, whichever is later, an industrial user who uses water at a sand and gravel facility, including an industrial user who acquires ownership of an existing sand and gravel facility after January 1, 2002, shall submit to the director a plan to improve the efficiency of water use at the facility on a form provided by the director. The plan shall analyze the economic feasibility of implementing all of the following at the facility:

1. *Disposal pond surface area reduction;*
2. *The use of clarifiers for recycling water;*
3. *Use of an alternative water supply if such a supply is available within a one mile radius of the facility.*

6-403. Monitoring and Reporting Requirements

For calendar year 2002 or the calendar year in which the sand and gravel facility first commences using water, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the Fourth Management Plan, an industrial user who uses water at a sand and gravel facility shall include the following information in its annual report required by A.R.S. § 45-632:

1. *The quantity of water reclaimed from disposal ponds or clarifiers during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
2. *The quantity of water from any source, including effluent, supplied to the wash plant during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
3. *The quantity of water from any source, including effluent, supplied to the asphalt plant during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules, A.A.C. R12-15-901, et seq.*
4. *The aggregate surface area of any disposal ponds.*
5. *The average depth of any disposal ponds.*
6. *The estimated quantity of water from any source, including effluent, used during the calendar year for:*

- a. *Industrial process purposes. Water used for industrial process purposes includes water used for sanitary waste disposal but does not include water used for cooling and cleaning purposes.*
 - b. *Non-domestic cooling purposes.*
 - c. *Non-domestic cleaning purposes. Water use for non-domestic purposes includes truck washing, truck mixer drum washing, or other non-domestic cleaning purposes.*
 - d. *Road dust control.*
 - e. *Landscape watering.*
 - f. *Other purposes.*
7. *The tonnage of material washed during the calendar year.*

6.5 NEW LARGE LANDSCAPE USERS

6.5.1 Introduction

New large landscape users are industrial users with a substantial water-intensive landscaped area that was planted after January 1, 1990. The conservation program differentiates between two types of new large landscape users: non-residential facilities that are hotels or motels and non-residential facilities that are not hotels or motels. If the facility is not a hotel or motel, conservation requirements apply to landscapable areas in excess of 10,000 square feet. If the facility is a hotel or motel, requirements apply to landscapable areas in excess of 20,000 square feet. If a facility has 10 or more acres of water-intensive landscaped area it is defined as a turf-related facility and is subject to specific conservation requirements discussed in section 6.3 of this chapter.

6.5.2 Water Use by New Large Landscape Users

Water use associated with landscaping is directly related to the size of the landscaped area, the types of vegetation, and the efficiency of the irrigation method used. Although low water use residential landscaping is common in the Santa Cruz AMA, significant water use may be associated with the landscaping of industrial parks, large commercial and institutional facilities. A nine-acre hotel landscape could use more than 40 acre-feet per year if it was planted entirely with water-intensive plants. This is enough water to supply about 104 households per year. By restricting lush plantings and water features to those areas that may be used for recreation or near areas that receive the most visitation, considerable water savings may be realized. Under the Third Management Plan requirements, this same facility would use about 10 acre-feet per year to meet its landscaping needs while still maintaining an esthetically pleasing and lush landscape.

No new large landscape users were identified during the second management period. While there are some large resorts and commercial facilities within water provider service areas, the potential exists for new facilities to be served by their own wells. It is difficult to predict the extent of growth possible in this subsector, but the potential for future facility construction and for corresponding significant water use exists.

6.5.3 Program Development and Issues

Consultant studies done for the Second Management Plan indicated that significant reductions in landscape water use can be achieved using the following techniques:

- Improving water application efficiency through proper irrigation scheduling, use of more sophisticated control systems, conversion to drip irrigation, and grouping plants with similar water needs.
- Reducing the size and perimeter of turfed areas and limiting the placement of turfed areas to functional use areas and areas of high visual impact.
- Using drought-resistant plant species adapted to the desert.
- Using proper planting, fertilization, and maintenance techniques.
- Grading sites to direct rainfall into planted areas.
- Avoiding the use of water-intensive plants within rights-of-way thus emphasizing the community's commitment to low water use designs.

The findings from these studies still apply for the third management period. Attractive landscapes can be maintained solely with rainfall. However, a lush, colorful, low water use landscape watered by a permanent drip irrigation system is considered more desirable for commercial and industrial landscape

applications. This type of landscape results in water savings of 50 to 75 percent of the amount used by a well-maintained turf (water-intensive) landscape.

The distinction in the program between hotel or motel landscapes and landscapes that are associated with facilities that are not hotels or motels is intended to address the contention by the lodging industry that for certain hotel and motel developments there is an economic benefit from planting high water using landscape plant material, thus economically justifying a larger water-intensive area.

6.5.4 New Large Landscape User Program

The new large landscape user program for the Third Management Plan is similar to that in the Second Management Plan. In addition to the requirements that apply to all industrial users, new large landscape users must limit the percentage of water-intensive landscaped area above a specified square footage. The facility must limit its water-intensive landscaped area to the greater of the following: (1) 10,000 square feet (20,000 square feet for hotels and motels) plus 20 percent of the area in excess of 10,000 square feet (20,000 square feet for hotels and motels) and (2) the total surface area of all bodies of water within the facility that qualify as water intensive landscaped area.

Water-intensive landscaping includes not only high water using plants such as turf, but also bodies of water such as ponds. However, it does not include any area of land watered exclusively with direct use effluent, bodies of water used primarily for swimming, bodies of water filled and refilled exclusively with direct use effluent and bodies of water allowed under an interim water use permit pursuant to the Lakes Bill if the body of water will be filled and refilled exclusively with direct use effluent after the permit expires. Direct use effluent is effluent that is either used directly or is stored underground and then recovered within the area of impact. If 100 percent wastewater is used to water the landscape, the requirements do not apply. For example, if there is sufficient cooling tower blowdown water and greywater available from the operations of a hotel, this wastewater could be used to water any amount of water-intensive landscaped area up to 10 acres. Once a water-intensive landscaped area equals or exceeds 10 acres in size, it is defined as a turf-related facility and is subject to regulation under that program.

6.5.5 Industrial Conservation Requirements and Monitoring and Reporting Requirements for New Large Landscape Users

6-501. *Definitions*

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-201 of this chapter, unless the context otherwise requires, the following words and phrases used in sections 6-502 through 6-503 of this chapter shall have the following meanings:

1. *“Direct use effluent” means effluent transported directly from a facility regulated pursuant to Title 49, Chapter 2, Arizona Revised Statutes, to an end user. Direct use effluent does not include effluent that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes.*
2. *“Effluent recovered within the area of impact” means effluent that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes, and recovered within the stored effluent’s area of impact. For purposes of this definition, “area of impact” has the same meaning as prescribed by A.R.S. § 45-802.01.*
3. *“Landscapable area” means the entire area of a lot less any areas covered by structures, parking lots, roads, or any other area not physically capable of being landscaped.*
4. *“New large landscape user” means a non-residential facility that has a water-intensive landscaped area in excess of 10,000 square feet and that has landscaping planted and maintained after January 1, 1990 or bodies of water, other than bodies of water used primarily for swimming purposes, filled and maintained after January 1, 1990, or both. Turf-related facilities as defined in section 6-301 of this chapter are excluded from this definition.*
5. *“Water-intensive landscaped area” means, for the calendar year in question, all of the following areas within a non-residential facility:*
 - a. *Any area of land that is planted primarily with plants not listed in Appendix 5B, Low Water Use/Drought Tolerant Plant list, or any modifications to the list, and watered with a permanent water application system, except any area of land that is watered exclusively with direct use effluent*
 - b. *The total water surface area of all bodies of water area within the facility, except bodies of water used primarily for swimming purposes, bodies of water filled and refilled exclusively with direct use effluent or effluent recovered within the area of impact, and bodies of water allowed under an interim water use permit pursuant to A.R.S. § 45-133 if the bodies of water will be filled and refilled exclusively with direct use effluent after the permit expires.*

6-502. *Conservation Requirements*

- A. ***Conservation Requirements for New Large Landscape Users that are not Hotels or Motels***
Beginning on January 1, 2002 and continuing thereafter until the first compliance date for any substitute conservation requirement in the Fourth Management Plan, the water-intensive landscaped area within a new large landscape user that is not a hotel or motel shall not exceed the greater of the following: (1) an area calculated by adding 10,000 square feet plus

20 percent of the facility's landscapable area in excess of 10,000 square feet; and (2) the total water surface area of all bodies of water within the facility that are allowed under A.R.S. § 45-131, et seq., and that qualify as water-intensive landscaped area.

B. Conservation Requirements for New Large Landscape Users that are Hotels or Motels

Beginning on January 1, 2002 and continuing thereafter until the first compliance date for any substitute conservation requirement in the Fourth Management Plan, the water-intensive landscaped area within a new large landscape user that is a hotel or motel shall not exceed the greater of the following: (1) an area calculated by adding 20,000 square feet plus 20 percent of the facility's landscapable area in excess of 20,000 square feet; and (2) the total water surface area of all bodies of water within the facility that are allowed under A.R.S. § 45-131, et seq., and that qualify as water-intensive landscaped area.

C. Waiver of Conservation Requirements for the Use of 100 Percent Wastewater

The conservation requirements set forth in subsections A and B of this section shall not apply to a new large landscape user in any year in which all of the water used for landscaping purposes within the facility is wastewater.

6-503. Monitoring and Reporting Requirements

For calendar year 2002 or the calendar year in which the facility first begins to use water, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the Fourth Management Plan, an industrial user that applies water to a new large landscape user shall include the following information in its annual report required by A.R.S. § 45-632:

1. The total quantity of water from any source, including effluent, withdrawn, diverted, or received for use on the facility during the calendar year for landscape watering purposes, including bodies of water filled or refilled during the calendar year, as measured with a measuring device in accordance with the Department's measuring device rules. A.A.C. R12-15-901, et seq.
2. The total amount of landscapable area within the facility.
3. The total amount of water-intensive landscaped area at the facility broken down into the area planted primarily with plants not on the low water use plant list (except any area watered exclusively with direct use effluent or effluent recovered within the area of impact) and the surface area of all bodies of water (except bodies of water used primarily for swimming purposes, bodies of water filled and refilled exclusively with direct use effluent or effluent recovered within the area of impact, and bodies of water allowed under an interim water use permit if the bodies of water will be filled and refilled exclusively with direct use effluent after the permit expires).

6.6 NEW LARGE INDUSTRIAL USERS

6.6.1 Introduction

New large industrial users are industrial users that use in excess of 100 acre-feet of water per year and commence use after January 1, 2000. In the Second Management Plan, new large industrial users were defined as industrial users that use in excess of 100 acre-feet per year and commenced use after January 1, 1990. As of February, 1998, all of the new large industrial users identified in the Santa Cruz AMA were industrial users subject to specific conservation requirements discussed elsewhere in this chapter (e.g., metal mines, turf-related facilities, etc.).

6.6.2 Water Use by New Large Industrial Users

As of December, 1998, there are currently no industrial facilities in the Santa Cruz AMA, other than turf-related and sand and gravel facilities, which individually use more than 100 acre-feet of water during the year. There are 13 rights and permits with allotments of over 100 acre-feet per year. These rights are either being used to withdraw less than 100 acre-feet per year or are not being used at all. The allotments for these 13 rights and permits total over 6,400 acre-feet. Although some of this large volume could potentially be used to serve new large industrial users, growth potential is difficult to predict. New large commercial or manufacturing facilities are often constructed within water company service areas and are customers of the water provider. Commercial water use in the Santa Cruz AMA includes a significant portion of use related to the packing, shipping and processing of produce. In the future, new large produce processing facilities may be added to the AMA and may individually use more than 100 acre-feet of water. A new produce processing facility that uses more than 100 acre-feet of water annually would be regulated as a new large industrial user in the Third Management Plan. The Santa Cruz AMA will continue to examine water use related to industry in this area and may include in a management plan modification further conservation requirements.

6.6.3 Program Development and Issues

There were no requirements for new industrial users in the First Management Plan. In addition to the conservation requirements for all industrial users, the Second Management Plan contains a specific conservation requirement for new industrial users that use over 100 acre-feet of water per year. In the Second Management Plan, new industrial users were required to prepare and submit a water conservation plan addressing the water conservation opportunities at the facility. The user was required to develop a plan which:

- describes the level of water conservation that can be achieved,
- identifies the water uses and conservation opportunities within the facility,
- describes an ongoing water conservation education program for employees, and
- includes an implementation schedule.

The Department has determined that submitting a conservation plan is a reasonable requirement to continue for the Third Management Plan considering the large volume of unused allotments that could be used for new large industrial uses and the corresponding opportunity to design water conservation into new or expanding facilities. When facilities expand, even after operation has commenced, there are additional water conservation opportunities associated with being able to “build in” water conserving designs. This is typically more economical and more feasible than retrofitting a facility that is not expanding.

6.6.4 New Large Industrial User Conservation Program

The new large industrial user program for the Third Management Plan is identical to that of the Second Management Plan. In addition to the requirements that apply to All Industrial Users, new large industrial users must prepare and submit a water conservation plan to the director. However, if the user is required to submit a conservation plan under another section of this chapter, it can combine the plans and submit one plan.

The water conservation plan must show how much water conservation can be achieved at the facility. It must identify how water is used at the facility and what can be done to conserve in major water use areas. The plan must also detail an employee water conservation education program at the facility and describe when conservation measures will be implemented.

6.6.5 Industrial Conservation Requirements and Monitoring and Reporting Requirements for New Large Industrial Users

6-601. *Definitions*

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-201 of this chapter, “new large industrial user” means an industrial user that begins using more than 100 acre-feet of water per year for industrial purposes after January 1, 2000.

6-602. *Conservation Requirements*

- A.** *Not later than January 1, 2002 or within 180 days after the end of the first calendar year in which the facility first uses more than 100 acre-feet of water for industrial purposes, whichever is later, a new large industrial user shall submit to the director a plan to improve the efficiency of water use by the facility. The plan shall:*
- 1. Specify the level of water conservation that can be achieved assuming the use of the latest commercially available technology consistent with reasonable economic return;*
 - 2. Identify water uses and conservation opportunities within the facility, addressing water used for the following categories as appropriate: landscaping; space cooling; process-related water use, including recycling; and sanitary and kitchen uses;*
 - 3. Describe an ongoing water conservation education program for employees; and*
 - 4. Include an implementation schedule.*
- B.** *If a person required to submit a plan under subsection A of this section is required to submit a conservation plan under another section of this chapter, the person may combine the plans into a single conservation plan.*

REFERENCES

Brown, P., Gilbert, J., and D. Kopec, 1996. *Final Report to the Arizona Department of Water Resources, Turfgrass Irrigation Scheduling Using Weather Based Estimates of Evapotranspiration for High and Low Traffic Turfs*. Contract No. CA94TU103-00, May 31, 1996.

**APPENDIX 6
TURF-RELATED FACILITIES
SANTA CRUZ ACTIVE MANAGEMENT AREA**

Facility Name	Water Source	Water Supply	Right Number
GOLF COURSES			
Kino Springs GC	City of Nogales	Water Withdrawn from Wells	56-000002
Palo Duro GC	City of Nogales	Water Withdrawn from Wells	56-000002
Rio Rico GC	Type II	Water Withdrawn from Wells	58-112482
Tubac Ranch Resort GC	Type II	Water Withdrawn from Wells	58-111271