

CHAPTER SIX: INDUSTRIAL

6.1 INTRODUCTION

The Industrial Conservation Program for *the Fourth Management Plan for the Tucson Active Management Area* (4MP) is the same as in the Third Management Plan (3MP), with the exception of the program for Large-Scale Power Plants. The Industrial Conservation Program/Large-Scale Power Plant program is similar to the program in the 4MP for the other four Active Management Areas (AMAs). The objective of the Industrial Conservation Program is to move industrial users within the TAMA to the greatest level of water use efficiency economically attainable given the use of the latest available water conservation technology. The 4MP also provides incentives to encourage industrial users to replace groundwater supplies with renewable supplies. Efficient use of groundwater and the replacement of groundwater sources with renewable supplies contribute towards the achievement and maintenance of the Tucson Active Management Area (TAMA) safe-yield goal.

What is an Industrial water user?

An industrial user is a person who uses groundwater withdrawn pursuant to a Type 1 or Type 2 non-irrigation grandfathered right (GFR) or a withdrawal permit for an industrial use. For more information on industrial users, refer to the *Demand and Supply Assessment, Tucson Active Management Area*, (Assessment) (ADWR, 2010). These GFRs and permits (collectively referred to in this chapter as “industrial rights”) have annual volumetric groundwater allotments. The total volume of Type 2 GFRs in the TAMA was set immediately following enactment of the *1980 Groundwater Code* (Code). The total volume of water associated with Type 1 GFRs can increase over time as agricultural land with Irrigation Grandfathered Right (IGFRs) is retired from agricultural production and the IGFRs are converted to Type 1 GFRs. However total allowable groundwater use is reduced at the time of conversion of the IGFR to a Type 1 GFR. General Industrial Use (GIU) groundwater withdrawal permits are issued by ADWR if water service cannot be secured from a municipal provider and if the use of surface water or reclaimed water, or the purchase or lease of a GFR is not economically feasible. GIU permits expire after a specified period of years.

An industrial user may receive groundwater from an irrigation district. However, an industrial user may not receive groundwater from an irrigation district in excess of the amount it was entitled to receive on June 12, 1980 unless it has obtained a GFR or a GIU permit (A.R.S. §§ 45-497(B) and 45-515)).

There are also groundwater 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, public rights-of-way and large-scale cooling facilities not part of a large-scale power plant. These users are referred to in the Municipal Conservation Program as “individual users.”

Industrial Conservation Program Requirements

The TAMA 4MP Industrial Conservation Program includes general conservation requirements that apply to all industrial users. For those Industrial Conservation Programs where a water conservation plan was required by the 3MP, an update to that plan is required within 180 days after the industrial user receives written notice from ADWR of its 4MP conservation requirements. In addition, there are specific conservation requirements that apply to the following current or new industrial users in the TAMA:

- Turf-Related Facilities (≥ 10 acres)
- Sand and Gravel Facilities (>100 ac-ft/year)
- Metal Mining Facilities (>500 ac-ft/year)
- Large-Scale Power Plants (>25 megawatts)
- Large-Scale Cooling Facilities ($>1,000$ tons)
- Dairy Operations (monthly average ≥ 100 lactating cows/day)

- New Large Landscape Users (>10,000 square feet of water intensive landscape)
- New Large Industrial Users (>100 ac-ft/year)

In addition, all industrial users are required to comply with certain conservation requirements, including avoiding waste and making diligent efforts to recycle water.

6.1.1 TAMA Industrial Sector Description

Industrial uses of groundwater in the TAMA consist primarily of industrial processing, cooling and landscape watering. Industrial demand as a percentage of overall water use is higher in the TAMA than in any other AMA due to mining operations. Industrial users with groundwater rights or permits accounted for about 14 percent of the TAMA water use in 2013, or about 48,000 ac-ft. About 67 percent of this demand was for mining, 16 percent was for turf-related watering and the remaining demand was for sand and gravel operations, electric power generation, with a very small amount for dairies and other industrial uses. Groundwater was the primary source of supply, accounting for 85 percent. A small amount of poor quality groundwater, as well as direct and recovered reclaimed water, made up the remaining supply in 2013.

6.1.2 History of TAMA Industrial Regulatory Programs/4MP Goals Summary

The Industrial Conservation Programs for the various subsectors are based on the requirement in the Code to include a conservation program for all non-irrigation uses of groundwater. Conservation requirements are based on the use of the latest commercially available conservation technology consistent with reasonable economic return. The Code authorizes ADWR to include additional conservation requirements for non-irrigation uses if feasible in the 4MP, however, no additional conservation requirements for non-irrigation uses have been added for the 4MP.

6.1.3 Industrial Program Goal and Objectives for the TAMA 4MP

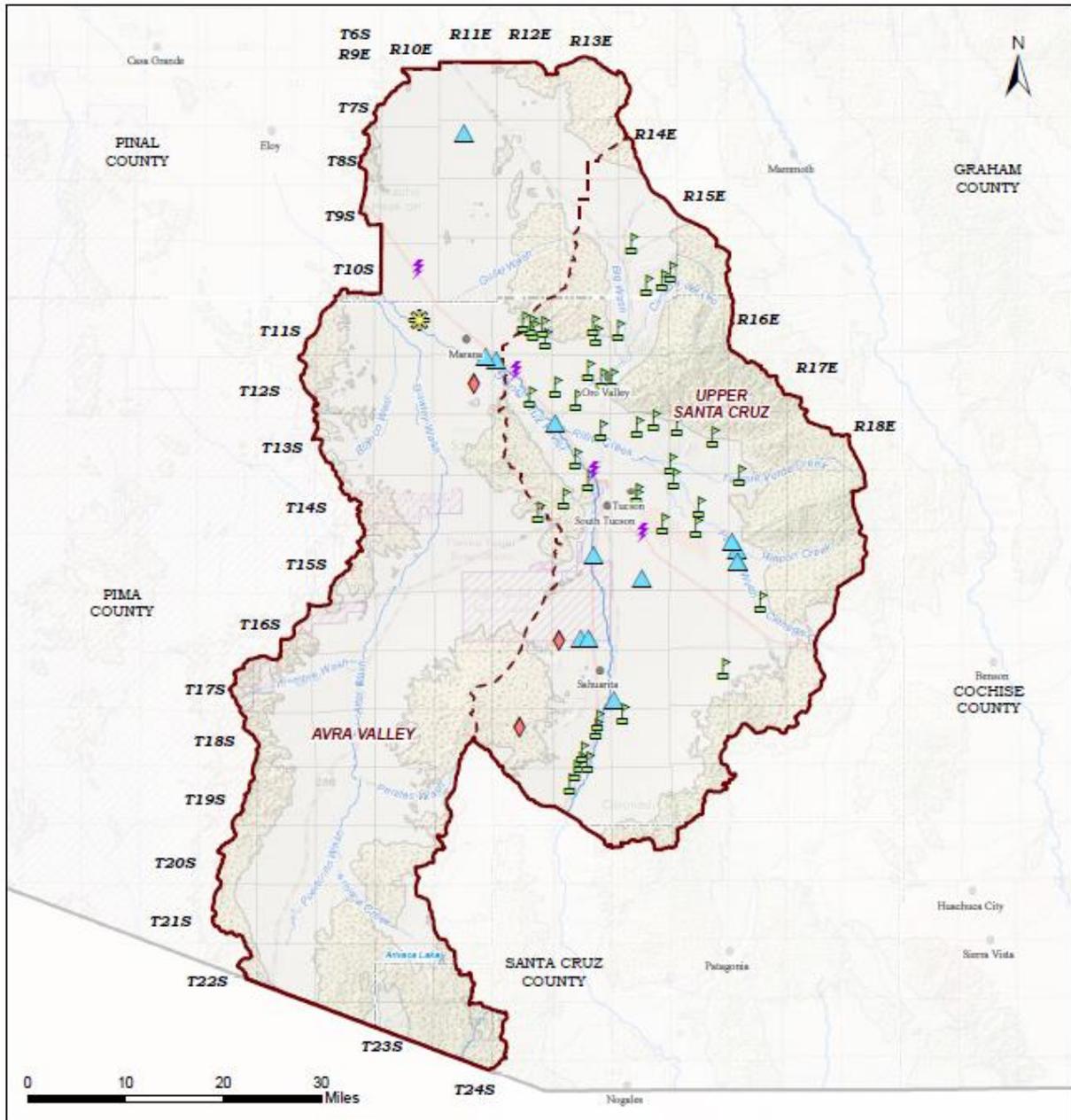
The purpose of the Industrial Conservation Program is to move industrial water users within the TAMA to the greatest level of efficiency economically attainable given use of the latest available water conservation technology. In addition to conservation, the program uses incentives to encourage the replacement of groundwater sources with renewable water supplies during the fourth management period. These measures will ensure that industrial users make effective strides toward contributing to the TAMA's statutorily mandated goal of safe-yield by the year 2025.

Conservation is an important tool in water demand management. 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 (1MP) became effective. This program has resulted in significant conservation through efficient use of water.

Industrial users have the legal authority to withdraw groundwater up to the annual allotment of their rights or permits subject to management plan conservation requirements. Because the cost of pumping groundwater is relatively low compared to the cost of other sources of water, there is no economic incentive for industrial users to switch to renewable water supplies. ADWR does not have the authority to require holders of industrial rights to use renewable supplies in place of groundwater, therefore it has developed meaningful incentives to encourage use of renewable supplies.

Some industrial users use surface water, reclaimed water or industrial wastewater. However, the majority of industrial water use is groundwater. The industrial sector uses a smaller volume of renewable water supplies than either the agricultural or municipal sector; therefore, the industrial sector's contribution to safe-yield is relatively small. As of 2013, the only industrial facilities that use reclaimed water in the

**FIGURE 6-1
TUCSON AMA INDUSTRIAL FACILITIES BY SUBSECTOR**



Locations of Selected Industrial Sub-Sectors

Tucson AMA



- Tucson AMA
- Sub-basin
- City or Town
- Indian Reservations
- Major Road
- Interstate Highway
- Lake
- Stream
- Park or Forest
- Military
- Hardrock
- State Boundary
- Township/Range
- County
- Dairy
- Metal Mining
- Power Generation
- Sand & Gravel
- Golf Courses

TAMA are turf-related facilities. However, almost all of this use is by individual users, not industrial right holders. Industrial right holders used 411 ac-ft of reclaimed water in 2013.

Users in several industrial categories have indicated that they may be interested in using renewable water supplies if such supplies were available and comparable in cost to groundwater. However, there are many factors that discourage industrial users from using renewable water supplies, including lack of proximity to renewable supplies, reliability, cost, supply ownership and water quality challenges. Use of this source by industrial users could require additional treatment to remove salts and other constituents.

In all the AMAs, significant amounts of industrial right allocations are unused. These unused allocations represent potential industrial groundwater pumping increases.

6.1.4 Industrial Conservation Programs – History and Background

All previous ADWR management plans have included conservation requirements for industrial users. The First Management Plan (1MP) requirements stressed water use efficiency and contained other general requirements. There were specific conservation programs only for 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 (2MP), additional conservation requirements were added for dairies and cattle feedlots. In addition, there was a more specific reclaimed water incentive provision added for turf-related facilities. In the 3MP, separate Industrial Conservation Program categories were added for large-scale cooling facilities, new large landscape users and new large industrial user subsectors. These three industrial water use groups were included in the “all industrial users” category in the 2MP, but were separated out to more clearly present the water use characteristics and specific conservation requirements for the third management period. The 4MP includes the same programs that made up the 3MP Industrial Conservation Program. There are eight Industrial Conservation Program subsectors in the 4MP for the TAMA: 1) turf-related facilities, 2) sand and gravel facilities, 3) mining facilities, 4) large-scale power plants, 5) large-scale cooling facilities, 6) dairy operations, 7) new large landscape users and 8) new large industrial users.

6.2 RELATIONSHIP OF THE INDUSTRIAL SECTOR TO ACHIEVEMENT OF THE TAMA WATER MANAGEMENT GOAL

Mining is the predominant industrial use in the TAMA; copper is the primary ore mined. The majority of the mines are located in the Upper Santa Cruz Sub-basin in the Green Valley/Sahuarita area. Other mines are located south and southwest of Marana in the Avra Valley Sub-basin. Turf-related facilities are the second largest industrial subsector in the TAMA. Golf courses comprise the majority of the turf-related facility demand in TAMA. There are 45 golf courses in the TAMA that qualify as turf-related facilities. Sand and gravel operations are generally located within stream channels. Electric power generation facilities are generally located along the I-10 corridor, and other industrial subsectors are scattered throughout the TAMA (*See Figure 6-1*).

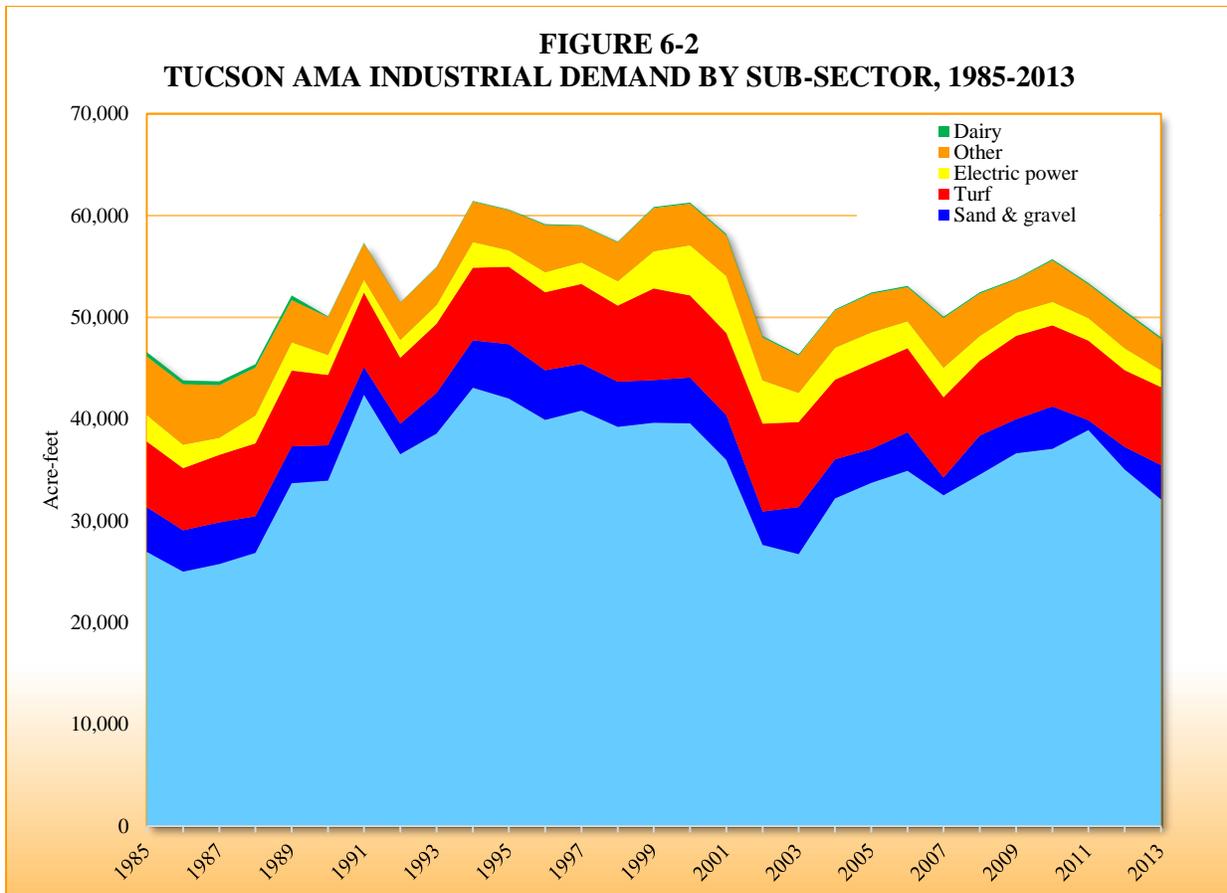
Industrial demand projections in the TAMA Assessment (ADWR, 2010) ranged from 56,000 to 71,000 ac-ft in the year 2025. In all projected scenarios in the 4MP, as in the Assessment, groundwater remains the primary water supply for the industrial sector.

**TABLE 6-1
TUCSON AMA INDUSTRIAL DEMAND & ALLOTMENT, 1985-2013 (ac-ft/year)**

	Groundwater	In-lieu Ground water	CAP Water	Reclaimed Water	Surface Water	Total Demand	Industrial Allotment
1985	45,896				720	46,616	175,162
1986	42,905				930	43,834	178,146
1987	42,770				934	43,704	187,575
1988	45,024				395	45,419	184,369
1989	51,990				178	52,168	186,198
1990	50,121					50,121	188,071
1991	57,337					57,337	188,088
1992	51,434			56		51,490	187,180
1993	54,902			63		54,964	186,239
1994	61,350			92		61,442	187,189
1995	60,500			89		60,589	203,427
1996	59,054			83		59,137	203,341
1997	58,968			78		59,046	203,021
1998	57,440					57,440	204,108
1999	60,582			248		60,831	202,388
2000	60,952		209	108		61,269	204,058
2001	56,435		1,624	132		58,191	192,267
2002	47,941			216		48,157	192,258
2003	45,271		160	533	400	46,364	191,816
2004	49,622		178	565	400	50,765	185,266
2005	51,116		175	732	400	52,423	178,322
2006	51,665		135	883	400	53,084	178,415
2007	48,404	1,028		617		50,049	178,392
2008	49,576	2,460		430		52,466	183,619
2009	45,017	8,240		545		53,802	163,168
2010	47,496	7,680		525		55,701	162,499
2011	43,750	8,995	82	547		53,374	165,913
2012	42,990	7,036	81	531		50,638	166,612
2013	40,612	6,547	451	411		48,020	165,819

The industrial sector in the TAMA has been relatively stable since 1985 with the exception of periodic fluctuations caused by mining, its largest subsector (*See Table 6-1*). Mining used more than 40,000 ac-ft of water in 1991, 1994, 1995 and 1997 (*See Figure 6-2*). The sum of the annual water allotments for GFRs and permits is also shown in Table 6-1. Industrial allotments can increase as IGFRs are retired to Type 1 GFRs. However, total allowable groundwater use is reduced at the time of conversion of the IGFR to a Type 1 GFR. The sum of the industrial allotments may decrease due to non-irrigation rights becoming inactive, or through extinguishment of GFRs. As of 2013, the annual industrial demand was less than one third of the total allotment of allowable industrial groundwater use under the Code. It also represents a potential for generation of Assured Water Supply (AWS) extinguishment credits. Under the AWS Rules,

GFRs may be extinguished to generate credits that may be used to meet the consistency with goal criterion of the AWS Rules. Extinguishment of a Type 1 GFR is based on the Type 1 acres, while extinguishment of a Type 2 GFR is based on the Type 2 allotment. Extinguishment credits reduce over time based on the year 2025 minus the year the right is extinguished. Mineral extraction Type 2 GFRs and groundwater withdrawal permits do not qualify for extinguishment under ADWR rules. The portion of the 2013 industrial allotment that was mining was 59,359 ac-ft. Historical water use in each of the industrial subsectors is shown in Table 6-2. Note that the columns “Non-Conservation Requirement/Non-Municipal Facilities” and “Drainage & Dewatering” are not included in the Total Industrial column since these industrial uses do not contribute to overdraft. For more information on these types of industrial uses, see the Assessment.



**TABLE 6-2
TUCSON AMA INDUSTRIAL DEMAND BY SUBSECTOR, 1985-2013 (ac-ft)**

Year	Total Industrial	Mining	Turf	Sand & Gravel	Electric power	Dairy	Feedlot	Other	Non-Conservation Requirement/Non-Municipal Facilities	Drainage & Dewatering
1985	46,616	26,945	6,423	4,420	2,598	449	21	5,761	9	29
1986	43,834	25,005	6,097	4,074	2,295	399	21	5,944	1	7
1987	43,704	25,774	6,622	4,090	1,687	356	9	5,168	1	2,787
1988	45,419	26,854	7,147	3,609	2,736	338	15	4,719	0	7
1989	52,168	33,687	7,458	3,640	2,774	461	25	4,124	44	1
1990	50,121	33,955	6,914	3,467	1,950	58	31	3,745	50	1

Year	Total Industrial	Mining	Turf	Sand & Gravel	Electric power	Dairy	Feedlot	Other	Non-Conservation Requirement/Non-Municipal Facilities	Drainage & Dewatering
1991	57,337	42,402	7,314	2,701	1,309	66	6	3,541	104	418
1992	51,490	36,531	6,453	3,026	1,772	50	25	3,633	182	302
1993	54,964	38,568	6,770	4,024	1,843	50	0	3,709	116	49
1994	61,442	43,072	7,130	4,664	2,524	70	0	3,984	161	1
1995	60,589	42,014	7,610	5,337	1,611	73	0	3,943	239	9
1996	59,137	39,916	7,651	4,897	1,970	85	0	4,619	137	931
1997	59,046	40,838	7,851	4,575	2,124	57	0	3,600	58	0
1998	57,440	39,243	7,484	4,416	2,427	85	0	3,784	67	0
1999	60,831	39,626	9,004	4,193	3,669	97	0	4,241	57	0
2000	61,269	39,573	8,085	4,497	4,935	115	0	4,064	162	0
2001	58,191	35,980	8,063	4,425	5,584	126	0	4,013	162	0
2002	48,157	27,644	8,636	3,262	4,268	132	0	4,216	116	0
2003	46,364	26,725	8,349	4,626	2,885	114	0	3,664	98	0
2004	50,765	32,210	7,797	3,847	3,160	88	0	3,664	151	2
2005	52,423	33,742	8,393	3,306	3,083	124	0	3,775	125	27
2006	53,084	34,905	8,249	3,807	2,656	110	0	3,357	165	27
2007	50,049	32,516	7,873	1,739	2,923	131	0	4,867	100	74
2008	52,466	34,552	7,346	3,851	2,422	139	0	4,157	617	42
2009	53,802	36,630	8,213	3,343	2,277	83	0	3,256	803	671
2010	55,701	37,081	7,966	4,168	2,305	120	0	4,060	1,454	567
2011	53,374	38,929	7,788	976	2,241	125	0	3,315	951	381
2012	50,639	35,046	7,539	2,216	2,164	158	0	3,516	1,181	444
2013	48,020	32,094	7,679	3,385	1,643	153	0	3,068	0	115

6.3 INCENTIVES FOR THE USE OF RENEWABLE SUPPLIES AND REMEDIAL GROUNDWATER

The TAMA 4MP contains incentives to increase the use of non-groundwater supplies. For example, ADWR has included a reclaimed water adjustment for turf-related facilities in the management plans. When determining a turf-related facility's compliance with its maximum annual water allotment within the TAMA, ADWR will count each acre-foot of direct use reclaimed water or reclaimed water recovered within the area of impact of storage that is used by the facility as 0.7 acre-foot of water. This adjustment does not apply to reclaimed water recovered outside the area of impact of the stored water. In addition to the reclaimed water adjustment, facilities using reclaimed water may apply to ADWR for an allotment addition to allow for leaching of salts below the root zone.

Legislation was enacted in 1997 and amended in 1999 that significantly revised the Water Quality Assurance Revolving Fund (WQARF) Program to provide incentives for the use of remediated groundwater to facilitate the treatment of contaminated groundwater. This legislation provides that ADWR shall account for most uses of groundwater withdrawn pursuant to an approved remedial action project as surface water when determining compliance with management plan conservation requirements (1999 Ariz. Sess. Law, H.B. 2189, § 51(B)). The criteria that must be met to qualify for this accounting are set forth in the legally enforceable provisions in Section 6-1504 of this chapter, entitled: *Remedial Groundwater Accounting for Conservation Requirements*. 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 Chapter 2. More information on ADWR's involvement in the WQARF Program is provided in Chapter 7.

6.4 NON-REGULATORY EFFORTS

ADWR has a program for water management assistance in the TAMA. Funding for the program comes from a portion of the annual withdrawal fees levied and collected from most persons withdrawing groundwater from non-exempt wells in the TAMA. Since the Water Management Assistance Program (WMAAP) began, the TAMA has funded several projects that promote prudent water management within the TAMA (*See Chapter 9 of this plan*).

6.5 INDUSTRIAL CONSERVATION PROGRAMS DESCRIPTION

The TAMA 4MP includes regulatory programs for the following eight industrial subsectors, as well as general requirements for all industrial uses:

- All Industrial Users
- Turf-Related Facilities (≥ 10 acres)
- Sand and Gravel Facilities (> 100 ac-ft/year)
- Mining Facilities (> 500 ac-ft/year)
- Large-Scale Power Plants (> 25 megawatts)
- Large-Scale Cooling Facilities ($> 1,000$ tons)
- Dairy Operations (monthly average ≥ 100 lactating cows/day)
- New Large Landscape Users ($> 10,000$ square feet of water intensive landscape)
- New Large Industrial Users (> 100 ac-ft/year)

Each Industrial Conservation Program is discussed under a separate subsection. Each subsection contains a description of the program followed by the regulatory requirements and any applicable appendices. In general, each of the subsections contains all or some of the following: an introduction, program goals and objectives, water use history by the subsector, challenges and objectives and program description.

6.6 ALL INDUSTRIAL USERS CONSERVATION PROGRAM DESCRIPTION

6.6.1 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 explained in more detail under other sections of this chapter. For example, a sand and gravel facility must comply with the requirement in this section to use plants from the ADWR Low Water Use/Drought Tolerant Plant List for the TAMA (*See <http://www.azwater.gov/azdwr/>*) for any landscaping at the facility, if applicable; and, in addition, must comply with the conservation requirements in Section 6.8 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, mining facilities, large-scale power plants, large-scale cooling facilities, dairy operations, 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.

6.6.2 Water Use by “Other Industrial Users”

“Other industrial users” in the TAMA used about 3,100 ac-ft of groundwater in 2013, which accounted for about nine percent of the total industrial groundwater withdrawals in the AMA in that year. Many different types of commercial and manufacturing uses are included in this category. Some of the largest users include

aerospace facilities, cement manufacturing plants, electronics plants, hospitals, bottling plants, shopping centers and resorts. Water uses commonly include cooling, landscaping, sanitary, kitchen and industrial process uses.

It is uncertain the extent to which water use by other industrial users will grow. It is anticipated that most future industrial development will be served by municipal providers because commercial and industrial development generally occurs within their service areas and therefore will be accounted for as municipal use.

6.6.3 All Industrial User Program Description

The TAMA 4MP conservation program for all industrial users is identical to the 3MP 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 otherwise reused.

Industrial users that are not regulated as turf-related facilities or new large landscape users are required to use plants listed on the ADWR Low Water Use/Drought Tolerant Plant List for the TAMA for landscaping 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. ADWR encourages all facilities to irrigate efficiently regardless of the type of vegetation planted. In addition, industrial users have been prohibited from serving groundwater to vegetation planted in a public right-of-way on or after January 1, 2002 unless the plants are on the ADWR Low Water Use/Drought Tolerant Plant List for the TAMA. Industrial users have also been prohibited from serving groundwater to a water feature in the right-of-way if installed after January 1, 2002.

6.7 TURF-RELATED FACILITIES

6.7.1 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 for human or animal consumption, turf-related watering for recreational and aesthetic purposes is considered a non-irrigation water use rather than an irrigation use. Turf-related facilities apply water for growing turf-grass 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.

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

6.7.2 Turf Program Goals and Objectives

For the 4MP, the Code allows ADWR to include additional conservation requirements for non-irrigation uses if feasible. ADWR has not modified the Turf-Related Facilities Program from the program included in the 3MP. Since the 1MP, the Turf-Related Facilities Program has included a maximum annual allotment for turf-related facilities, stressed water use efficiency and provided an incentive for the use of reclaimed water. ADWR allows facility managers flexibility in selecting conservation techniques most appropriate to each facility. During the development of each management plan through the 3MP, ADWR conducted extensive data collection and analysis to determine whether additional reductions in turf-related facility

allotments appeared feasible. Flexibility has been given in each management plan to turf-related facilities to account for varying weather conditions. First a three year averaging of water use was incorporated and then later, in some AMAs, a turf-related facility flexibility account. In each management plan prior to the 4MP, ADWR has increased the incentive to use reclaimed water for landscape irrigation. The objective is to reduce groundwater pumping for turf-related watering and replace that groundwater with reclaimed water to the maximum extent feasible to assist the TAMA in achieving safe-yield by 2025.

6.7.3 Turf Related Water Use History

ADWR has identified 122 turf-related facilities in the TAMA, including golf courses, parks, schools, cemeteries and common areas. Common areas within residential subdivisions are subject to regulation as turf-related facilities if they have 10 or more acres of water-intensive landscaping. During the fourth management period, ADWR will seek to identify any additional turf-related facilities in the TAMA. The location of TAMA turf-related facilities that are golf courses are shown in Figure 6-1.

Total water use by all turf-related facilities in the TAMA was 24,904 ac-ft in 2013. Ninety-one of these facilities received all or a portion of their water from municipal providers and were classified as individual users. Their water use is included in the water demand for the municipal sector. The remaining 29 turf-related facilities are industrial users that were either in existence before the Code and use Type 2 rights or were developed after the Code on retired agricultural land using Type 1 rights. This industrial subsector has grown moderately from using 6,423 ac-ft of water in 1985 to using 7,679 ac-ft in 2013. Total demand by industrial turf-related facilities is second only to the mining subsector in the TAMA.

In 2013, there were 45 golf courses in the TAMA; 17 were industrial users, while the other 28 were served by municipal water providers and thus categorized as individual users. Golf courses in the TAMA used about 20,167 ac-ft of water in 2013. Approximately 43 percent of this use was groundwater; the balance of the use was predominantly direct-use reclaimed water. Turf-related facilities that use any groundwater, regardless of whether they are industrial users or served by a municipal provider, must comply with a maximum annual water allotment based on the size and age of the facility.

6.7.4 Turf-Related Facilities Program Description

6.7.4.1 Maximum Annual Water Allotment

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. The total acreage of turf, low water use landscaped area and water surface area is multiplied by an acre-foot per acre rate to determine the allotment.

The allotment for all turf-related facilities in the TAMA is calculated by determining the actual acreage within the facility in each of the three landscaping categories mentioned above, and then multiplying the number of acres by the appropriate application rate (*See Table 6-3*). The approach used for these facilities allows expansion of landscaped area. Beginning with the 1MP, ADWR recognized that the latest conservation technology for golf courses includes course design which concentrates water-intensive landscaping into areas that 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 that came into existence after December 31, 1984 is therefore capped to encourage efficiency in design, construction, water application, and over-seeding practices. These water allotment caps are described below.

**TABLE 6-3
TUCSON AMA ANNUAL APPLICATION RATES
FOR TURF-RELATED FACILITIES**

Type of Use	Application Rate (ac-ft per acre)
Turf	4.6
Water Surface Acres	5.8
Low Water Use Landscaping	1.5

Golf course acreage that came into existence from January 1, 1985 through December 31, 1991

For golf courses within the TAMA, 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 ac-ft 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 ac-ft 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 reclaimed water or reclaimed water recovered within the area of impact is limited to an amount calculated by multiplying the number of holes within those turf acres by 0.8 ac-ft 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 within the TAMA, 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 ac-ft of water, plus any allotment additions described later in this section. This cap is sufficient to water 5 acres of turf at 4.6 ac-ft 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 direct use reclaimed water or reclaimed water recovered within the area of impact is limited to an amount calculated by multiplying the number of holes within the turf acres that came into existence after December 31, 1991 by 0.8 ac-ft 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.

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 4MP.

Reduction of Water-Intensive Landscaped Area

Conservation requirements for the fourth management period continue to provide an incentive to reduce water-intensive 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 ac-ft 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 five ac-ft 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 that will need only temporary supplemental water application after construction of a new or renovated facility. This allotment addition of up to 1.5 ac-ft 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 ADWR'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 that 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 turf-grass. Since most water supplies in the TAMA are of a quality that 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 ADWR for an allotment addition for leaching.

6.7.4.2 Additional Conservation Requirements

All turf-related facilities are required to prepare and maintain a water conservation plan within 180 days after notification of the conservation requirements. The plan update 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 that will minimize water-intensive landscaped areas consistent with reasonable use and enjoyment of the facility. Golf courses have a capped maximum annual allotment that 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 ADWR's Low Water Use/Drought Tolerant Plant List for the TAMA. 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.

6.7.4.3 Reclaimed Water Use Adjustment

Currently in the TAMA, reclaimed water is the only water supply that is expected to increase in availability throughout the fourth management period. Reclaimed water'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 of potential groundwater pollutants is avoided. Despite the availability and suitability of reclaimed water for turf watering, reclaimed water is currently underutilized as a source of water for turf-related facilities.

To encourage the maximum use of reclaimed water on turf-related facilities in the TAMA during the fourth management period, ADWR has maintained the reclaimed water incentive that was included in the 3MP. While the maximum annual water allotment will not change, each acre-foot of reclaimed water will be counted as 0.7 of an acre-foot when compliance with the maximum annual water allotment is determined. This adjustment does not apply to reclaimed water 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 reclaimed water adjustment, facilities using reclaimed water may apply to ADWR for an allotment addition to allow for leaching of salts below the root zone.

6.7.4.4 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.

6.7.4.5 Monitoring and Reporting Requirements

The TAMA 4MP 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 domestic uses at a park is not metered, 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.

6.8 SAND AND GRAVEL FACILITIES

6.8.1 Introduction

Regulated sand and gravel facilities are facilities that use more than 100 ac-ft of water from any source in a calendar year. Sand and gravel facilities typically 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 producers. 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.

Sand and gravel facilities in the TAMA used 3,385 ac-ft of water in 2013. Sand and gravel demand peaked in 1995 at 5,337 ac-ft. In 2013, there were 19 active sand and gravel operations in the TAMA. Increases in sand and gravel production and associated water use are closely tied to population growth and urbanization. Sand and gravel operations in the TAMA have historically relied solely on groundwater.

6.8.2 Sand and Gravel Facility Program Description

For the 4MP ADWR has not changed the Sand and Gravel Facility Program from the program included in the 3MP. The 4MP includes requirements for recycling wash water to improve water use efficiency, which can be applied by all sand and gravel operations. In addition to recycling wash water, sand and gravel facility operators must implement two additional conservation measures, included in the sand and gravel best management practices (BMP) program. There are two general BMP categories, 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 fourth management period.

As in the 3MP, sand and gravel operators will be required to evaluate specific water-saving methods and submit a conservation plan to ADWR during the fourth management period. The conservation plan must be submitted to the Director within 180 days after notification of the conservation requirements. The requirement to submit a conservation plan is carried over from the 3MP.

Implementation of water conservation practices or technologies can result in reduced costs which can lead to increased profits. Sand and gravel facility operators will 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 must 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
- Costs associated with regulatory permitting.

6.9 MINING FACILITIES

6.9.1 Introduction

ADWR regulates mining facilities that mine and process ores and use or have the potential to use more than 500 ac-ft of water per year. Copper is the primary product of the mines in the TAMA. Two mining techniques are used in the TAMA. Open-pit mining followed by milling and flotation are the predominant mining techniques. Leaching followed by solvent extraction and electrowinning (SX/EW) is also used at some locations. Water is used in almost all steps of the mining process. Conservation requirements address specific process steps to reduce overall water use.

There are three active mines and one inactive mine in the TAMA. ASARCO owns and operates two of the active mines. The ASARCO Mission mine is an open pit mine in the Sahuarita area. The ASARCO Silver Bell Mine is a surface leaching mine located near the Pinal AMA/TAMA boundary close to the Silver Bell Mountains. Freeport McMoRan owns and operates the largest of the TAMA open pit mines, the Sierrita mine, located just west of the Sahuarita/Green Valley area. The Twin Buttes Mine, located adjacent to the Sierrita mine, is currently inactive.

6.9.2 Mining Program Goals and Objectives

ADWR has the authority under the Code to include additional conservation requirements for non-irrigation uses if feasible in the 4MP. ADWR has not modified the Mining Program from the 3MP. ADWR's Mining Program has always been a performance based, best management practices type of program with the exception of the requirement to achieve a specified tailings density. With each subsequent management plan, the required tailings density has increased.

6.9.3 Mining Water Use History

In 2013, the mining subsector had a combined total of 59,359 ac-ft of grandfathered groundwater rights and permits available. In 2013, it used 32,094 ac-ft of water, approximately 54 percent of its total allotment. Mining has been the dominant industrial subsector in the TAMA since 1985 and has averaged about two-thirds of the sector's total demand (*See Table 6-2*). Mining water use in the TAMA shows two distinct troughs, one in the mid-1980s and another in the early 2000s. The highest year of mining occurred in 1994 when about 43,000 ac-ft of groundwater was used.

Mining in the TAMA has historically relied on groundwater. However, the Southern Arizona Water Rights Settlement Act gave ASARCO the right to use up to 10,000 ac-ft of CAP water from the Tohono O'odham Nation (TON) annually. ASARCO Mission Mine Complex, located adjacent to the San Xavier District of the TON, has historically received a portion of its groundwater supply from the TON's wells. In 1995, ASARCO pumped approximately 2,982 ac-ft of groundwater from three wells on the TON. In 2006, this amount had dropped to 842 ac-ft. Beginning in 2010, ASARCO began reporting receiving in-lieu water from the TON San Xavier District pursuant to A.R.S. § 45-841.01. Additionally, the TAMA mining sector used some direct CAP water starting in 2007.

6.9.4 Mining Conservation Program Description

The 4MP requirements for mines include the following provisions:

- Transport tailings at an average density of 48 percent solids by weight over a three-year running average at pre-1985 mines and at an average annual density of 50 percent at facilities built on or after 1985
- Reduce water loss from tailings impoundments by depositing tailings up slope from the free water surface in impoundments to reduce seepage, or by installing interceptor wells down gradient of impoundments to intercept seepage at pre-1985 mines
- Manage tailings impoundments to minimize the free water surface of stilling basins and recover decant water
- Recover and recycle tailings impoundment water
- Cap abandoned tailings impoundments to minimize water used for dust control
- Minimize water use in leaching processes
- Implement three of eight specified additional conservation techniques
- Comply with monitoring and reporting requirements

In the fourth management period, mines will be required to evaluate water conservation practices and technologies that may be implemented at their facility and submit these evaluations to ADWR in a long-range conservation plan.

6.10 LARGE-SCALE POWER PLANTS

6.10.1 Introduction

ADWR regulates power plants that produce or are designed to produce more than 25 megawatts of electricity. Two types of electric power plants are regulated in the 4MP: steam electrical plants and

combustion turbine plants. Steam electrical plants use cooling towers to dissipate excess heat that builds up in the steam electrical generation process. Combustion turbine plants do not use steam to generate electricity. Rather than using steam to drive a turbine, combustion turbines use compressed air. Steam electric power plants use more water than combustion turbine plants. Regardless of whether the plant is a steam electric power plant or a combustion turbine plant, the major consumptive use of water at electrical plants is evaporation from cooling towers. Because of the large volume of water used in towers to condense steam, conservation requirements for the electric power plants require facilities to achieve a high level of efficiency in cooling tower operation. Some large-scale power plants, such as combustion turbine plants, utilize cooling towers for dissipation of heat for auxiliary loads. These are regulated in this subsector, but the conservation requirements are similar to the Large-Scale Cooling Facility Program.

There are two large-scale power plants located in the TAMA. The larger Wilson Sundt Generating Station (formerly the Irvington Station), is operated by Tucson Electric Power. It is located near Irvington Road and Interstate 10. The Saguaro Station, operated by Arizona Public Service, is a peaking plant and is located in the northern portion of the TAMA in Pinal County. Total water demand for the electric power generation sector in the TAMA was 2,598 ac-ft in 1985 and 1,643 ac-ft in 2013. In 2001, at the height of the California energy crisis, electric power generation water demand spiked to more than 5,500 ac-ft because of an increase in local power generation and associated water use. The power sector in the TAMA currently holds over 10,000 ac-ft of annual withdrawal authority.

6.10.2 Large-Scale Power Plant Conservation Program Description

6.10.2.1 *Steam electric power plants*

The 4MP requires steam electric power plants to achieve an annual average of 15 cycles of concentration in cooling towers. The cycles of concentration requirement applies only when cooling towers are dissipating heat created during the generation of electricity. In addition to achieving 15 cycles of concentration, facilities must divert the maximum possible volume of on-site wastewater (other than blowdown water and sanitary wastewater) to the cooling process so long as this steam does not have a negative impact on the cycles of concentration or any other environmental requirement.

Facilities may be granted adjustments to their full cycles of concentration requirements in cases where, due to the quality of recirculating water, adhering to the 15 cycles of concentration standard is likely to result in equipment damage or blowdown water exceeding environmental discharge standards. Cooling towers at power plants are exempted from cycles of concentration requirements during the first 12 months in which reclaimed water constitutes more than 50 percent of tower water supply. After this period, facilities may request an adjustment to full cycles of concentration requirements for reclaimed water-served towers based on the water quality of the reclaimed water supply.

Facilities may apply to the Director to use alternative conservation technologies in place of achieving 15 cycles of concentration if the use of the proposed alternative technologies will result in equal or greater water savings. Facilities may also request a waiver from conservation requirements on the basis that cooling tower blowdown water is completely reused. Facilities must periodically measure and annually report blowdown water volumes, make-up water volumes, and the chemical concentration of blowdown and make-up water. In addition, facilities must report the amount of electricity generated, periods when they are not generating electricity, and the volume of water used for purposes other than electric power generation.

6.10.2.2 *Combustion Turbine Plants*

Cooling towers associated with combustion turbine power plants with a capacity of 250 tons or more have the following requirements:

- Fully operational cooling towers with 250 tons or more of cooling capacity must achieve either 120 mg/L of silica or 1,200 mg/L of total hardness in recirculating water, whichever is reached first, before blowing down;
- If needed, a facility may apply for an alternative blowdown standard for any towers using reclaimed water. During the initial 12-month period during which 50 percent or more of the water used by a tower is reclaimed water, the tower is exempt from blowdown standards;
- If needed, a facility may apply for an alternative blowdown standard for any tower if compliance with blowdown requirements would likely result in damage to cooling towers or associated equipment or exceedance of environmental discharge standards because of the accumulation of limiting constituent other than silica or total hardness.
- Facilities must record monthly and report annually the volumes of tower make-up water and blowdown water and the concentrations of silica, total hardness, or approved alternative constituent, in both make-up water and blowdown water.

6.11 LARGE-SCALE COOLING FACILITIES

6.11.1 Introduction

Currently, there are no large-scale cooling facilities subject to conservation requirements in the TAMA. However, ADWR has elected to continue to include this program in the 4MP. For the 4MP ADWR has not changed the Large-Scale Cooling Facility Conservation Program from the program included in the 3MP.

The purpose of cooling tower operation is to cool water that has absorbed the heat load of a heat-generating process. Cooling towers are present at a variety of commercial, industrial and institutional facilities. Large-scale cooling facilities are defined as facilities with an aggregate cooling capacity of a minimum of 1,000 tons. The minimum cooling unit that is added to create the aggregate total of 1,000 tons is 250 tons in size. Most large-scale cooling facilities are served by municipal water providers. These facilities are termed individual users. Water providers are responsible for the individual users' compliance with industrial conservation requirements unless they have notified ADWR of the existence of the individual user as provided in section 5-709 of the Municipal Conservation Requirements (*See Chapter 5 of this plan*) or ADWR has given the individual user notice of the conservation requirements, in which case the individual user is responsible for compliance. Large-scale cooling facilities served by their own wells are regulated directly by ADWR and are responsible for complying with industrial conservation requirements.

6.11.2 Large-Scale Cooling Facility Conservation Program

The following 4MP conservation requirements apply to cooling towers that are located at large-scale cooling facilities and that have 250 tons or more of cooling capacity:

- Fully operational cooling towers with 250 tons or more of cooling capacity must achieve either 120 mg/L of silica or 1,200 mg/L of total hardness in recirculating water, whichever is reached first, before blowing down;
- If needed, a facility may apply for an alternative blowdown standard for any towers using reclaimed water. During the initial 12-month period during which 50 percent or more of the water used by a tower is reclaimed water, the tower is exempt from blowdown standards;
- If needed, a facility may apply for an alternative blowdown standard for any tower if compliance with blowdown requirements would likely result in damage to cooling towers or associated equipment or exceedance of environmental discharge standards because of the accumulation of limiting constituent other than silica or total hardness.
- Facilities must record monthly and report annually the volumes of tower make-up water and blowdown water and the concentrations of silica, total hardness, or approved alternative constituent, in both make-up water and blowdown water.

6.12 DAIRY OPERATIONS

6.12.1 Introduction

ADWR regulates dairy operations that annually house a monthly average of 100 or more lactating cows per day. The majority of water use at dairies occurs for animal drinking needs, udder washing, barn cleanup, and animal cooling.

In 2013, the one active dairy in the TAMA used 153 ac-ft of groundwater. This subsector currently has 210 ac-ft of annual groundwater withdrawal authority. Dairies in the TAMA have historically relied on groundwater.

6.12.2 Dairy Operation Conservation Program Description

6.12.2.1 Allotment Based Requirements

The amount of water required by a dairy depends upon the number of lactating cows and non-lactating animals housed at the dairy, the breed of cow, dairy management practices and the type and effectiveness of the water use technology employed. Table 6-4 summarizes daily water needs for each dairy process, assuming use of appropriate water conservation technology and practices.

The water needs listed are based on two assumptions: 1) milking is done three times per day per lactating animal and 2) cooling is done during the summer for at least a portion of the herd.

The assumptions of Table 6-4 are the basis for the annual water allotments for dairies. When calculating the total annual allotment, lactating cows are allotted 105 gallons per animal per day (GAD) while non-lactating animals are allotted 20 GAD. The allotment is calculated annually and will vary with the monthly average number of lactating cows and non-lactating animals per day present at the dairy each year.

**TABLE 6-4
TUCSON AMA WATER NEEDS AT A TYPICAL DAIRY**

Operation	Water Use Allocation (gallons per day)	
	Lactating Cow	Non- Lactating Animal
Drinking needs ¹	30	15
Udder washing - based on 72 minutes/day at 8 gallons/minute; 16 cows per milking (two per group). Varies with number of milkings per day. ¹	35	0
Barn cleanup and sanitizing. Varies with number of milkings per day. ¹	20	0
Animal cooling management option, site-specific	10	0
Calf barn cleanup	0	5
Milk cooling tower (if present)	5	0
Miscellaneous	5	0
Total	105	20

¹ Assumes three milkings per day

Upon application, ADWR may approve an additional allocation of water for a dairy operation above its annual allotment if the dairy operation demonstrates that one or more of the following conditions exist:

- Milking is being done more than three times daily;
- Technologies that are designed to achieve industry health and sanitation objectives, such as the recommended pre-milking sanitation method, are being used;
- Animal cooling technologies designed to increase milk production are being used.

In consideration of weather variability, ADWR has included a three-year averaging provision in the maximum annual water allotments for the fourth management period. The water use of three consecutive years can be averaged to determine if compliance with the 4MP allotment has been achieved.

6.12.2.2 Best Management Practices Requirements

As an alternative to the annual allotment requirement, a dairy may submit an application to the Director to be regulated under the Best Management Practices Program (BMP Program). This program requires implementation of conservation and management practices to maximize efficiency in the following water use categories:

- Delivery of drinking water for dairy animals;
- Udder washing and milk parlor cleaning;
- Corral design and maintenance;
- Cleaning and sanitizing milking equipment;
- Dust control, calf housing cleaning, and feed apron flushing;
- Dairy animal cooling; and
- Dairy animal feed preparation.

Implementation of all the standard BMPs listed in Appendix 6B will have a specific measurable result. While most of the standard BMPs are applicable to all dairies, the water use activities associated with some of the standard BMPs may not exist at all dairies. If a dairy cannot implement a standard BMP, the dairy may apply to implement a substitute BMP with a specific measurable result that demonstrates a water savings equivalent to the water savings associated with the standard BMP. If a substitute BMP is not possible, the dairy may apply for a waiver of the standard BMP. The Director may grant a waiver only for the following standard BMPs: BMP 2.1.2 (Udder Wash System); BMP 2.2.2 (Milking Parlor Floor and Wall Washing); BMP 4.1.1 (Milk Cooling and Vacuum Pump); all of the standard BMPs in Water Use Category No. 5 (Dust Control, Calf Housing Cleaning, and Feed Apron Flushing); all of the standard BMPs in Water Use Category No. 6 (Dairy Animal Cooling); and all of the standard BMPs in Water Use Category No. 7 (Dairy Animal Feed Preparation).

Five years after a dairy is accepted for regulation under the BMP Program, the Director will review the dairy's BMPs to determine if they are still appropriate. If the BMPs are no longer appropriate due to an expansion of the dairy or a change in management practices, the Director will require a modification to the BMPs.

6.13 NEW LARGE LANDSCAPE USERS

6.13.1 Introduction

No new large landscape users served by their own wells, rather than a municipal water provider, were identified during the third management period. However, ADWR has elected to continue to include this program in the 4MP. For the 4MP, ADWR has not changed the New Large Landscape Users Program included in the 3MP.

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 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 6.7 of this chapter.

6.13.2 New Large Landscape User Conservation Program Description

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: 10,000 square feet (20,000 square feet for hotels and motels) plus twenty percent of the area in excess of 10,000 square feet (20,000 square feet for hotels and motels); or the total surface area of all bodies of water within the facility that qualify as water intensive landscaped area and that are allowed under the Lakes Bill (A.R.S. § 45-131, *et seq*).

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 reclaimed water or reclaimed water recovered within the area of impact, bodies of water used primarily for swimming, bodies of water filled and refilled exclusively with direct use reclaimed water or reclaimed water recovered within the area of impact and bodies of water allowed under an interim water use permit pursuant to the Lakes Bill (A.R.S. §§ 45-131-139) if the body of water will be filled and refilled exclusively with direct use reclaimed water or reclaimed water recovered within the area of impact after the permit expires. 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 grey water 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.

6.14 NEW LARGE INDUSTRIAL USERS

6.14.1 Introduction

ADWR has not identified any new large industrial users in the TAMA since 2015. However, ADWR has elected to continue to include this program in the 4MP. For the 4MP ADWR has not modified the New Large Industrial Users Program included in the 3MP.

New large industrial users are industrial users that use in excess of 100 ac-ft of water per year and commenced use after January 1, 2019. Most of the new large industrial users identified in the TAMA are industrial users subject to specific conservation requirements discussed elsewhere in this chapter (e.g., metal mines, turf-related facilities, etc.).

6.14.2 New Large Industrial User Conservation Program Description

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 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 it 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.

6.15 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR ALL INDUSTRIAL USERS**6-1501. 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 this chapter shall have the following meanings:

1. *“IMP” means First Management Plan for the TAMA.*
2. *“2MP” means Second Management Plan for the TAMA.*
3. *“3MP” means Third Management Plan for the TAMA.*
4. *“4MP” means Fourth Management Plan for the TAMA.*
5. *“5MP” means Fifth Management Plan for the TAMA.*
6. *“ADWR’s Low Water Use/Drought Tolerant Plant List for the TAMA” means the list of low water use/drought tolerant plants found on ADWR’s website, www.azwater.gov including any modifications to the list.*
7. *“Industrial process purposes” means water that is used by an industrial user directly in the creation or manufacture of a product.*
8. *“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.*
9. *“Industrial user” means a person who uses water for industrial uses.*
10. *“TAMA” means the Tucson Active Management Area.*
11. *“Reclaimed water” has the same definition as effluent in A.R.S. § 45-101.*
12. *“Remedial Groundwater” means groundwater withdrawn pursuant to an approved remedial action project, but does not include groundwater withdrawn to provide an alternative water supply pursuant to A.R.S. § 49-282.03.*
13. *“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.*
14. *“Wastewater” means water that is discharged after an industrial or municipal use, excluding reclaimed water.*

6-1502. Conservation Requirements

Beginning on January 1, 2019 or upon commencement of water use, whichever is later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, an industrial user who uses groundwater shall comply with the following requirements:

1. *Avoid waste; use only the amount of water from any source, including reclaimed water, 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 ADWR's Low Water Use/Drought Tolerant Plant List for the TAMA 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 6-1601, et seq., or as a new large landscape user under section 6-2201, et seq., is exempt from this requirement.*
5. *Do not serve or use groundwater for the purpose of watering landscaping plants planted on or after January 1, 2002 within any publicly owned right-of-way of a highway, street, road, sidewalk, curb, or shoulder that is used for travel in any ordinary mode, including pedestrian travel, unless the plants are listed in ADWR's Low Water Use/Drought Tolerant Plant List for the TAMA. The Director may waive this requirement upon request from the industrial user if the industrial user demonstrates to the satisfaction of the Director that plants listed in ADWR's Low Water Use/Drought Tolerant Plant list for the TAMA cannot grow in the publicly owned right-of-way because of high elevation or low light conditions, such as a freeway underpass. This requirement does not apply to any portion of a residential lot that extends into a publicly owned right-of-way.*
6. *Do not serve or use groundwater for the purpose of maintaining water features, including fountains, waterfalls, ponds, water courses, and other artificial water structures, installed after January 1, 2002 within any publicly owned right-of-way of a highway, street, road, sidewalk, curb or shoulder which is used for travel in any ordinary mode, including pedestrian travel. This requirement does not apply to any portion of a residential lot that extends into a publicly owned right-of-way.*

6-1503. Monitoring and Reporting Requirements

A. Requirements

For calendar year 2019 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 5MP, an industrial user who uses groundwater shall, except as provided for in subsection B below, include the following information in its annual report required by A.R.S. § 45-632:

1. *The total quantity of water by source, including reclaimed water, withdrawn, diverted, or received during the reporting year for industrial process purposes, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et. seq.*
2. *The total quantity of water by source, including reclaimed water, withdrawn, diverted, or received during the reporting year for purposes other than industrial process purposes, as*

measured with a measuring device in accordance with ADWR'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 reclaimed water, is used.*
6. *The number of acres of land that were planted with plants listed in ADWR's Low Water Use/Drought Tolerant Plant List for the TAMA during the calendar year as a result of removal of plants not on ADWR's Low Water Use/Drought Tolerant Plant List for the TAMA. An industrial user regulated as a turf-related facility under sections 6-1601, et seq., or as a new large landscape user under section 6-2201, 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 ac-ft 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 ac-ft per year and withdraws more than 10 ac-ft of groundwater during the calendar year pursuant to those rights or permits.

6-1504. Remedial Groundwater Accounting for Conservation Requirements

A. Accounting

Remedial groundwater 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 remedial 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 prior to 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 remedial 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 Remedial 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 Remedial 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 Remedial Groundwater that will be pumped annually pursuant to the project, the time period to which the document applies, and the annual authorized volume of Remedial Groundwater that may be withdrawn pursuant to the project.*
2. *The purpose for which the Remedial 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 remedial groundwater accounting for conservation requirements as provided in subsection A of this section, Remedial 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 remedial groundwater accounting for conservation requirements shall indicate in its annual report under A.R.S. § 45-632 the volume of groundwater withdrawn and used during the previous calendar year that qualifies for the accounting.

6.16 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR TURF-RELATED FACILITIES

6-1601. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes, and section 6-1501 of this chapter, unless the context otherwise requires, the following words and phrases used in sections 6-1601 through 6-1605 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 owned and operated as a single integrated facility and 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 along a boundary, or part of the same master planned community. Two parcels of land are contiguous if they are separated only by one or more of the following: a road, easement, or right-of-way.*
- 4. “Direct use reclaimed water” means reclaimed water transported directly from a facility regulated pursuant to Title 49, Chapter 2, Arizona Revised Statutes, to an end user. Direct use reclaimed water does not include reclaimed water that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes.*
- 5. “First management period new acres” means a water-intensive landscaped area or a low water use landscaped area that came into existence or was substantially commenced after December 31, 1984 and before January 1, 1992, but that was not substantially commenced prior to January 1, 1985.*
- 6. “First management period new turf acres” means turf acres that came into existence or were substantially commenced after December 31, 1984 and before January 1, 1992, but that was not substantially commenced prior to January 1, 1985.*
- 7. “Golf course” means a turf-related facility used for playing golf with a minimum of nine holes and including any practice areas.*
- 8. “Hole” means a component of a golf course consisting of a tee and a green. A practice area or driving range is not a hole.*

9. *“Landscape watering” means the application of water from any source, including reclaimed water, to a water-intensive landscaped area, a low water use landscaped area or revegetation acres within a turf-related facility.*
10. *“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, watered by a permanent water application system and planted primarily with plants listed in ADWR’s Low Water Use/Drought Tolerant Plant List for the TAMA. Mature vegetation planted in a low water use landscaped area must cover at least 50 percent of the area.*
11. *“Newly turfed area” means, for a calendar year, an area of land planted with a warm-season grass species that was not planted with any warm-season grass species during the preceding calendar year.*
12. *“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.*
13. *“Post-1991 acres” means a water-intensive landscaped area or a low water use landscaped area that was neither in existence nor was substantially commenced as of December 31, 1991.*
14. *“Pre-1985 acres” means a water-intensive landscaped area or a low water use landscaped area that was either in existence or was substantially commenced as of December 31, 1984.*
15. *“Reclaimed water recovered within the area of impact” means reclaimed water that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes, and recovered within the stored reclaimed water’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.*
16. *“Revegetation acres” means acreage within and/or contiguous to a turf-related facility that has been approved by the Director as qualifying for a revegetation allotment addition.*
17. *“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.*
18. *“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.*
19. *“Turf acres” means an area of land that is watered with a permanent water application system and planted primarily with plants not listed in ADWR’s Low Water Use/Drought Tolerant Plant List for the TAMA.*
20. *“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 ten or more acres. Turf-related facilities include, but are not limited to, those facilities listed in Appendix 6A.*

21. *“Water-intensive landscaped area” means, for a calendar year, the turf acres and water surface acres within a turf-related facility.*
22. *“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.*

6-1602. Conservation Requirements for Turf-Related Facilities

A. Maximum Annual Water Allotment

Beginning with calendar year 2019 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 5MP, an industrial user who uses water at a turf-related facility during the calendar year 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 6-1603.

B. Conservation Plan

No later than 180 days after receiving official notice of conservation requirements, an industrial user who uses water at a turf-related facility shall have prepared a conservation plan for the facility that 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 5MP.

C. Limiting Water-Intensive Landscaped Area

1. *Beginning on January 1, 2019 or upon commencement of landscape watering, whichever occurs later, and continuing until the first compliance date for any substitute requirement in the 5MP, an industrial user who uses water at a turf-related facility that is not a cemetery or a golf course shall design, construct, and maintain the grounds of the facility in a manner that 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-related facility’s primary purposes.*
2. *Beginning on January 1, 2019 or upon commencement of landscape watering, whichever occurs later, and continuing until the first compliance date for any substitute requirement in the 5MP, 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 ADWR’s Low Water Use/Drought Tolerant Plant List for the TAMA, 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.*

6-1603. 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 6-5 by the application rates listed in Table 6-5 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 6-5.

TABLE 6-5
APPLICATION RATES, CONDITIONS & ALLOTMENT RESTRICTIONS
FOR TURF-RELATED FACILITIES
(From January 1, 2019 until the first compliance date for
any substitute conservation requirement in the 5MP)

For All Facilities:	Application Rate: (ac-ft per acre per calendar year)
1. Pre-1985 Acres	
Turf Acres	4.6
Water Surface Acres	5.8
Low Water Use Landscaped Area	1.5
Conditions and Restrictions:	
<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>	
2. First Management Period New Acres	
Turf Acres	4.6
Water Surface Acres	5.8
Low Water Use Landscaped Area	1.5
Conditions and Restrictions:	
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 ac-ft of water, plus any allotment additions as determined under subsection B of this section.</i>	
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 reclaimed water or reclaimed water 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 reclaimed water or reclaimed water recovered within the area of impact if the body of water will be filled and refilled entirely with direct use reclaimed water or reclaimed water recovered within the area of impact after the permit expires.</i>	
3. Post-1991 Acres	
Turf Acres	4.6
Total Water Surface Area	5.8
Low Water Use Landscaped Area	1.5
Conditions and Restrictions:	
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 ac-ft of water, plus any allotment additions as determined under subsection B of this section.</i>	

For All Facilities:	Application Rate: (ac-ft per acre per calendar year)
<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 reclaimed water or reclaimed water 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 reclaimed water or reclaimed water recovered within the area of impact if the body of water will be filled and refilled entirely with direct use reclaimed water or reclaimed water 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 initially 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 ac-ft 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 ac-ft 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 that are planted within the revegetation area are listed in ADWR's Low Water Use/Drought Tolerant Plant List for the TAMA 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 6-1703.A; and*
- d. *All of the water applied to the revegetation acres 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, 2019 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. *Removed Acreage Addition*

A turf-related facility that removes pre-1985 acres of water-intensive landscaped area in existence within the facility prior to January 1, 1990 shall receive an allotment addition equal to the allotment the acres would have received pursuant to the 4MP if they had not been removed, provided that the acres were given a water allotment in the 1MP, the 2MP, the 3MP, or the 4MP.

5. *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 1,000 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 5MP, 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 use groundwater or surface water in any manner that violates Chapter 1 or Chapter 2 of Title 45, Arizona Revised Statutes.

6-1604. Compliance with Maximum Annual Water Allotment

A. Reclaimed Water Use Adjustment

For purposes of determining compliance with the maximum annual water allotment requirement, the Director shall count each acre-foot of direct use reclaimed water or reclaimed water 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 2019 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 ac-ft.*
- 2. Following each calendar year in which groundwater 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 reclaimed water, as adjusted under subsection A of this section, 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 of this subsection 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 calendar 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 calendar 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 of this section, 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 subsection B, paragraph 3, subparagraph b of this section, the industrial user who uses water at the facility is in violation of the facility's maximum annual water allotment for that calendar 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.

6-1605. 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, 2019 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 as 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 as a civil engineer or land surveyor.*
 - 4. Any other documentation upon approval by the Director.*
- B. For calendar year 2019 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 SMP, 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 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 ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
 - 2. The total quantity of reclaimed water, disaggregated by direct use reclaimed water,*

reclaimed water recovered within the area of impact, and reclaimed water recovered outside the area of impact that was withdrawn or received during the calendar year for landscape watering purposes at the facility, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.

3. *The number of turf acres within the facility during the calendar year, not including newly turfed area.*
 4. *The number of acres of total water surface area 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 acres of total water surface area 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 6-1603, subsection B, paragraph 2 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 6-1603, subsection B, paragraph 3.*
 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 reclaimed water, 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 that are under the*

same ownership or operation if the allotments for the contiguous facilities are combined pursuant to section 6-1603, subsection C. The annual report shall report water use and landscaped areas of the contiguous facilities as required in subsection B of this section.

6.17 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR SAND AND GRAVEL FACILITIES

6-1701. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-1501 of this chapter, unless the context otherwise requires, the following words and phrases used in sections 6-1702 and 6-1703 shall have the following meanings:

- 1. "Alternative water supply" means a water source other than groundwater of drinking water quality.*
- 2. "Sand and gravel facility" means a facility that produces sand and gravel and that uses more than 100 ac-ft 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.*

6-1702. Conservation Requirements

A. Standard Conservation Requirements

Beginning on January 1, 2019 or upon commencement of water use, whichever occurs later, and continuing thereafter until the first compliance date for any substitute conservation requirements in the 5MP, 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 that demonstrates water savings equivalent to any of the technologies or techniques listed in subparagraphs a through d, and that 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; or*
 - d. *A technology or technique designed to reduce water use for cleaning that is not included in subparagraphs a through c of this paragraph that demonstrates water savings equivalent to any of the measures listed in subparagraphs a through c and that 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;*

1. *The quantity of water reclaimed from disposal ponds or clarifiers during the calendar year, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
2. *The quantity of water from any source, including reclaimed water, supplied to the wash plant during the calendar year, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
3. *The quantity of water from any source, including reclaimed water, supplied to the asphalt plant during the calendar year, as measured with a measuring device in accordance with ADWR'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 reclaimed water, 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.*

6.18 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR METAL MINING FACILITIES

6-1801. 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 shall have the following meanings:

1. *“Abandoned tailings impoundment” means a tailings impoundment that the owner/operator of a metal mining facility does not plan to use for additional disposal of tailings.*

2. *“Alternative water supply” means a water source other than groundwater of drinking water quality.*
3. *“Decant water” means water removed from the stilling basin of a tailings impoundment either by gravity flow into a decant tower or by pumping.*
4. *“Heap and dump leaching” means the extraction of minerals using acid solutions applied to metallic ores that have been removed from their original location and heaped or dumped in a new location.*
5. *“In situ leaching” means the extraction of metallic ores using acid leaching of ores that are not moved from their original natural location.*
6. *“In situ leaching sites” mean those portions of metal mining facilities at which in situ leaching and associated copper recovery operations occur, including surface applications of acid leaching solutions and deep well injection of acid leaching solutions.*
7. *“Large-scale metal mining and processing facility” means an industrial facility at which mining and processing of metallic ores is conducted and that uses or has the potential to use more than 500 ac-ft of water per reporting year. For the purposes of this definition, the annual water use or potential annual water use includes all water from any source, including reclaimed water, used or projected to be used within or by the facility, regardless of the nature of the use.*
8. *“Mill concentrator” means the structure at open-pit metal mines within which metallic ore is crushed and the flotation process is used to remove minerals.*
9. *“Mill circuit” means the flow of water used in the process of crushing ore, recovering copper at the mill concentrator, and transporting and disposing of tailings, and includes recovery of water at the tailings impoundments for reuse in the mill concentrator.*
10. *“Post-1984 metal mining facility” means either:*
 - a. *A large-scale metal mining and processing facility that does not qualify as a pre-1985 metal mining facility, including any expanded or modified portion of the facility, or*
 - b. *Any expanded or modified portion of a pre-1985 metal mining facility if the expansion or modification includes one or more new tailings impoundments, new mill circuits, or new leaching facilities, and was not substantially commenced as of December 31, 1984.*
11. *“Pre-1985 metal mining facility” means a large-scale metal mining and processing facility at which the mining and processing of metallic ores was occurring as of December 31, 1984, or that was substantially commenced as of December 31, 1984, and includes any expanded or modified portion of such a facility if the expansion or modification includes one or more new tailings impoundments, new mill concentrator circuits, or new wells, and was substantially commenced as of December 31, 1984.*
12. *“Seepage water” means water that has infiltrated from tailings impoundments into the material underlying the tailings impoundments.*

13. *“Substantially commenced as of December 31, 1984” means, with regard to the construction, expansion, or modification of a large-scale metal mining and processing facility, that the owner or operator of the facility had obtained all pre-construction permits and approvals required by federal, state, or local governments for the construction, expansion, or modification of the facility by December 31, 1984, or had made a substantial capital investment in the physical on-site construction of the project in the 12 months prior to December 31, 1984.*
14. *“Tailings” mean the slurry of water and fine-grained waste rock material remaining after minerals have been removed in the mill concentrator and excess water has been recovered and returned to the mill concentrator.*
15. *“Tailings impoundment” means the final disposal site for tailings generated in the milling circuit.*

6-1802. Conservation Requirements for Pre-1985 Metal Mining Facilities

Beginning on January 1, 2019 and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, an industrial user who uses water at a pre-1985 metal mining facility shall comply with the following requirements:

A. Management of Tailings Density

The industrial user shall transport tailings to the tailings impoundment area at the maximum density possible consistent with reasonable economic return; but, beginning with calendar year 2019, the three-year average density of the tailings during transport shall be 48 percent solids by weight or greater during the period consisting of the reporting year and the previous two years. The Director may reduce the density required for a period of time determined by the Director if the industrial user demonstrates that, due to the shutdown of ore processing or tailings transport equipment or due to the density of ore being mined, a three-year average density of 48 percent or greater cannot be achieved.

B. Management of Pre-sliming/Interceptor Wells

The industrial user shall comply with one of the following:

1. *Deposit a layer of tailings immediately up-slope from the free water level in each tailings impoundment. The tailings layer shall be 12 inches or more in thickness and shall minimize soil surface permeability.*
2. *Drill interceptor wells down-gradient from each tailings impoundment. The interceptor wells shall be designed, located, and operated in such a manner as to intercept the maximum amount of seepage water possible from each tailings impoundment. Water recovered from the interceptor wells shall be reused at the mining facility.*

C. Management of Water in Tailings Impoundments

The industrial user shall minimize the free water surface area in each tailings impoundment by complying with all of the following:

1. *Manipulate tailings that have been disposed of in a tailings impoundment, and manage new disposal of tailings in an impoundment, to create stilling basins that increase the rate of recovery of decant water from the stilling basins, and to minimize the free water surface area of stilling basins.*
2. *Use decant towers, barge pumps, or sump pumps to recycle water from each tailings impoundment back to the mill concentrator.*
3. *Expand decant tower barge pumping capacity where necessary to increase the capacity to recycle water from each tailings impoundment back to the mill concentrator.*
4. *Use, to the maximum extent possible, tailings impoundment water, rather than pumping additional groundwater.*

D. Capping Abandoned Tailings Impoundments

The industrial user shall cap each abandoned tailings impoundment in a manner that minimizes the quantity of water used for dust control purposes and/or revegetation.

E. Heap and Dump Leaching

The industrial user shall apply water to heap and dump leaching operations in a manner that minimizes water use to the extent practicable, consistent with reasonable economic return.

F. Additional Conservation Measures

An industrial user who uses water at a metal mining facility shall comply with three of the following eight conservation measures at those portions of the facility that do not qualify as in situ leaching sites:

1. *When revegetating abandoned mine-related areas, utilize drought-tolerant vegetation.*
2. *Utilize multiple decant towers in single impoundments to increase decant rate.*
3. *Convert piping to high density polyethylene piping to increase density of transported tailings.*
4. *Harvest and reuse storm water runoff on site.*
5. *Reuse pit dewatering water.*
6. *Reduce evaporation from free-standing water surfaces in addition to evaporation reduction from stilling basins.*
7. *Reduce water used for dust control by reducing the number and extent of haul trips, using road binders, converting to conveyors for material transport, or using another dust control measure that reduces water use.*
8. *Reduce water used for delivery of acid/water solution for heap or dump leaching operations by using delivery methods that use less water than sprinkler delivery.*

6-1803. Conservation Requirements for Post-1984 Metal Mining Facilities

Beginning on January 1, 2019 or upon commencement of operations at the facility, whichever is later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, an industrial user who uses water at a post-1984 metal mining facility shall comply with conservation requirements applicable to pre-1985 metal mining facilities as prescribed in section 6-1802, subsections C through F, and the following additional requirements:

A. Management of Tailings Impoundments

The industrial user shall design and construct any post-1984 tailings impoundments to maximize recovery of water from the stilling basins and to minimize seepage water. Any interceptor wells down gradient of tailings impoundments shall be constructed to maximize recovery of seepage water.

B. Management of Tailings Density

The industrial user shall design, construct, and operate any post-1984 mill concentrators and their associated tailings transport systems to achieve the maximum tailings densities possible consistent with reasonable economic return, but the average annual density of tailings during transport shall not be less than 50 percent solids by weight.

C. Management of In Situ Leaching

The industrial user shall utilize water for in situ leaching in a manner that minimizes water use to the extent practicable, consistent with reasonable economic return.

6-1804. Alternative Conservation Program

An industrial user who uses water at a metal mining facility may apply to the Director to use conservation technologies other than the technologies prescribed in sections 6-1802 and 6-1803, whichever is applicable. The Director may approve the use of alternative conservation technologies if the Director determines that both of the following apply:

- 1. The industrial user has filed with the Director a detailed description of the proposed alternative technologies and the water savings that can be achieved by the use of these technologies.*
- 2. The industrial user has demonstrated to the satisfaction of the Director that the latest commercially available conservation technology consistent with reasonable economic return will be used.*

6-1805. Modification of Conservation Requirements for Metal Mining Facilities

- A. An industrial user who uses water at a metal mining facility may apply to the Director to modify conservation requirements prescribed in sections 6-1802 and 6-1803, whichever is applicable, for any year in which compliance with the conservation requirements would likely result in violation of any federal, state, or local environmental standards or regulations. To apply for a modification of conservation requirements, an industrial user shall submit a request in writing to the Director that includes the following information:*

1. *Documentation describing the conservation requirement(s) for which compliance with this requirement is likely to result in violation of environmental standards, and the environmental standards that are likely to be violated.*
 2. *The proposed modification to the conservation requirements.*
- B. *The Director shall grant a request for modification of conservation requirements if the Director determines that compliance with the conservation requirements prescribed in sections 6-1802 and 6-1803, whichever is applicable, would likely result in a violation of any federal, state, or local environmental standards or regulations.*

6-1806. *Preparation of a Long-Range Conservation Plan for Metal Mining Facilities*

By January 1, 2019 or three months prior to commencement of operations at the facility, whichever is later, an industrial user who uses water at a metal mining facility shall submit to the Director an updated long-range water conservation plan that describes the existing or planned design, construction, and operation of the facility, including a description of the ore type, method of mining, and method of metal extraction. The plan shall include an evaluation of the use of the latest commercially available conservation technology consistent with reasonable economic return. Prior to submitting the plan, the industrial user shall analyze the feasibility of applying the following conservation practices or technologies at the mine and shall report the results in the plan:

1. *Using alternative water sources for mining and metallurgical needs, including determining the source and volume of the alternative water sources being analyzed.*
2. *Reducing tailings impoundment evaporation through the application of the latest commercially available technologies for minimizing evaporation from the impoundments and through the application of improved tailings management.*
3. *Minimizing water use for dust suppression through the use of road binders, conveyors, paved haul roads, and other available dust control mechanisms.*
4. *Increasing tailings densities to 55 percent solids or greater by weight.*

The industrial user may include any additional conservation techniques or technologies in the plan. The plan shall include a schedule of the approximate dates for implementation of any conservation practices or technologies that the industrial user intends to implement.

6-1807. *Monitoring and Reporting Requirements for Metal Mining Facilities*

A. *Water Measurement and Reporting*

For calendar year 2019 or the calendar year in which the facility commences operation, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute requirement in the 5MP, an industrial user who uses water at a metal mining facility shall include in its annual report required by A.R.S. § 45-632 the following information:

1. *The quantity of water from any source, including reclaimed water, used during the calendar year for each of the following purposes: dust control, tailings revegetation,*

domestic use, and transportation of tailings to tailings impoundments. The quantity of water used for dust control and tailings revegetation shall be separately measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq. The quantity of water used for domestic use and transportation of tailings to tailings impoundments may be estimated.

- 2. The quantity of make-up water from any source, including reclaimed water, used during the calendar year for each of the following purposes: equipment washing, leaching operations, and milling operations, as separately measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
- 3. The quantity of water from any source, including reclaimed water, reclaimed during the calendar year from each of the following: tailings impoundments and pit dewatering. These quantities shall be separately measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R-12-15-901, et seq.*
- 4. The tons of ore milled during the calendar year.*
- 5. The tons of ore stacked to heap and/or dump leach during the calendar year.*
- 6. The tons of ore vat leached during the calendar year.*
- 7. The tons of material mined during the calendar year.*
- 8. The tons of mineral produced from mill circuits and from leach circuits during the calendar year.*
- 9. The average gallons of water consumed per ton of mineral produced during the calendar year.*
- 10. The average percentage of solids by weight in tailings transported to the tailings impoundments during the calendar year and in each of the previous two years.*
- 11. The average annual depth of water at the deepest portion of the stilling basin(s).*
- 12. Copies of aerial photos of tailings impoundments, with scale indicated, for use by ADWR in determining the wetted surface area of the tailings impoundments.*
- 13. A description of the additional conservation measures applied at the metal mining facility as prescribed in section 6-1802, subsection F.*

B. Contiguous Facilities

A single annual report may be filed for a pre-1985 metal mining facility and a post-1984 metal mining facility that are contiguous and owned by the same owner. The combined operations of the metal mining facilities shall be described pursuant to reporting requirements specified in subsection A of this section.

6.19 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR LARGE-SCALE POWER PLANTS

6-1901. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-1501 of this chapter, unless the context otherwise requires, the following words and phrases shall have the following meanings:

1. *“Blowdown water” means water discharged from a cooling tower recirculating water stream to control the buildup of minerals or other impurities in the recirculating water.*
2. *“Combustion turbine electric power plant” means an industrial facility that produces or is designed to produce more than 25 megawatts of electricity by utilizing an internal combustion engine in which the expanding gases from the combustion chamber drive the blades of a turbine which turns a generator to produce electricity.*
3. *“Conservative mineral constituent” means a component of recirculating water in a cooling tower, the concentration of which is not significantly modified by precipitation, loss to the atmosphere, or the addition of treatment chemicals.*
4. *“Continuous blowdown and make-up” means patterns in cooling tower operation that include continuous blowdown and make-up or frequent periodic blowdown and make-up of recirculating water.*
5. *“Cycles of concentration” means the ratio of the concentration of total dissolved solids, other conservative mineral constituent, or electrical conductivity in the blowdown water to the concentration of this same constituent or electrical conductivity in the make-up water. This can be calculated by dividing the total make-up water by the total blowdown water.*
6. *“Reclaimed water-served cooling tower” means a cooling tower served by a make-up water supply that on an annual average basis consists of 50 percent or more reclaimed water.*
7. *“Fully operational cooling tower” means a cooling tower that is functioning to dissipate heat from a large-scale power plant that is generating electricity.*
8. *“Large-scale power plant” means an industrial facility that produces or is designed to produce more than 25 megawatts of electricity including steam electric power plants and combustion turbine plants.*
9. *“Limiting constituent” means a chemical, physical, or biological constituent present in recirculating cooling tower water that, due to potential physical or biological factors or due to potential exceedance of any federal, state, or local environmental standards upon discharge as blowdown, should not be allowed to accumulate in recirculating cooling tower water above a certain concentration.*
10. *“Make-up water” means the water added back into the cooling tower recirculating water stream to replace water lost to evaporation, blowdown, or other mechanisms of water loss.*
11. *“Steam electric power plant” means an industrial facility that produces or is designed to produce more than 25 megawatts of electricity by utilizing the Rankin Steam Cycle in which*

water is heated, turns into steam and spins a steam turbine which drives an electrical generator.

6-1902. Conservation Requirements for Steam Electric Power Plants

A. Conservation Requirements

Beginning on January 1, 2019 or upon commencement of water use, whichever occurs later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, an industrial user who uses groundwater at a steam electric power plant shall comply with the following requirements:

- 1. An annual average of 15 or more cycles of concentration shall be achieved during periods when the steam electric power plant is generating electricity.*
- 2. The maximum amount of wastewater feasible, excluding blowdown water and sanitary wastewater, shall be diverted to the cooling process so long as this stream does not have a negative impact on the cycles of concentration or any other environmental requirement.*

B. Cycles of Concentration Adjustment Due to the Quality of Recirculating Water

An industrial user who uses groundwater at a steam electric power plant may apply to the Director for an adjustment to the cycles of concentration requirements set forth in subsection A of this section if compliance with the cycles of concentration requirements would likely result in damage to cooling towers or associated equipment or exceedance of federal, state or local environmental discharge standards because of the quality of recirculating water. To apply for an adjustment to the cycles of concentration requirements based on recirculating water quality, an industrial user shall submit a request in writing to the Director that includes the following information:

- 1. Historic, current and projected water quality data for the relevant constituent(s).*
- 2. Documentation describing the potential damage to cooling towers or associated equipment, or documentation of environmental standards that are likely to be exceeded, whichever applies.*

The Director shall grant the request if the Director determines that compliance with the cycles of concentration requirements set forth in subsection A of this section would likely result in damage to cooling towers or associated equipment or exceedance of federal, state, or local environmental discharge standards because of the quality of recirculating water. Any cycles of concentration adjustment granted pursuant to this subsection shall apply only while the quality of recirculating water would cause compliance with the cycles of concentration requirements to likely result in damage to cooling towers or associated equipment or exceedance of federal, state or local environmental discharge standards.

C. Exemption and Cycles of Concentration Adjustment Due to the Quality of Reclaimed Water Make-up Water Supplies

- 1. The cycles of concentration requirements set forth in subsections A and B of this section do not apply to any reclaimed water-served cooling tower at a steam electric power plant*

during the first 12 consecutive months in which more than 50 percent of the water supplied to the cooling tower is reclaimed water.

2. *Within 30 days after the 12-month exemption period expires, the industrial user who uses water at the steam electric power plant may apply to the Director for a cycles of concentration adjustment to lower the cycles of concentration requirement for the reclaimed water-served cooling tower if compliance with the requirement would not be possible due to the presence of a limiting constituent in the reclaimed water supplying the tower. To apply for an alternative cycles of concentration requirement to address such a limiting constituent, an industrial user shall submit a request in writing to the Director that includes the following information:*
 - a. *The limiting constituent(s) that is present in the reclaimed water supplying the tower that results in the need to blow down a greater annual volume of water than that required in subsection A of this section.*
 - b. *Documentation describing the concentration at which this limiting constituent(s) should be blown down and the reason for the alternative cycles of concentration.*

The Director shall grant the request if the Director determines that the presence of a limiting constituent in the reclaimed water supplying the cooling tower results in the need to blow down a greater annual volume of water than that required in subsection A of this section. Any cycles of concentration adjustment granted pursuant to this paragraph shall apply only while the tower qualifies as a reclaimed water-served cooling tower.

D. Substitute Conservation Requirements

1. *An industrial user who uses groundwater at a steam electric power plant 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 subsection A.*
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 SMP.*

E. Waiver

An industrial user who uses groundwater at a steam electric power plant may apply to the Director for a waiver of any applicable conservation requirement in subsection A of this section by submitting a detailed, long-term plan for beneficial reuse of 100 percent of blowdown water

outside the cooling circuit, including an implementation schedule. Reuse of blowdown water includes the discharge of blowdown water into pipes, canals, or other means of conveyance if the discharged water is transported to another location at the plant or off the plant for reuse.

The Director shall grant a waiver request if the Director determines that implementation of the plan will result in the beneficial reuse of 100 percent of blowdown water outside the cooling circuit. If a waiver request is granted, the industrial user shall implement the plan in accordance with the implementation schedule submitted to and approved by the Director.

6-1903. Conservation Requirements for Combustion Turbine Electric Power Plants

- A. *Beginning on January 1, 2019 or upon commencement of water use, whichever occurs later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, an industrial user who uses groundwater at a combustion turbine electric power plant shall comply with the following requirement:*

Each fully operational cooling tower with greater than or equal to 250 tons of cooling capacity at the combustion turbine electric power plant facility shall achieve a cycles of concentration level that results in blowdown water being discharged at an average annual minimum of either 120 milligrams per liter (mg/L) silica or 1,200 mg/L total hardness, whichever is reached first.

B. *Exemptions and Alternative Blowdown Standards*

1. *The requirement set forth in subsection A of this section does not apply to a combustion turbine electric power plant in any year in which the beneficial reuse exceeds the conservation requirement.*
2. *The requirement set forth in subsection A of this section does not apply to any reclaimed water-served cooling tower at a combustion turbine electric power plant during the first 12 consecutive months in which more than 50 percent of the water supplied to the cooling tower is reclaimed water.*

Within 30 days after the 12-month period expires, the person using water at the reclaimed water-served cooling tower may apply to the Director to use an alternative blowdown level from that required in subsection A of this section if compliance with the blowdown requirement would not be possible due to the presence of a limiting constituent other than silica or total hardness in the reclaimed water supplying the cooling tower. To apply for an alternative blowdown level to address such a limiting constituent, an industrial user shall submit a request in writing to the Director which includes the following information:

- a. *The limiting constituent other than silica or total hardness that is present in the reclaimed water supplying the cooling tower which results in the need to blow down a greater annual volume of water than that required under subsection A of this section.*
- b. *Documentation describing the concentration at which this limiting constituent should be blown down and the reason for the alternative blowdown level.*

The Director shall grant the request if the Director determines that the presence of a limiting constituent other than silica or total hardness in the reclaimed water supplying the cooling tower results in the need to blow down a greater annual volume of water than that required under subsection A of this section. Any alternative blowdown level granted

pursuant to this paragraph shall apply only while the cooling tower qualifies as a reclaimed water-served cooling tower.

3. *A combustion turbine electric power plant may apply to the Director to use an alternative blowdown level from that required in subsection A of this section if compliance with the blowdown requirement would likely result in damage to cooling towers or associated equipment or exceedance of federal, state or local environmental discharge standards because of the accumulation of a limiting constituent other than silica or total hardness in recirculating water. To apply for an alternative blowdown level for such a limiting constituent, an industrial user shall submit a request in writing to the Director which includes the following information:*
 - a. *Historic, current and projected water quality data for the relevant limiting constituent(s).*
 - b. *Documentation describing the potential damage to cooling towers or associated equipment, or documentation of environmental standards that are likely to be exceeded, whichever applies.*

The Director shall grant the request if the Director determines that compliance with the blowdown level set forth in subsection A of this section would likely result in damage to cooling towers or associated equipment or exceedance of federal, state, or local environmental discharge standards because of the accumulation of a limiting constituent other than silica or total hardness in recirculating water.

6-1904. Monitoring and Reporting Requirements

A. Monitoring and Reporting Requirements for Steam Electric Power Plants

1. *For calendar year 2019 or the calendar year in which water use first commences, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute requirement in the 5MP, an industrial user who uses groundwater at a steam electric power plant shall include in its annual report required by A.R.S. § 45-632 the following information:*
 - a. *Source of water providing make-up water to each cooling tower at the facility.*
 - b. *For each cooling tower at the facility that is exempt from cycles of concentration requirements pursuant to section 6-1902, subsection C, paragraph 1 or for which a cycles of concentration adjustment was granted pursuant to section 6-1902, subsection C, paragraph 2, the percentage of water served to the tower during the year that was reclaimed water.*
 - c. *For all fully operational cooling towers subject to cycles of concentration requirements under section 6-1902, subsection A:*
 - i. *The total quantity of blowdown water discharged from the cooling towers for each month or partial month when the facility was generating electricity during the calendar year.*

B. Monitoring and Reporting Requirements for Combustion Turbine Electric Power Plants

For calendar year 2019, or the calendar year in which water use first commences, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the 5MP, an industrial user who uses groundwater at a large-scale electric power plant that is a combustion turbine electric power plant shall include in its annual reports required by A.R.S. § 45-632 the following information for all cooling towers with 250 tons or more of cooling capacity at the facility:

- 1. Capacity in tons of each cooling tower.*
- 2. For each cooling tower at the facility that is exempt from the requirements of 6-1903, subsection A pursuant to section 6-1903, subsection B, paragraph 2 or for which an alternative blowdown level has been granted, pursuant to section 6-1903, subsection B, paragraph 2, the percentage of water served to the cooling tower during the year that was reclaimed water.*
- 3. The quantity of water from any source, specified by source, that was used for make-up water on an annual basis during the calendar year as measured with a measuring device in accordance with ADWR's measuring device rules. A.A.C. R12-15-901, et seq.*
- 4. The quantity of water that was blown down on an annual basis during the calendar year as measured with a measuring device in accordance with ADWR's measuring device rules. A.A.C. R12-15-901, et seq.*
- 5. The average annual concentrations of silica, total hardness or other approved limiting constituent established under section 6-1903, subsection B, paragraph 2 or 3, in make-up and blowdown water during the calendar year, reported in mg/L or other measurement units established under section 6-1903, subsection B, paragraph 2 or 3, and either:*
 - a. Determined by direct analysis; or*
 - b. Calculated based on average monthly electrical conductivity readings for those portions of each month when cooling towers were fully operational if the following conditions have been met: (a) correlations between electrical conductivity and silica, between electrical conductivity and total hardness or between electrical conductivity and another approved limiting constituent established pursuant to section 6-1903 subsection B, paragraph 2 or 3, have been established over a period of one year or more in make-up and blowdown water; and (b) documentation of these correlations has been provided to the Director.*

6.20 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR LARGE-SCALE COOLING FACILITIES

6-2001. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-1501 of this chapter, unless the context otherwise requires, the following words and phrases used in section 6-2002 and 6-2003 shall have the following meanings:

1. *“Blowdown water” means water discharged from a cooling tower recirculating water stream to control the buildup of minerals or other impurities in the recirculating water.*
2. *“Conservative mineral constituent” means a component of recirculating water in a cooling tower, the concentration of which is not significantly modified by precipitation, loss to the atmosphere, or the addition of treatment chemicals.*
3. *“Cycles of concentration” means the ratio of the concentration of a conservative mineral constituent or electrical conductivity in the blowdown water to the concentration of this same constituent or electrical conductivity in the make-up water.*
4. *“Reclaimed water-served cooling tower” means a cooling tower served by a make-up water supply that on an annual average basis consists of 50 percent or more reclaimed water.*
5. *“Fully operational cooling tower” means a cooling tower that is functioning to dissipate heat.*
6. *“Large-scale cooling facility” means a facility that has control over cooling operations with a total combined cooling capacity greater than or equal to 1,000 tons. For the purposes of this definition, the minimum cooling tower size that shall be used to determine total facility cooling capacity is 250 tons. A large-scale cooling facility does not include a large-scale power plant that utilizes cooling towers to dissipate heat.*
7. *“Large-scale power plant” means an industrial facility that produces or is designed to produce more than 25 megawatts of electricity.*
8. *“Limiting constituent” means a chemical, physical, or biological constituent present in recirculating cooling tower water that, due to potential physical or biological factors or due to potential exceedance of any federal, state, or local environmental standards upon discharge as blowdown, should not be allowed to accumulate in recirculating cooling tower water above a certain concentration.*
9. *“Make-up water” means the water added back into the cooling tower recirculating water stream to replace water lost to evaporation, blowdown, or other mechanisms of water loss.*

6-2002. Conservation Requirements

A. Conservation Requirements for Large-Scale Cooling Facilities

Beginning on January 1, 2019 or upon commencement of water use, whichever occurs later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the SMP, an industrial user who uses water at a large-scale cooling facility shall comply with the following requirement:

Each fully operational cooling tower with greater than or equal to 250 tons of cooling capacity at the facility shall achieve a cycles of concentration level that results in blowdown water being discharged at an average annual minimum of either 120 mg/l silica or 1,200 mg/l total hardness, whichever is reached first.

B. Exemptions and Alternative Blowdown Standards

1. *The requirement set forth in subsection A of this section does not apply to a large-scale cooling facility in any year in which 100 percent of facility blowdown water is beneficially reused.*
2. *The requirement set forth in subsection A of this section does not apply to any reclaimed water-served cooling tower at a large-scale cooling facility during the first 12 consecutive months in which more than 50 percent of the water supplied to the cooling tower is reclaimed water.*

After the 12-month period expires, the person using water at the reclaimed water-served cooling tower may apply to the Director to use an alternative blowdown level from that required in subsection A of this section if compliance with the blowdown requirement would not be possible due to the presence of a limiting constituent other than silica or total hardness in the reclaimed water supplying the cooling tower. To apply for an alternative blowdown level to address such a limiting constituent, an industrial user shall submit a request in writing to the Director that includes the following information:

- a. *The limiting constituent other than silica or total hardness that is present in the reclaimed water supplying the tower which results in the need to blow down a greater annual volume of water than that required under subsection A of this section.*
- b. *Documentation describing the concentration at which this limiting constituent should be blown down, and the reason for the alternative blowdown level.*

The Director shall grant the request if the Director determines that the presence of a limiting constituent other than silica or total hardness in the reclaimed water supplying the cooling tower results in the need to blow down a greater annual volume of water than that required under subsection A of this section. Any alternative blowdown level granted pursuant to this paragraph shall apply only while the tower qualifies as a reclaimed water-served cooling tower.

3. *An industrial user may apply to the Director to use an alternative blowdown level from that required in subsection A of this section if compliance with the blowdown requirement would likely result in damage to cooling towers or associated equipment or exceedance of federal, state, or local environmental discharge standards because of the accumulation of a limiting constituent other than silica or total hardness in recirculating water. To apply for an alternative blowdown level for such a limiting constituent, an industrial user shall submit a request in writing to the Director that includes the following information:*
 - a. *Historic, current, and projected water quality data for the relevant limiting constituent(s).*
 - b. *Documentation describing the potential damage to cooling towers or associated equipment, or documentation of environmental standards that are likely to be exceeded, whichever applies.*

The Director shall grant the request if the Director determines that compliance with the blowdown level set forth in subsection A of this section would likely result in damage to cooling towers or associated equipment or exceedance of federal, state, or local

environmental discharge standards because of the accumulation of a limiting constituent other than silica or total hardness in recirculating water.

6-2003. Monitoring and Reporting Requirements

For calendar year 2019, or the calendar year in which water use first commences, whichever is later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirement in the SMP, an industrial user who uses water at a large-scale cooling facility shall include in its annual report required by A.R.S. § 45-632 the following information for all cooling towers with 250 tons or more of cooling capacity at the facility:

- 1. Capacity in tons of each cooling tower.*
- 2. Number of days per month that each cooling tower was fully operational.*
- 3. For each cooling tower at the facility that is exempt from cycles of concentration requirements under section 6-2002, subsection B, paragraph 2 or for which an alternative blowdown level has been granted, pursuant to section 6-2002, subsection B, paragraph 3, the percentage of water served to the tower during the year that was reclaimed water.*
- 4. The quantity of water from any source, specified by source, that was used for make-up water on a monthly basis during the calendar year as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
- 5. The quantity of water that was blown down on a monthly basis during the calendar year as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
- 6. The average monthly concentrations of silica, total hardness or other approved limiting constituent established under section 6-2002, subsection B, paragraph 2 or 3, in make-up and blowdown water for those portions of each month when cooling towers were fully operational during the calendar year, reported in mg/l or other measurement units established under section 6-2002, subsection B, paragraph 2 or 3, and either:*
 - a. Determined by direct analysis; or*
 - b. Calculated based on average monthly electrical conductivity readings for those portions of each month when cooling towers were fully operational if the following conditions have been met: (a) correlations between electrical conductivity and silica, between electrical conductivity and total hardness, or between electrical conductivity and another approved limiting constituent established pursuant to section 6-2002 subsection B, paragraph 2 or 3, have been established over a period of one year or more in make-up and blowdown water; and (b) documentation of these correlations has been provided to the Director.*

6.21 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR DAIRY OPERATIONS

6-2101. 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 6-2102 through 6-2105 of this chapter shall have the following meanings:

1. *“Dairy animal” means a lactating cow or a non-lactating animal present at a dairy operation.*
2. *“Dairy operation” means a facility that houses an average of 100 or more lactating cows per day during a calendar year as calculated in section 6-2102.*
3. *“Dairy wastewater” means any water that has been put to a beneficial use at the dairy operation, including water containing dairy animal wastes.*
4. *“Lactating cow” means any cow that is producing milk that is present on-site at a dairy operation and receives water through the dairy operation’s watering system.*
5. *“Non-lactating animal” means a calf, heifer, mature dry cow, bull, or steer that is present on-site at a dairy operation and receives water through the dairy operation's watering system.*

6-2102. Maximum Annual Water Allotment Conservation Requirements

A. Maximum Annual Water Allotment

Beginning on January 1, 2019 or upon commencement of water use, whichever is later, and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, an industrial user shall not withdraw, divert or receive water for use at a dairy operation during a calendar year in a total amount that exceeds the dairy operation’s maximum annual water allotment for the year as calculated in subsection B below, unless the industrial user applies for and is accepted into the Best Management Practices Program described in section 6-2104.

B. Calculation of Maximum Annual Water Allotment

A dairy operation's maximum annual water allotment for a calendar year shall be determined as follows:

1. *Calculate the average daily number of lactating cows and non-lactating animals that are present during the calendar year. The average daily number of lactating cows and non-lactating animals present during the calendar year shall be calculated as follows:*
 - a. *Determine the total number of lactating cows and non-lactating animals present at the dairy operation on the last day of each month during the calendar year.*
 - b. *For each category of animal, add together the total number of such animals present at the dairy operation on the last day of each month during the year in question and then divide the result by 12. The quotient is the average daily number of lactating cows and non-lactating animals present during the calendar year.*
2. *Calculate the dairy operation's maximum annual water allotment for the calendar year as follows:*

- a. Multiply the average daily number of lactating cows present during the calendar year by 105 gallons per animal per day (GAD) and then convert to ac-ft per year as follows:

$$C_L \times \frac{105 \text{ GAD}}{325,851 \text{ g/af}} \times d/\text{yr} = \text{Maximum annual water allotment for lactating cows (ac-ft per year)}$$

Where: C_L = Average daily number of lactating cows

GAD = Gallons per animal per day

g/af = Gallons per acre-foot

d/yr = Days in the year

The result is the dairy operation's maximum annual water allotment for lactating cows for the calendar year.

- b. Multiply the average daily number of non-lactating animals present during the calendar year by 20 gallons per animal per day (GAD) and then convert to ac-ft per year as follows:

$$A_N \times \frac{20 \text{ GAD}}{325,851 \text{ g/af}} \times d/\text{yr} = \text{Maximum annual water allotment for non-lactating animals (ac-ft per year)}$$

Where: A_N = Average daily number of non-lactating animals

GAD = Gallons per animal per day

g/af = Gallons per acre-foot

d/yr = Days per year

The result is the dairy operation's maximum annual water allotment for non-lactating animals for the calendar year.

- c. Add the dairy operation's maximum annual water allotment for non-lactating animals for the calendar year as calculated in subparagraph b of this paragraph and the dairy operation's maximum annual water allotment for lactating cows for the calendar year as calculated in subparagraph a of this paragraph. The sum is the maximum annual water allotment for the dairy operation for the calendar year, except as provided in subparagraph d of this paragraph.
- d. Upon application, the Director may approve an additional allocation of water for the dairy operation consistent with industry health and sanitation objectives if the dairy operation requires more than its maximum annual water allotment because of one or more of the following:
- 1) Milkings per lactating cow occur more than three times daily,
 - 2) Technologies are used to achieve industry health and sanitation objectives that require additional water use, or

- 3) *Technologies are designed and/or implemented for cooling lactating cows and non-lactating animals that increase milk production.*
3. *Nothing in this section shall be construed to authorize a person to use more water from any source than the person is entitled to use pursuant to a groundwater or appropriable water right or permit held by the person. Nor shall this section be construed to authorize a person to use water from any source in a manner that violates Chapter 1 or Chapter 2 of Title 45, Arizona Revised Statutes.*

6-2103. Compliance with Maximum Annual Water Allotment

An industrial user who uses water at a dairy operation is in compliance for a calendar year with the dairy operation's maximum annual water allotment if the Director determines that either of the following applies:

1. *The volume of water withdrawn, diverted, or received during the calendar year for use at the dairy operation, less the volume of dairy wastewater delivered from the dairy operation to the holder of a grandfathered groundwater right for a beneficial use, is equal to or less than the dairy operation's maximum annual water allotment for the calendar year; or*
2. *The three-year average volume of water withdrawn, diverted, or received for use at the dairy operation during that calendar year and the preceding two calendar years is equal to or less than the dairy operation's three-year average maximum annual water allotment for that calendar year and the preceding two calendar years. In calculating the three-year average volume of water withdrawn, diverted or received for use at the dairy operation, the volume of dairy wastewater delivered from the dairy operation to the holder of a grandfathered right for a beneficial use shall not be counted.*

6-2104. Best Management Practices Program Conservation Requirements

A. Criteria for Approval of Application

An industrial user who uses water at a dairy operation may apply for regulation under the Best Management Practices Program (BMP Program) by submitting an application on a form provided by the Director. The Director shall approve a complete and correct application for regulation under the BMP Program if the Director determines that the applicant will implement all of the standard best management practices (BMPs) described in Appendix 6B, unless the Director approves a substitution of a standard BMP under subsection D of this section or a waiver of a standard BMP under subsection E of this section. If the Director approves a substitution of a standard BMP, the Director shall approve the application if the Director determines that the applicant will implement the substitute BMP or BMPs in addition to any remaining standard BMPs.

B. Exemption from Maximum Annual Water Allotment Conservation Requirements

An industrial user accepted for regulation under the BMP Program is exempt from the maximum annual water allotment conservation requirements set forth in section 6-2102 beginning on January 1 of the first calendar year after the industrial user's application for the BMP Program is approved, unless the Director approves an earlier date.

C. Compliance with Best Management Practices Program

Beginning on a date established by the Director and continuing thereafter until the first compliance date for any substitute conservation requirement established in the 5MP, an industrial user accepted for regulation under the BMP Program shall comply with all standard BMPs listed in Appendix 6B, unless the Director approves a substitution of a standard BMP under subsection D of this section, or a waiver of a standard BMP under subsection E of this section. If the Director approves a substitution of a standard BMP, the industrial user shall comply with the substitute BMP or BMPs in addition to any remaining standard BMPs. The standard BMPs listed in Appendix 6B are broken into the following seven categories: (1) delivery of drinking water for dairy animals; (2) udder washing and milking parlor cleaning; (3) corral design and maintenance; (4) cleaning and sanitizing milking equipment; (5) dust control, calf housing cleaning, and feed apron flushing; (6) dairy animal cooling; and (7) dairy animal feed preparation.

D. Substitution of Best Management Practices

- 1. The Director may allow an industrial user applying for the BMP Program to replace a standard BMP listed in Appendix 6B with a substitute BMP if the Director determines that the standard BMP cannot be achieved and that implementation of the substitute BMP will result in water use efficiency equivalent to that of the standard BMP. To apply for a substitution of a standard BMP, the industrial user shall include in its application for the BMP Program an explanation of why the standard BMP is not achievable and a description of how the substitute BMP will result in water use efficiency equivalent to that of the standard BMP.*
- 2. An industrial user regulated under the BMP Program may apply to the Director for a substitution of an existing BMP that is no longer appropriate for the industrial user's dairy operation. The Director may allow the industrial user to replace the existing BMP with a substitute BMP if the Director determines that the substitute BMP will result in water use efficiency equivalent to that of the existing BMP.*

E. Waiver of Best Management Practices

- 1. The Director may waive a standard BMP listed in paragraph 3 of this subsection if the Director determines that the standard BMP cannot be achieved and that no substitute BMP is appropriate. To apply for a waiver of a standard BMP listed in paragraph 3, the industrial user shall include in its application for the BMP Program an explanation of why the standard BMP is not achievable and why no substitute BMP is appropriate.*
- 2. An industrial user regulated under the BMP Program may apply to the Director for a waiver of an existing BMP listed in paragraph 3 of this subsection if the BMP is no longer appropriate for the industrial user's dairy operation. The Director may waive the existing BMP if the Director determines that the existing BMP is no longer appropriate for the industrial user's dairy operation and that no substitute BMP is appropriate.*
- 3. Only the following standard BMPs may be waived by the Director under this subsection: (1) BMP 2.1.2 (Udder Wash System); (2) BMP 2.2.2 (Milking Parlor Floor and Wall Washing); (3) BMP 4.1.1 (Milk Cooling and Vacuum Pump); (4) all of the standard BMPs in Water Use Category No. 5 (Dust Control, Calf Housing Cleaning, and Feed Apron Flushing); (5) all of the standard BMPs in Water Use Category No. 6 (Dairy Animal*

Cooling); and (6) all of the standard BMPs in Water Use Category No. 7 (Dairy Animal Feed Preparation).

F. Five Year Review of Best Management Practices

Five years after an industrial user is accepted for regulation under the BMP Program, the Director shall review the industrial user's BMPs to determine whether any changes in the BMPs are warranted. If the Director determines that any of the existing BMPs are no longer appropriate due to an expansion of the dairy operation or a change in management practices at the operation, the Director shall notify the industrial user in writing of that determination and the Director and the industrial user shall make a good faith effort to stipulate to a modification of the BMPs so that they are appropriate for the expanded operation or the change in management practices.

If the Director and the industrial user are unable to stipulate to a modification to the BMPs within 180 days after the Director notifies the industrial user of the determination that one or more of the existing BMPs are no longer appropriate or such longer time as the Director may agree to, the industrial user shall no longer be regulated under the BMP Program but shall thereafter be required to comply with the maximum annual water allotment conservation requirements set forth in section 6-2102.

If the Director and the industrial user stipulate to a modification of the BMPs, the industrial user shall comply with the modified BMPs by a date agreed upon by the Director and the industrial user and shall continue complying with the modified BMPs until the first compliance date for any substitute conservation requirement in the SMP.

G. Change in Ownership of Dairy Operation

- 1. If an industrial user regulated under the BMP Program sells or conveys the dairy operation to which the BMPs apply, the new owner of the dairy operation shall continue to be regulated under the BMP Program until January 1 of the first calendar year after acquiring ownership of the dairy operation. Except as provided in paragraph 2 of this section, beginning on January 1 of the first calendar year after acquiring ownership of the dairy operation, the new owner shall comply with the maximum annual water allotment conservation requirements set forth in section 6-2102. The new owner may at any time apply for regulation under the BMP Program.*
- 2. If the new owner submits a complete and correct application for regulation under the BMP Program prior to January 1 of the first calendar year after acquiring ownership of the dairy operation, the new owner shall continue to be regulated under the BMP Program until the Director makes a determination on the application. If the Director denies the application, the new owner shall be required to comply with the maximum annual water allotment conservation requirements set forth in section 6-2102 immediately upon notification of the denial or January 1 of the first calendar year after acquiring ownership of the dairy, whichever is later. If the Director approves the application, the new owner shall continue to be regulated under the BMP Program until the first compliance date for any substitute conservation requirement in the SMP.*

6-2105. Monitoring and Reporting Requirements

For the calendar year 2019 or the calendar year in which water use is commenced at the dairy operation, whichever occurs later, and for each calendar year thereafter until the first compliance date for any substitute monitoring and reporting requirements in the 5MP, an industrial user who uses water at a dairy operation 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 reclaimed water, withdrawn, diverted, or received during the calendar year for use by the dairy operation, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
- 2. The total quantity of water delivered during the calendar year to any uses other than the dairy operation from the well or wells that serve the dairy operation, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R12-15-901, et seq.*
- 3. The total quantity of dairy wastewater delivered to grandfathered rights other than the dairy operation, as measured with a measuring device in accordance with ADWR's measuring device rules, A.A.C. R-12-15-901, et seq.*
- 4. The total number of lactating cows and non-lactating animals that were present on-site at the dairy operation on the last day of each month during the calendar year.*
- 5. If the dairy operation is regulated under the BMP Program, any documentation as required by the Director that demonstrates compliance with the program.*

6.22 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR NEW LARGE LANDSCAPE USERS

6-2201. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-1501 of this chapter, unless the context otherwise requires, the following words and phrases used in sections 6-2202 and 6-2203 of this chapter shall have the following meanings:

- 1. "Direct use reclaimed water" means reclaimed water transported directly from a facility regulated pursuant to Title 49, Chapter 2, Arizona Revised Statutes, to an end user. Direct use reclaimed water does not include reclaimed water that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes.*
- 2. "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.*
- 3. "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. The following facilities are excluded from this definition: schools, parks, cemeteries, golf courses, common areas of housing developments and public recreational facilities.*

4. *“Reclaimed water recovered within the area of impact” means reclaimed water that has been stored pursuant to Title 45, Chapter 3.1, Arizona Revised Statutes, and recovered within the area of impact of storage. For the purposes of this definition, “area of impact” has the same meaning as prescribed by A.R.S. § 45-802.01.*
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 ADWR’s Low Water Use/Drought Tolerant Plant List for TAMA and watered with a permanent water application system, except any area of land that is watered exclusively with direct use reclaimed water or reclaimed water recovered within the area of impact.*
 - b. *The total water surface area of all bodies of water within the facility, except bodies of water used primarily for swimming purposes, bodies of water filled and refilled exclusively with direct use reclaimed water or reclaimed water 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 reclaimed water or reclaimed water recovered within the area of impact after the permit expires.*

6-2202. Conservation Requirements

A. Conservation Requirements for New Large Landscape Users that are not Hotels or Motels

Beginning on January 1, 2019 and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, 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; or 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, 2019 and continuing thereafter until the first compliance date for any substitute conservation requirement in the 5MP, 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; or 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.

6-2203. Monitoring and Reporting Requirements

For calendar year 2019, 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 SMP, 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 reclaimed water, 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 ADWR'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 listed in ADWR's Low Water Use/Drought Tolerant Plant List for TAMA (except any area watered exclusively with direct use reclaimed water or reclaimed water 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 reclaimed water or reclaimed water 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 reclaimed water or reclaimed water recovered within the area of impact after the permit expires).*

6.23 INDUSTRIAL CONSERVATION REQUIREMENTS AND MONITORING AND REPORTING REQUIREMENTS FOR NEW LARGE INDUSTRIAL USERS

6-2301. Definitions

In addition to the definitions set forth in Chapters 1 and 2 of Title 45 of the Arizona Revised Statutes and section 6-1501 of this chapter, "new large industrial user" as used in section 6-2302 means an industrial user that begins using more than 100 ac-ft of water per year for industrial purposes after January 1, 2019.

6-2302. Conservation Requirements

- A. *Not later than 180 days after receiving notice of these conservation requirements, or within 180 days after the end of the first calendar year in which the facility first uses more than 100 ac-ft 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.*

**APPENDIX 6A
TURF-RELATED FACILITIES**

Facility Name	Water Source	Water Supply	Right Number
GOLF COURSES			
(FORMER) MORRY CANOA HILLS GC	GREEN VALLEY DWID	Groundwater	56-000302.0000
ARIZONA NATIONAL GC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
ARTHUR PACK GC	PIMA COUNTY WASTEWATER	Effluent	NA
CANOA RANCH GOLF COURSE	GREEN VALLEY DWID	Groundwater	56-00302.0000
CC OF GREEN VALLEY	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-101735.0001
DEL LAGO GOLF COURSE	RECOVERY WELL PERMITS		74-591933.0000
DELL URICH GC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
DESERT HILLS GC	GREEN VALLEY DWID	Groundwater	56-000302.0000
DORADO CC	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-108946.0000
DOVE MOUNTAIN #1 - RITZ	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
DOVE MOUNTAIN #2 - RITZ	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
EL CONQUISTADOR CC	TOWN OF ORO VALLEY WATER	Effluent	56-000368.0000
EL CONQUISTADOR RESORT GC	TOWN OF ORO VALLEY WATER	Groundwater	56-000368.0000
EL RIO GC	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
FORTY-NINER GC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
FRED ENKE GC	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
GALLERY AT DOVE MOUNTAIN	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
GALLERY GOLF CLUB - SOUTH COURSE	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
GEN. WM BLANCHARD GC	DMAFB WATER SYSTEM	Effluent & Groundwater	56-000058.0000
HAVEN GC	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-104567.0000
HERITAGE HIGHLANDS GC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
LA PALOMA GOLF COURSE	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
LINKS AT CONTINENTAL RANCH (QUARRY PINES GOLF CLUB)	TYPE 1 GFR/TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112446.0006 58-160014.0015 58-160014.0016 58-160014.0020
MOUNTAIN VIEW GC	LAGO DEL ORO WATER CO.	Groundwater & Effluent	56-000245.0000
ORO VALLEY CC	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-101530.0002
QUAIL CANYON GOLF COURSE	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-100274.0003
QUAIL CREEK CC	TYPE 1 GFR	Groundwater	58-105292.0036
RANDOLPH GC	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
ROLLING HILLS CC	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112457.0001
SADDLEBROOKE GC	LAGO DEL ORO WATER CO.	Effluent	56-000245.0000
SADDLEBROOKE RANCH GOLF COURSE	RECOVERY WELL PERMITS	Recovered Effluent	74-593307.0002
SAN IGNACIO GC	GREEN VALLEY DWID	Groundwater	56-000302.0000
SANTA RITA CC	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-107119.0000
SILVERBELL GC	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
SKYLINE CC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
STARRPASS GC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
STONE CANYON GC	TOWN OF ORO VALLEY WATER	Effluent	56-000368.0000

**APPENDIX 6A
TURF-RELATED FACILITIES**

Facility Name	Water Source	Water Supply	Right Number
SUN CITY VISTOSO GC	TOWN OF ORO VALLEY WATER	Effluent	56-000368.0000
THE GOLF CLUB AT VISTOSO	TOWN OF ORO VALLEY WATER	Effluent	56-000368.0000
THE PRESERVE GOLF CLUB AT SADDLEBROOKE	RIDGEVIEW UTILITY COMPANY	Groundwater & Effluent	56-000375.0000
TORRES BLANCAS GC	TYPE 1 GFR/TYPE 2 NON-IRRIGATION GFR	Groundwater	58-101963.0032
TUCSON CC	CITY OF TUCSON/TUCSON WATER/TYPE 2 NON-IRRIGATION GFR	Groundwater & Effluent	58-106007.0002
TUCSON ESTATES GC	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
TUCSON NATIONAL GC	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-102307.0002
VENTANA CANYON GC	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
CEMETERIES			
EAST LAWN CEMETERY	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
EVERGREEN CEMETERY	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-109101.0000
HOLY HOPE CEMETERY	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-108519.0000
SOUTH LAWN CEMETERY	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-109112.0001
PARKS			
BRANDI FENTON PARK	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
CHRISTOPHER COLUMBUS PARK	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
EL CAMINO DEL CERRO PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
FORT LOWELL PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent & Groundwater	56-000001.0000
FREEDOM PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
GOLF LINKS SPORTS COMPLEX	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
HIMMEL PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
JACOBS PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
JAMES D. KRIEGH PARK	TOWN OF ORO VALLEY WATER	Groundwater	56-000368.0000
JESSE OWENS PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
JOAQUIN MURRIETA PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
KENNEDY PARK	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
KINO SPORTS PARK	CITY OF TUCSON/TUCSON WATER	Effluent & Groundwater & Rain Harvesting	56-000001.0000
LAKESIDE PARK	CITY OF TUCSON/TUCSON WATER	Other & Recovered Effluent	56-000001.0000
LINCOLN PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent & Groundwater	56-000001.0000
MANSFIELD PARK	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
MARANA PARK	RECOVERY WELL PERMITS	Recovered CAP	74-211278.0001

**APPENDIX 6A
TURF-RELATED FACILITIES**

Facility Name	Water Source	Water Supply	Right Number
MCCORMICK PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
MISSION PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
PALO VERDE PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
PIMA COUNTY FAIRGROUNDS	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-100381.0006
REID PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent & Groundwater	56-000001.0000
RILLITO REGIONAL PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
RODEO PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
SANTA RITA PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
SILVERLAKE PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
SUNNYSIDE PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
THE CLUB AT LA MARIPOSA	TYPE 1 GFR	Groundwater	58-109720.0002
THE PRACTICE TEE	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
TOWN OF SAHUARITA LAKE PARK	TYPE 1 GFR	Groundwater	58-100316.0018
UDALL PARK	CITY OF TUCSON/TUCSON WATER	Recovered Effluent	56-000001.0000
SCHOOLS			
AMPHITHEATER HS	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112278.0002
AMPHITHEATER MS	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112278.0002
APOLLO MIDDLE SCHOOL	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
BOOTH-FICKETT MS	CITY OF TUCSON/TUCSON WATER	Effluent & Commingled	56-000001.0000
CANYON DEL ORO HS	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112278.0002
CATALINA FOOTHILLS HS	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
CATALINA HS	CITY OF TUCSON/TUCSON WATER	Effluent & Commingled	56-000001.0000
CHAPARRAL MS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
CHERRY FIELD	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
CHOLLA HS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
CIENEGA HIGH SCHOOL	VAIL WATER COMPANY	Groundwater	56-000060.0000
CORONADO SCHOOL	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112278.0002
DESERT VIEW HS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
DOOLEN MS	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
DUFFY SCHOOL	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
EMPIRE HIGH SCHOOL	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
ESPERERO MS	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
FLOWING WELLS HS	FLOWING WELLS IRR. DIST.	Groundwater	56-000084.0000
FLOWING WELLS JHS	FLOWING WELLS IRR. DIST.	Groundwater	56-000084.0000
GRIDLEY MS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
IRONWOOD RIDGE HIGH SCHOOL	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
LIN CROSS JHS/HARELSON ELEMENTARY	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-112278.0002

**APPENDIX 6A
TURF-RELATED FACILITIES**

Facility Name	Water Source	Water Supply	Right Number
MAGEE MS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
MARANA HS	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-111064.0000
MARANA JHS	TYPE 2 NON-IRRIGATION GFR	Groundwater	58-111066.0002
NAYLOR MS	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
ORANGE GROVE MS	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
PALO VERDE HS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
PISTOR MS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
PUEBLO HS	CITY OF TUCSON/TUCSON WATER	Effluent & Commingled	56-000001.0000
RINCON HS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
SABINO HS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
SAHUARITA UNIFIED SCHOOL DIST #30	TYPE 2 NON-IRRIGATION GFR	Groundwater & Effluent	58-160083.0000
SAHUARO HS	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
SANTA RITA HS	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
SECRIST MS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
TOWNSEND MS	CITY OF TUCSON/TUCSON WATER	Effluent	56-000001.0000
UTTERBACK MS	CITY OF TUCSON/TUCSON WATER	Commingled & Effluent	56-000001.0000
VAIL MS	CITY OF TUCSON/TUCSON WATER	Commingled	56-000001.0000
WILSON K-8 SCHOOL - AMPHI SCHOOL DIST	CITY OF TUCSON/TUCSON WATER	Groundwater	56-000001.0000
HOMEOWNERS ASSOCIATIONS			
GLADDEN FARMS HOA	TYPE 1 NON-IRRIGATION GFR	Groundwater	58-109009.0001
THE LAKES AT CASTLE ROCK HOA	TOWN OF MARANA, CORTARA MARANA IRR. DIST	Recovered CAP	56-000107.0000

**APPENDIX 6B
DAIRY OPERATION BEST MANAGEMENT PRACTICES PROGRAM
STANDARD BEST MANAGEMENT PRACTICES**

WATER USE CATEGORY 1. DELIVERY OF DRINKING WATER FOR DAIRY ANIMALS

Description: The level of milk production, season of year and type of dairy animal housing has a significant effect on the water intake of a dairy animal. The drinking water needs of a lactating cow will vary from 25 to 45 gallons per day. As milk production per cow per day increases, drinking water intake will also increase. Conservation of dairy animal drinking water could best be accomplished by preventing and promptly repairing leaks in the drinking water system.

BMP 1.1 Install and maintain valves and floats throughout the drinking water system to allow for the isolation of leaks in lines and tanks.

The Annual Report required by A.R.S. § 45-632 shall include a water system map of the dairy facility showing the location of all valves and floats. This map shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in the location of the valves or floats.

BMP 1.2 Inspect the drinking water system for leaks daily to ensure that leaks are promptly identified and repaired to prevent water loss. If a leak occurs, stop water flow by isolating the area of the leak and/or repair the leak within 72 hours.

WATER USE CATEGORY 2. UDDER WASHING AND MILKING PARLOR CLEANING

Description: Udder washing and milking parlor cleaning is the single largest water use at a dairy operation. Floor and wall wash and sanitation of the milking area is necessary for producing a safe product. These systems can be either manual or semi-automatic. The amount of water used also depends on weather conditions. Udder washing and milking parlor cleaning offer the greatest conservation potential at a dairy through management of the system.

2.1 UDDER WASH SYSTEM

BMP 2.1.1 Install and operate the udder washing system with automatic timers. When udder washing, use a maximum of one minute of water for the soak cycle followed by a minimum of two minutes off and a maximum of three minutes of water for the wash cycle followed by one minute off. Repeat with a second wash cycle if needed.

BMP 2.1.2 Install a grid no larger than six feet by five feet between sprinkler heads on wash pens installed or renovated after January 1, 2002.

The Annual Report required by A.R.S. § 45-632 shall include a water system map of the dairy facility showing the location of all sprinkler heads and the dimensions of the wash pens. This map shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to the location of the sprinkler heads or to the dimensions of the wash pens.

BMP 2.1.3 Install lock-out devices so that the wash system can be used only once per group of cows unless exceptional conditions require an override of the lock-out device.

The Annual Report required by A.R.S. § 45-632 shall include a water system map of the dairy facility showing the location of all lock-out devices. This map shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to the location of the lock-out devices.

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BMP 2.1.4 Establish and implement an inspection schedule to properly maintain and replace spray heads and timing devices. Inspect all spray heads and timing devices daily to ensure that they are operating correctly. If a device is found to be malfunctioning, repair or replace the device within 72 hours.

2.2 MILKING PARLOR FLOOR AND WALL WASHING

BMP 2.2.1 Equip all parlor hoses with shut-off valves. Inspect all hoses and valves daily. If a leak occurs, stop water flow by isolating the area of the leak and/or repair the leak within 72 hours.

BMP 2.2.2 If a semi-automatic floor flush system is used, it must be equipped with a timing device to limit the duration of cleaning and be designed to use no more water than necessary unless the water used is water recycled within the dairy operation.

The Annual Report required by A.R.S. § 45-632 shall include a description of the flush system that includes the flush schedule and the amount of water used for each flush. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to the timing device.

WATER USE CATEGORY 3. CORRAL DESIGN AND MAINTENANCE

Description: Proper corral design and maintenance will reduce water use in the cow wash pen prior to milking by reducing the amount of wash time necessary to clean the cow. Sloping and maintaining the corral in a dry condition keeps the cow in a cleaner condition.

BMP 3.1 Slope corrals to prevent standing water and to promote drainage to the wastewater system.

The Annual Report required by A.R.S. § 45-632 shall include a dairy facility map that shows the corral design and the direction of slope. This map shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to corral design.

BMP 3.2 Scrape, harrow or drag corrals to eliminate holes and maintain corrals in a dry condition.

The Annual Report required by A.R.S. § 45-632 shall include a description of corral maintenance for wet and dry conditions and a maintenance schedule. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in corral maintenance.

WATER USE CATEGORY 4. CLEANING AND SANITIZING MILKING EQUIPMENT

Description: Cleaning and sanitizing milking equipment is necessary to provide a safe dairy product. Water is also used in pre-coolers and vacuum pumps during the milking operation. Water used for this purpose is usually between 5-10 percent of the total water use at the dairy operation. This water can be recycled for other uses at the dairy.

4.1 MILK COOLING AND VACUUM PUMP

BMP 4.1.1 If the milk cooling and vacuum pump system is water-cooled and is not a closed system, reuse water from the system to wash cow udders or pens, or for any other uses, consistent with state and federal sanitary codes.

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The Annual Report required by A.R.S. § 45-632 shall include a description and diagram of how water is reused from the milk cooling and vacuum pump system. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in how water is reused from the milk cooling and vacuum pump system.

4.2 MILK LINE WASHING

BMP 4.2.1 Install and operate the milk line washing system with an automatic or semi-automatic timing device.

The Annual Report required by A.R.S. § 45-632 shall include a description of how the milk line washing system operates. The description shall include the number of cycles per washing and the amount of water used per washing. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in the number of cycles per washing and the amount of water used per washing.

4.3 BACK-FLUSH SYSTEMS

BMP 4.3.1 Maintain and service all back-flush systems in accordance with the manufacturer's design specifications and maintenance schedule.

The Annual Report required by A.R.S. § 45-632 shall include the manufacturer's design specifications and a maintenance schedule. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to the back flush system.

WATER USE CATEGORY 5. DUST CONTROL, CALF HOUSING CLEANING AND FEED APRON FLUSHING

Description: Control of dust, wastes and feed residues is necessary for fly control, sanitation and animal health. This requires water for cleaning and flushing feed aprons and calf housing and for wetting roadways. Conservation potential in this category includes recycling and reusing water, avoiding waste, and employing simple technologies that can reduce the amount of water needed for dust control.

BMP 5.1 If the dairy flushes the cow feed apron, design the systems to recycle water from the cow udder wash system or to pump wastewater and recycle it from the lagoon or wetland area.

The Annual Report required by A.R.S. § 45-632 shall include a description of how water is recycled at the operation, an estimate of the amount of water recycled, and the method of estimation. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to how water is recycled.

BMP 5.2 If the calf housing utilizes a flush system to remove animal wastes, design and manage the system so that it uses only the minimum amount necessary and equip with a timer to minimize the duration of each flush.

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The Annual Report required by A.R.S. § 45-632 shall include a description of how the system is designed and managed to minimize water use, the length of time of each flush and the number of times per day on average that the system is in operation, and a water system map of the facility showing the location of the timer. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to the design or operation of the flush system.

BMP 5.3 If dust control practices are used at the facility, the following dust control methods should be used: paving, aggregate, chemical binding agents or dairy wastewater if consistent with state and federal standards. If potable water is used for dust control it must be used as efficiently as possible.

The Annual Report required by A.R.S. § 45-632 shall include a description of the dust control technology(ies) used and the area on which dust control is practiced, and the amount of water used for dust control. If water use is estimated, provide a description of how water use is estimated. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to dust control practices.

WATER USE CATEGORY 6. DAIRY ANIMAL COOLING

Description: Dairy animal cooling is an effective method to improve milk production per cow and reproductive efficiency, which are important factors in dairy profitability. Animal cooling is also an important factor in improving animal health. The amount of water required depends on the type of method or methods used to cool cows, on the maintenance practices for the system and on the hours of usage. Methods to conserve water for each cooling system are available to dairy farm management.

6.1 HOLDING PEN COOLING

BMP 6.1.1 Design and operate independent fan and spray systems to ensure that water is used efficiently under all weather conditions.

The Annual Report required by A.R.S. § 45-632 shall include a diagram demonstrating that fans and spray systems are used independently and provide information on how the system is managed depending on weather conditions. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change to the fan and spray systems.

6.2 COW EXIT AND RETURN LANES COOLING

BMP 6.2.1 Use leaf gate, wand switch, electric eye or motion (proximity) indicators to automatically activate the water valve.

The Annual Report required by A.R.S. § 45-632 shall include a description of the activation device used at the dairy operation and how it operates, including the length of time the water valve is in operation and the amount of water used, and include the average number of times per day that the device is activated in a year. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in activation device.

6.3 FEED LINE COOLING

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BMP 6.3.1 Locate the feed line cooling system to take advantage of prevailing winds in order to place water directly on the dairy animal. Equip the system with timers to control the duration of use.

The Annual Report required by A.R.S. § 45-632 shall include a water system map of the dairy facility showing the location of all timers and the direction of prevailing winds. Report the length of time the timer is in operation and the average number of times per day that the system is in operation in a year. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in the feed line cooling system or timers.

6.4. CORRAL SHADE COOLERS

BMP 6.4.1 Equip corral shade coolers with thermostats or timers to control operation time.

The Annual Report required by A.R.S. § 45-632 shall include a water system map of the dairy facility showing the location of all thermostats or timers and report the average daily length of time the coolers are in operation in a year. This information shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in the thermostats or timers.

BMP 6.4.2 Establish an inspection schedule to ensure regular maintenance of nozzles and water filter systems.

The Annual Report required by A.R.S. § 45-632 shall include an inspection and maintenance schedule. This schedule shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in the maintenance schedule.

WATER USE CATEGORY 7. DAIRY ANIMAL FEED PREPARATION

Description: Water is used in the preparation of dairy animal feed at dairy operations to pre-soak cereal grain for processing, (rolling and flaking). A large use of water in feed preparation is its addition to the total mixed ration (TMR) to improve feed intake. The amount of water needed depends on the dryness of the feed in the ration. The total amount of water added to the feed could equal 20 percent of the ration. The greatest conservation potential for feed preparation rests with leak detection and prevention.

BMP 7.1 Install shut-off valves at each water source used for feed preparation to allow for the isolation of leaks. If a leak occurs, isolate the area of the leak and/or repair the leak within 72 hours.

The Annual Report required by A.R.S. § 45-632 shall include a water system map of the facility showing the location of all valves. This map shall be submitted one time only (the first annual report following acceptance into the BMP Program) unless there is a change in the location of the valves.

Bibliography

ADWR. (2010). *Demand and Supply Assessment, Tucson Active Management Area*. ADWR.