ECONOMIC, SMALL BUSINESS, AND CONSUMER IMPACT STATEMENT

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Water quality standards are provisions of state law required by the Clean Water Act, and require review and revision once every three years. These standards are implemented through various surface water programs at the Department, including the AZPDES permitting program, authorized under § 402 of the Clean Water Act for point source discharges of pollutants. Persons most affected by this rulemaking are AZPDES permittees. From an economic cost standpoint, permittees may experience costs through conditions established in future AZPDES permits to achieve the surface water quality standards of these rules. Some permittees, such as private and public wastewater utilities, mining operations, and electric utilities, may be required to make wastewater treatment changes to comply with new permit conditions to regulate their discharges.

In addition to costs, there are benefits to these rules. These rules ensure that clean water will be available as a source for drinking water, bathing, cooking, washing clothes, and is safe for swimming, fishing, boating, wading, or other water-based recreation. The rules also protect aquatic and riparian ecosystems that are dependent on a surface water. It is, however, much more difficult to quantify these benefits in monetary terms.

The Department does not require the costs of wastewater treatment to be submitted as part of the AZPDES permitting program, so any specific information on costs has been obtained from permittees or knowledgeable individuals in the area of wastewater treatment.

For purpose of this analysis, the Department defines annual costs or revenues on a cost-revenue scale as follows:

Minimal – less than $10,000
Moderate – $10,000 to $1 million
Substantial – more than $1 million

A. ***Estimated Costs and Benefits to the Department of Environmental Quality.***

The Department may incur minimal costs in implementing this rulemaking. It is possible that new or revised water quality standards and new implementation procedures for narrative standards may lead to an increase in the number of surface waters that are identified as impaired waters. This may result in a corresponding increase in the number of Total Maximum Daily Loads (TMDLs) that the Department would be required to complete under the Clean Water Act. The Department does not anticipate any increase in FTEs or state funding to complete additional TMDLs.

There are some new costs for monitoring under narrative standards, but the Department expects these costs to reduce over time due to fewer sampling visits in the field. Narrative standard measurements provide a longer, more direct measure of the water quality and can show a recent history of the health of a surface water, instead of just a snapshot as with a chemical-based numeric standard. Accordingly, monitoring costs incurred by the Department may be reduced by this rulemaking.

B. ***Estimated Costs and Benefits to Political Subdivisions.***

Political subdivisions are affected by the rules if they own or operate sewage treatment plants, and their costs are discussed below in section C. There may be additional costs for some political subdivisions that have a pretreatment program under the Clean Water Act. The pretreatment program requires political subdivisions to control industrial wastewater discharged to the sanitary sewer before it is mingled with domestic sewage and discharged at the treatment facility. These facilities, called publicly-owned treatment works (POTW), have the authority to establish water quality standards and

issue permits to industrial facilities that discharge pollutants to the sanitary sewer to control the industrial wastewater and ensure that water quality standards are met. POTWs may incur minimal-to-moderate costs in reviewing the new surface water quality standards to ensure their own compliance and to evaluate the need to change limits and controls on local industrial wastewater to ensure compliance under their AZPDES permit. If changes are necessary, a POTW would make necessary changes to its future permits issued to industrial facilities or through its local regulations.

Local industries generating industrial wastewater could indirectly be affected if the POTW requires changes in local limits in order to meet new surface water quality standards. Currently, 21 Arizona municipalities have pretreatment programs.

C. ***Businesses Directly Affected By the Rulemaking***

Surface water quality standards are implemented through various general and individual permits under the AZPDES permitting program, authorized under § 402 of the Clean Water Act and A.R.S. Title 49, Chapter 2, Article 3.1 for point source discharges of pollutants. Businesses affected by this rulemaking are AZPDES permittees who discharge as a point source to a water of the United States. Below are the numbers of authorizations for the current five-year AZPDES general permits. Most of these permits are held by businesses:

AZPDES GENERAL PERMITS	
General Permit Category	**# Per Category**
Multi-Sector General Permit (MSGP)	1039
Construction General Permit (CGP)	3800
Municipal Separate Storm Sewer System (MS4) (Phase II permits)	41
De Minimus General Permit	472

There are potential impacts to those discharging under an AZPDES general permit; however, the Department does not expect these rule changes to affect significantly large numbers of permittees. The De Minimus permit regulates minor discharges resulting from specified activities and is generally restricted to discharges containing minimum pollutant amounts. The other three general permits regulate stormwater discharges primarily by requiring the use of best management practices (BMPs) to lessen pollutants. These rules may impact a permittee if a surface water changes classification, such as ephemeral to effluent-dependent, or if a numeric standard becomes stricter. The rules also may impact a permittee if under the new narrative standards criteria, a water is listed as impaired under 18 A.A.C. 11, Article 6. A project located near an impaired or water that seeks general permit coverage, especially the CGP and De Minimus, could see increased monitoring requirements or additional BMPs being required to protect water quality. For example, a small or medium MS4 is not typically required to monitor under the current general permit. This would change if the MS4 had to determine the source of a pollutant if its stormwater discharge contributed to an exceedance of a new water quality standard. Any facility permitted under a general permit with discharges that are above a new water quality standard could lose eligibility under the general permit and be required to seek an individual permit with more specific requirements. The Department expects only minimal, if any, impact to each permittee discharging under general permits.

The outstanding Arizona water (OAW) classification can affect existing and potential facilities that discharge to an OAW. Tier 3 of the antidegradation rule prohibits a new or expanded point source directly discharging to an OAW. Antidegradation protection includes a tributary to, or upstream of, an OAW. An AZPDES applicant must demonstrate that the regulated discharge will not degrade existing water quality in the downstream OAW. OAW designation does not prohibit a discharge activity but it generally may make it more expensive in treatment costs or to divert a discharge.

The Department is designating two new surface waters as OAWs; Fossil Creek and Davidson Canyon. Fossil Creek is located on U.S. Forest Service land, with some of the area designated as a Wilderness Area. Arizona Public Service (APS) is discharging under an existing permit but will be ending its discharge activities in 2011. There are numerous closed mining claims along Fossil Creek—

even though mining has not been a reported historical activity in this area. Any holder of a closed mining claim in this area that seeks to reactivate a claim to develop mining will not be able to discharge to Fossil Creek in a manner that would degrade the existing water quality. Land use in this area is mainly grazing and recreation. While Arizona does not have a regulatory program to directly control nonpoint sources of pollution such as grazing, the intention of the Tier 3 antidegradation policy is that best management practices be developed and implemented to prevent the degradation of existing water quality in an OAW.

The Department is aware of a few mining claims in the area that would face limitations on discharging to Davidson Canyon or to any of its tributaries. The Department has no data that any sand and gravel or cement operation has been permitted in or around Davidson Canyon.

It is unclear what economic costs a potential discharger to these new OAWs would bear. Any potential costs of discharging to a designated OAW should be weighed with the benefits that come from increased tourism of the area, as further discussed below.

The Department believes that the changes in these rules will affect a relatively small number of existing AZPDES individual permittees, though costs may be moderate or substantial, depending on the specific case. Permit conditions are reviewed and revised as applicable when permittees apply for renewal, usually every five years. These permittees would incur costs if their discharge contains pollutants in a concentration that may result in an exceedance of a new surface water quality standard.

The Department has reviewed the comments regarding the economic impact of this rulemaking. While the comments present an apparent "worst case scenario", the Department assumes that permittees affected by this rulemaking actually will exercise every lawful option to delay, defray, and minimize any costs to their business and consumers. Two options to delay, defray, or minimize costs are offered in existing rules. One, there is the opportunity to request a compliance schedule in a permit when a facility cannot meet a new water quality standard. This allows the facility time to evaluate, design and construct treatment or other means of meeting the new standard. R18-11-121 (Schedules of Compliance). In addition, R18-11-122 (Variances) allow the Department flexibility in issuing AZPDES permits when there has been a change in water quality standards. The Department currently has 33 variances for a variety of pollutants, though some are multiples on the same permitted facility. There are 11 other permits with compliance schedules to meet water quality standards for a variety of pollutants.

Under new provisions in R18-11-113(E) (Effluent-Dependent Waters), the Department has flexibility to conclude that acute-only standards are sufficiently protective for point source discharges of wastewater when the discharge is infrequent, sporadic, or an emergency. This will allow AZPDES permits to be written without chronic water quality standards when conditions are appropriate. If applicable, a discharger that provides adequate treatment will unlikely exceed acute standards, therefore this provision would likely result in cost savings to the discharger in not having to institute additional treatment measures to meet chronic standards. Under this provision, the permittee will need to have sufficient discharge and storage options such that surface water discharge was infrequent, sporadic or on an emergency basis.

The table below shows the number of AZPDES individual permits, broken down by category type. The individual permittees most likely to be affected by this rulemaking include owners of domestic wastewater treatment plants (sewage treatment plants), and some industries such as mining and electric power generation. Other industries could be impacted on a case-by-case basis, similar to how permittees of general permits could be impacted.

AZPDES INDIVIDUAL PERMITS	
By Industry	**# of Permits**
Sewage treatment plants (municipal & private)	113
Drinking water treatment plants & well discharges	7
Power Generation	7
Mining	12
WQARF/Remediation projects	7
Miscellaneous (EPNG, Lakeside, Rio Salado, FD)	4

Fish hatcheries	4
Truck Stops	3
Marinas	2
Industrial (other)	1

Costs to Sewage Treatment Plants

Rule changes may require some sewage treatment plants to incur costs to meet water quality-based discharge limitations established in an AZPDES permit. There are possible minimal increased monitoring costs based on a new numeric standard, but a number of variable factors make it difficult to quantify any increased costs for public and privately owned sewage treatment plants.

Sewage treatment plants collect and treat wastewater, which is mostly sewage, and is as most people think, *"untreated wastes from toilets, baths, sinks, lavatories, laundries, other plumbing fixtures, and waste pumped from septic tanks in places of human habitation, employment, or recreation."* R18-9-101(35). Federal and state laws require primary and secondary treatment before the sewage is discharged to a receiving water. Basic treatment processes are physical (removes solids), biological (uses bacteria to consume organic matter), and chemical (chemicals used to create changes in pollutants or kill harmful organisms).

Compliance costs for a typical sewage treatment plant can be difficult to quantify because of the various contributing factors, including:

- Capital costs of new equipment and land;
- Operation and maintenance of new equipment;
- Waste capture and disposal, selling, or reuse;
- Change in production processes or inputs; and
- Maintenance changes in other equipment.

Whether treated sewage may cause an exceedance of a surface water quality standard to the receiving water depends on such factors as:

- Type or degree of treatment;
- Size of flow from the treatment plant;
- Characteristics of sewage from the treatment plant;
- Amount and quality of flow from industrial contributors and the status of pretreatment plans;
- Amount of flow in the receiving water that that can be used for dilution;
- Quality of the receiving waters;
- Amount of mixing between the discharged sewage and receiving waters; and
- Uses of receiving waters.

Assuming a sewage treatment plant is faced with a discharge that has a reasonable potential to cause an exceedance under the new standards, a number of options exist to achieve compliance. A sewage treatment plant would first consider the feasibility of low cost options, and only consider the more costly options if necessary. If adjusting existing operations would not be feasible or would not be sufficient to achieve the desired reductions, the next lowest cost option could be controlling the source of the wastewater, such as contributions from industrial users. The feasibility of source control efforts depends on the make-up of the influent. For example, industrial discharges can be regulated through pretreatment regulations, but residential sources would have to be targeted through public outreach and education, which may have low participation rates and may not result in adequate reductions.

If the relatively low-cost options would not be sufficient for compliance, alternative discharge options or end-of-pipe treatment technologies may be necessary, such as diverting flow to recharge or reuse, land application, impoundments, or changing the outfall location to a different area with different water quality standards. The feasibility of each option would need to be considered; for example, an impoundment may not be feasible for a major facility with a large flow because the necessary amount of land may not be available. Remaining options come with greater capital expenditures, such as reducing the volume of discharge by reusing effluent, or installing treatment technology to reduce pollutants.

An example of the cost of a sewage treatment plant is the expansion of the City of Casa Grande Water Reclamation Facility. Due to a 68 percent growth in population, the facility is planning to double its capacity from 6 to 12 million gallons per day, and increase the effluent quality. It is reported

that the expansion will cost $67,129,710 and includes preliminary treatment, anoxic/aerobic basins, secondary clarification and return activated sludge/waste, tertiary treatment, effluent pumping and conveyance system, and solids stream expansion. Notably, this expansion was planned before and separate from this rulemaking, so these actual costs cannot necessarily be attributed to these rules.

Another example is Pima County's major renovation and expansion of its regional wastewater system due to aging infrastructure, population growth, and necessary environmental compliance. Pima County is planning to construct a new water reclamation campus to replace its aging Roger Road water reclamation facility, which first operated in 1951. Costs of this new water reclamation facility are estimated at $235.2 million. Also, as discussed below, the costs of retrofitting a plant can be more than constructing a new one. Pima County plans to upgrade and expand its Ina Road water reclamation facility, designed in 1973, and constructed from 1975 to 1977. These costs are estimated at $244 million. However, these are gross project costs; the fraction of these costs that may be required to meet new surface water quality standards is not specified by the project proponent. This plan was developed in large part for compliance with existing water quality standards in Pima County's existing AZPDES permits for these facilities.

If a publicly-owned sewage treatment plant must incur costs to achieve compliance with these rules, then options exist for financial assistance. The Water Infrastructure Finance Authority (WIFA) is an independent agency in Arizona and is authorized to finance the construction, rehabilitation, and/or improvement of drinking water, wastewater, wastewater reclamation, and other water quality facilities/projects. Generally, WIFA offers borrowers below-market interest on loans for 100 percent of eligible project costs. As a "bond bank," WIFA is able to issue water quality bonds on behalf of communities for basic water infrastructure, providing significant savings due to lower interest rates and shared/reduced closing costs. WIFA is able to lower a borrower's interest costs to between 70 and 100 percent of WIFA's tax-exempt cost of borrowing. WIFA's principal tool for providing low-interest financial assistance for publicly and privately held sewer treatment plants is the Clean Water Revolving Fund, which is capitalized by contributions from the state and the U.S. Congress. In fiscal year 2007, WIFA executed loans in the amount of $133,448,342 to nine sewer treatment plants (or sewer-related projects). Three of the loans awarded were to communities with regulatory compliance issues. WIFA also manages a Technical Assistance (TA) program. The TA program offers pre-design and design grants to all eligible wastewater and drinking water systems. Both pre-design and design loans are available. The purpose of the TA program is to enhance project readiness to proceed with a WIFA project construction loan. In fiscal year 2007, WIFA provided $302,756 in grants for technical assistance to 11 sewer treatment plants.

Ammonia Standard

Based on comments received, the Department recognizes that changes in some rules will have more direct impact on sewage treatment plants than other rule changes.

The new numeric water quality standard for ammonia in surface waters with the A&W(edw) designated use may result in new water quality-based discharge limitations in AZPDES permits for sewage treatment plants discharging to existing effluent-dependent waters (EDW) or ephemeral streams, with accompanying costs. Ammonia, a regulated pollutant, is a component of total nitrogen. Total nitrogen in sewage is typically composed of ammonia, nitrate, organic nitrogen, and soluble organic nitrogen. With only primary and secondary wastewater treatment, nitrogen usually is not removed to a sufficient level. Nitrogen discharged into surface waters can consume and deplete the oxygen in the water, damaging aquatic fauna, which also need the oxygen. Nitrogen in the form of ammonia is highly toxic to aquatic life. For sewage treatment plants that have no other management options to achieve compliance with the ammonia standard, the most cost-effective method of ammonia removal is accomplished through the advanced treatment of biological nutrient removal (BNR) processes. The biological processes that remove the various forms of nitrogen from sewage are called nitrification and denitrification.

BNR Systems Overview

There are at least six common BNR treatment processes currently available to remove ammonia and nitrate from sewage. The BNR configuration that is appropriate for any particular sewage treatment plant depends on the target effluent quality (e.g., the applicable ammonia and nitrate criteria), sewage treatment plant operator experience, influent quality, and existing sewage treatment

processes (if retrofitting an existing facility to meet the standards). In general, new sewage treatment plants have more flexibility and options when deciding which BNR system to implement because they are not constrained by existing treatment processes and sludge handling procedures. Retrofitting an existing sewage treatment plant to provide ammonia removal involves consideration of the following factors:

- Aeration basin size and configuration,
- Clarifier capacity,
- Type of aeration system,
- Sludge processing units, and
- Operator experience.

The aeration basin size and configuration of an existing sewage treatment plant dictates which BNR configurations are the most economical and feasible. If a sewage treatment plant has available excess capacity, it may reduce the need for construction of additional basins which may allow for a more complex BNR configuration. The need for additional basins may require the sewage treatment plant to purchase additional land if the space needed is not available. If land is not available, another BNR configuration will have to be considered. Clarifier capacity influences the effluent-suspended solids concentration, which affects effluent total nitrogen levels. Existing clarifiers may need to be modified to achieve target total nitrogen levels in the discharged effluent. Similarly, the sewage treatment plant will need to modify the existing aeration system to provide for aerobic and anaerobic zones in the sewage treatment train. The manner in which sludge is processed at an existing sewage treatment plant is important to the design of the BNR system. Sludge must be recycled within the sewage treatment process to provide the organisms and bacteria necessary for ammonia and nitrate removal and operators need to adjust treatment processes to compensate for changing conditions in the plant. BNR treatment processes are sensitive to influent conditions, including weather events and sludge processing. Sufficient operator skill and training are essential for achieving the target effluent concentrations of ammonia and total nitrogen.

BNR Systems Costs

BNR treatment systems will differ for new sewage treatment plants and retrofits. New plant BNR costs are based on estimated influent quality, target effluent quality, and available funding. Retrofit costs are more site-specific and may vary considerably for any given size category of sewage treatment plant. No economic studies have been conducted in Arizona to estimate the costs of upgrading sewage treatment plants to provide BNR. However, EPA conducted studies in Maryland and Connecticut for BNR upgrade costs, *Biological Nutrient Removal Processes and Costs,* which provides guidance as to potential costs associated with retrofitting existing sewage treatment plants in Arizona as may be required on a case-by-case basis as a result of this rulemaking. The capital costs ranged from a low of $1,375,866 for a 2.5 mgd (million gallons per day) plant to a high of $138,305,987, for a 180 mgd sewage treatment plant, all in 2006 dollars. The same EPA report provided costs for BNR upgrades to existing sewage treatment plants in Connecticut. The total costs of BNR retrofits ranged from $649,320 to $22,074,225.

These figures appear on the low end of what the Department has seen in informal communications with municipalities in recent years. Based on conversations with various municipalities, new plant costs for BNR technology in Arizona likely range from $6-12 per gallon while retrofit facilities may cost as little as $2-4 per gallon but likely average in the $6-8 per gallon range, which is in keeping with EPA's calculated average unit capital costs shown below. One example for which there are estimates for full nitrification and denitrification using the Modified Ludzack-Ettinger process, is the upgrade to the Nogales International Wastewater Treatment Plant. The project, currently 30 percent constructed, will cost over $62 million dollars for a 14.7 mgd facility. Costper-treatment gallon is approximately $4.40 and estimated annual operating costs are $5.3 million. Another example is the expansion of the Casa Grande Water Reclamation Facility, which as part of its $67 million costs, includes $4,239,724 for a nitrification/denitrification and BOD (biological oxygen demand) removal system.

The EPA study underscores that site-specific factors such as existing treatment system layout and space availability may cause costs to vary significantly between treatment plants with the same design capacities that are implementing the same type of BNR treatment upgrade. The study shows that despite this variability in costs, the unit cost per million gallons per day generally decreases as the

size of the sewage treatment plant increases due to economies of scale. EPA calculated the following average unit capital costs for BNR upgrades at the Maryland and Connecticut sewage treatment plants:

Average Unit Capital Costs for BNR Upgrades at MD and CT Sewage Treatment Plants	
Flow (in mgd)	**Cost/mgd (in $2006)**
> 0.1 – 1.0	$6,972,000
> 1.0 – 10.0	$1,742,000
> 10.0	$588,000

The Department expects similar average unit capital costs for sewage treatment upgrades to provide ammonia and nitrate removal for existing facilities in Arizona that do not already meet the new standard with flows of 100,000 gpd (gallons per day) or more. Small BNR systems of less than 0.1 mgd are usually pre-engineered, factory or field-assembled package plant systems. Capital costs for package plants for new small systems (<100,000 gpd) that can provide ammonia and nitrate removal will vary depending on the treatment process installed and the size of the package plant. Construction costs include all required facilities for a package plant on a new site and range from approximately $350,000 for a 4,000 gpd package plant to $1.5 million for a 100,000 gpd package plant. Annual operation and maintenance costs include labor, electricity, maintenance and repair, solids handling and disposal, administration, laboratory analytical costs, and chemical costs, and range from $25,000/year for the smallest plant (4,000 gpd) to over $160,000/year for the largest package plant (100,000 gpd).

The EPA study of BNR costs for retrofitting sewage treatment plants in Maryland and Connecticut suggests that the cost of upgrading existing sewage treatment plants in Arizona to provide BNR treatment to remove ammonia and nitrate from effluents may be substantial for some communities. However most sewage treatment plants have already incurred the costs for denitrification treatment upgrades due to mandates under their required aquifer protection permits (APP). See A.R.S. § 49-241(B)(10); A.A.C. R18-9-A202. As part of the APP process, a sewage treatment plant has to demonstrate that it will use Best Available Demonstrated Control Technology (BADCT). For sewage treatment plants, the treatment performance standards for BADCT are specified in rule at R18-9-B204 through B206. For most sewage treatment plants, BADCT requires nitrate removal to meet the aquifer water quality standard of 10 mg/L, which is the same as the surface water quality standard of 10,000 µg/L. See R18-11-406(B); 18 A.A.C. 11, Article 1, Appendix A, Table 1.

There are 36 EDWs currently identified in the rules that will be affected by the new numeric ammonia criteria for EDW. This rulemaking adds 29 new EDWs. Most facilities discharging to these areas already provide biological nutrient removal treatment, including nitrification to transform ammonia to nitrate and denitrification to meet the current BADCT requirements for the APP permitting program. The Department estimates that as many as 18 sewage treatment plants may be required, over a period of time, to retrofit their existing facility and upgrade unit treatment processes to meet numeric ammonia standards if they choose to continue discharging to surface waters. The Department expects that the additional reductions necessary to meet surface water quality standards will not require capital expenditures to the same level as initial upgrades to install BNR systems. Independent of this rulemaking, discharges under AZPDES permits are prohibited from being toxic to aquatic life. See R18-11-108(A)(5). Several of these 18 facilities have been discharging ammonia at a level showing toxicity to organisms. These facilities are required to consider the options discussed above, including additional treatment, despite the new ammonia standard.

Between the new water reclamation facility and the upgrade to the Ina Road facility, Pima County estimates that the new ammonia standard will cost $9,400 in total additional energy costs, increased chemical costs of methanol treatment of $37,800 annually and $300,000 for new storage, pumping and fire safety equipment. The Department considers these estimated increased energy costs to be minimal to moderate, and notes that in documentation submitted for its existing AZPDES permit, Pima County plans to use methanol as part of treatment. It is unclear how much of the estimated costs for methanol is necessary to meet the requirements of Pima County's existing AZPDES permit due to existing ammonia toxicity and how much is needed to meet the new ammonia standard.

Narrative Nutrient Standard Criteria in R18-11-108.03

A number of comments raised concerns about treatment requirements to use reclaimed water as source water in lakes and reservoirs, particularly in urban lakes. As noted in the response to comments, there is considerable misunderstanding about how the new narrative nutrient standard will be used to support AZPDES permitting. The matrix was not developed to be end-of-pipe limitations unless all other options fail. The standard will be applied in AZPDES permits, if necessary, once the assimilative capacity of the lake is determined and the target parameters chosen based on the in-lake water quality and the quality of the proposed discharge water.

Most lakes and reservoirs in Arizona are terminal systems, meaning they receive little inflow or discharge little outflow, or both. Basically what enters the lake stays and accumulates over time. Nutrients, such as nitrogen and phosphorus, naturally occur in all surface waters. The natural balance of these nutrients in a lake can be disrupted due to a wastewater discharge from a sewage treatment plant, which contains high levels of nitrogen and phosphorus. Too many nutrients means algae overgrowth, leading to high pH, low dissolved oxygen, and periodic fish kills. The amount of algae growth also depends on lake size, configuration, age, retention time and sources of inputs including stormwater, irrigation runoff, and discharge.

Nitrogen should be less of a concern in algae production because of the new ammonia standard for surface waters with the A&W(edw) designated use, as discussed above. However, phosphorus concentrations in reclaimed water tend to be higher than most lakes can assimilate without increased algae growth. A wastewater discharge with phosphorus concentrations in the 0.5 mg/l range allows the natural assimilation processes of a lake to better absorb this nutrient, allowing the lake to meet the target ranges in the rule matrix.

If necessary, there are basically three options a sewage treatment plant can choose in order to achieve the 0.5 mg/l phosphorus range for effluent discharging into the lake:

1. Retrofitting the existing sewage treatment plant to provide additional treatment;
2. Constructing a smaller treatment facility to reduce phosphorus before discharging to the lake; or
3. Treatment in the lake, such as chemicals or aeration.

The treatment options depend on certain factors:

1. How often will effluent be discharged into an urban lake?
2. How much effluent will be discharged into an urban lake?
3. What is the phosphorus level in the effluent?
4. What is the phosphorus level in the lake?
5. How much phosphorus needs to be reduced?

Determining the costs to comply with the new narrative nutrient criteria will require permittees to answer these key questions first and then weigh the various options to decide which set of options is the most cost-effective for its particular set of circumstances. Since each of these options is case-specific and dependent on factors such as volume of discharge, level of pollutants in the effluent, and quality of the receiving water, the Department presents a basic comparison of estimated costs by treatment option.

Treatment Options

If the choice is to retrofit an existing sewage treatment plant, there are a number of treatment technologies capable of reducing phosphorus in effluent to satisfactory levels. Two common technologies are:

- *Chemical addition with filtration:* This involves adding chemicals to wastewater with aluminum- or iron-based coagulants followed by tertiary filtration, which can reduce total phosphorus concentrations in the final effluent to very low levels. It requires a capital investment of chemical feed pumps, chemical storage and filters. Sludge production and disposal will increase.
- *Enhanced biological phosphorus removal (EBPR):* This is a biological process that promotes growth of organisms that attract phosphorus. Sewage treatment plants which utilize EBPR in the secondary treatment process can often reduce total phosphorus concentrations to 0.3 mg/l or less, depending on the quality of wastewater influent.

Below is a cost comparison of the two processes to upgrade flows at a 16 mgd sewage treatment plant. In this example, the plant upgrades for EBPR cost approximately $ 4.0 million, and reduce the

phosphorus concentration in the effluent from 5 mg/L to 1.1 mg/L (an 80 percent reduction). A plant upgrade using chemical treatment alone can reduce phosphorus from 5 mg/l to 0.8 mg/l for $7.4 million in capital costs. These costs increase 600 percent, or to $44.4 million, in order to reduce phosphorus to 0.4 mg/l. A combination of the two processes can produce effluent with a phosphorus concentration of 0.8 mg/l for $11.4 million but reducing to 0.4 mg/l will cost nearly 4.5 times, or $45 million. The cost comparison underscores the importance of selecting the required phosphorus target reduction range.

Treatment Process	EBPR Only	Chemical Treatment Only		EPBR + Chemical Treatment	
Target Effluent Phosphorus (mg/L)	1.1	0.8	0.4	0.8	0.4
Total Capital Costs	$4,000,000	$7,440,000	$44,440,000	$11,440,000	$48,440,000
Annual O&M Costs	$1,870,000	$20,000,000	$50,000,000	$9,600,000	$37,000,000
Total Costs	$5,870,000	$27,440,000	$94,440,000	$21,040,000	$85,440,000

Instead of retrofitting the sewage treatment plant to treat the entire wastewater stream, a permittee may consider treating only that portion of the wastewater that will actually be discharged into the lake. The Department looked at the costs of treating 50,000 gallons per day of wastewater to a phosphorus concentration range of 0.5 mg/L. This assumes an average urban lake, which is about fifteen acres, ten feet deep, requires approximately 50,000 gallons per day of makeup water during the summer months. The costs to build a 50,000 gpd wastewater treatment plant with chemical addition and sand filtration, capable of achieving a 96 percent removal of phosphorus to less than 0.5 mg/L would be $1.5 to $2 million.

Alternatively, a small wetlands system also can be used to treat the effluent, assuming sufficient land resources are available. Wetlands are highly effective at removing nutrients. The costs to construct a small wetlands system to treat 50,000 gpd of wastewater would be $250,000 to $500,000. Wetlands are not difficult to operate but do require periodic maintenance.

A final option to reducing phosphorus levels is in-lake treatment, which can be achieved with in-lake alum application, allowing coagulated material to settle to the bottom. An average urban lake of fifteen acres, ten feet deep, would have a volume of 490 million gallons, and require approximately 1000 liquid gallons of aluminum sulfate (liquid being the preferred method of application). At $3 per gallon, the cost per treatment would be $3000 for the chemicals in addition to labor and materials costs. The average urban lake might require alum application about three to four times in the summer in order to remove 80 percent of the available phosphorus from the water column.

Power Generation and Mining

Power plants and mines are also likely to be affected by surface water quality rule changes. As with sewage treatment plants, some of the rule changes may require a permittee to incur costs to meet water quality-based discharge limitations established in an AZPDES permit. There are possible minimal increased monitoring costs based on a new numeric standard. However, as with the sewage treatment plants, economic challenges associated with wastewater disposal present themselves with and without this rulemaking.

Based on public comments, the greatest economic impact will come from the change in the EDW definition, which will require some permittees to treat their discharges to meet the chronic aquatic life criteria for the first time, instead of the more lenient standards for discharges that meet ephemeral water standards. Under the previous rule, permittees that did not treat their wastewater had been allowed to discharge higher levels of pollutants at levels that were not protective of aquatic life. The Department estimates that there at least seven permitted industrial facilities that will be impacted by the change in EDW definition. These permitted facilities will be eligible to request a compliance schedule or variance, as discussed above, to delay or defray costs.

This rulemaking clarifies that any discharge of "wastewater" to an ephemeral water will require use of EDW standards in the AZPDES permit and brings parity to all permitted discharges without distinguishing between treated and untreated discharges. With this change, all dischargers to the same waterbody will be held to the same water quality requirements. The Department acknowledges that some permittees may incur moderate to substantial costs to achieve compliance with the new surface

water quality standards under the EDW definition, although it is difficult to quantify those costs. In general, power plants have not been required to treat cooling tower discharges, which due to cycling of water through the cooling processes results in increasingly higher concentrations of metals, total dissolved solids (TDS), and other pollutants. Mining facilities have implemented varying degrees of treatment, depending on the wastewater generated whether it is stormwater, process wastewater or mine dewatering. Dewatering is a commonly used method of coping with groundwater seepage, mine excavations intersecting aquifers or excessive rainfall on mining operations. These waters contain concentrated levels of metals from the mineralized area and/or TDS.

To determine what costs a permittee would incur to meet new water quality-based discharge limitations established in an AZPDES permit at some appropriate time in the future, the following factors would have to be examined including:

- What are the pollutants for the facility?
- Which pollutants present in the discharge have a reasonable potential to violate a new standard?
- What is the effect of this rulemaking on the previous wasteload allocation (i.e., what are the revised AZPDES permit limits considering the revised chemical criteria, changes to the stream designation, and elimination of protected flow provisions?)
- What are the existing effluent levels for each pollutant discharged under the current AZPDES permit?
- Are the industrial wastewater streams for an individual facility segregated before discharge and if so, what are the flow rates for each wastewater stream?
- Does the facility treat (or pre-treat) its wastewater and if so, what type of treatment technology is used?
- Where a reasonable potential to exceed a new standard exists, is additional treatment necessary or are there alternatives available such as source reduction or recovery to reduce the existing levels in the wastewater stream?
- What are the influent concentrations for each pollutant prior to any existing or anticipated treatment process?
- Is eliminating all discharges a cost-effective option?

Most permitted power plants and mining operations have some options as to where wastewater is discharged. Most power plants have more than one discharge location, with at least one location not being a water of the United States, where they can discharge at certain times of the year or under certain conditions. Mining operations generally are able to route waste streams to impoundments within the mine site, except maybe during storm weather events. Industries affected by this rulemaking will need to explore these options, as well as consider discharge volumes, duration of discharge, seasons, levels of pollutants, geography and other factors, in order to determine the most cos-effective, viable and environmentally protective option or combination of options.

For purposes of this rulemaking, the Department has looked at several scenarios that a power plant or a mine operation might consider if circumstances require the facility either to not discharge or to treat the waste stream to meet the new standards. Below is a brief description of the disposal and treatment options considered. Following each option is a discussion of how these options would impact each industry. While costs depend on the site and operation specifics, there are certain assumptions made to estimate impacts. For both mines and power plants, the Department assumes the pollutants of concern will be elevated metals and/or salts in the process water, dewatering water or cooling tower blowdown. The Department also assumes due to volume and quality of these waste streams, direct discharge to surface waters, injection into the aquifer, discharge to municipal sewers, or reusing the water within the facility are not viable options without treatment. These assumptions may or may not be accurate in all cases.

Storage and Evaporation Options

In many cases, the simplest method for disposing of unusable wastewater is storage and evaporation in lined surface impoundments. Lined evaporation ponds are a well developed and common method for disposing of industrial wastewaters and work extremely well in Arizona's arid climate. The costs associated with evaporation ponds are primarily the cost of land and necessary liners to protect the aquifer and facility security, such as fencing. Optimal depths are less than 40 inches, and operation and maintenance costs are relatively low. Periodic dredging and transport of sludge is an

added, occasional cost. Ponds work well for small to moderate waste streams. Large ponds in an urban environment, especially where land prices are high, become less economically feasible. Cost modeling shows a rapid increase in costs with increases in the volume of wastewater and location. An evaporation pond sized to contain one million gallons per day of discharge for 30 days could cost upwards of $20 million if it were constructed today in the East Valley, given land prices estimated in excess of $200,000 per acre.

Impoundments can be used with other techniques. A new technology called Wind Aided Intensified evaporation may eventually prove appropriate for use in the southwest. It reduces the overall surface area of the ponds by increasing evaporation through the use of netting. This technology would reduce the footprint of the ponds and therefore reduce land costs but would have some additional capital costs for piping, pumps and netting materials. Impoundments also can be combined with chemical additions to provide various types of primary treatment to drop out metals and other pollutants. The types, amounts and costs of the chemicals are directly related to the pollutants of concern in the waste stream, such as metals, nutrients, and TDS.

Most mining operations are of such a scale that lined surface impoundments are generally the chosen method of disposal for excess process water that cannot be discharged under an AZPDES permit because of the low quality of the water. As most mines are in rural, undeveloped locations, land prices are generally not prohibitive. For mining operations with limited land for storage, especially in highly developed metropolitan areas or where discharges are too high, the wastewater may require treatment prior to disposal. Power plants in rural settings are able to utilize impoundments for wastewater disposal, but for those facilities in the metropolitan area, land prices may make large surface impoundments economically infeasible.

Treatment Options

The power plant industry, as well as municipalities, has been exploring zero liquid discharge systems, which use a variety of treatment techniques, often together with smaller surface impoundments, to treat, recycle and reuse all process wastewater leaving only the solids as a concentrate. Two technologies are discussed here, both of which are currently being used in the electric utility industry and could be transferred to other industries, including mining.

Brine concentrators convert highly saturated industrial wastewater, such as process cooling water, into distilled water for reuse, and a waste stream. The waste stream is typically five to ten percent of the influent stream. For example, 100 gallons of highly saline wastewater would yield 90-95 gallons of distilled water (with low TDS) and five to ten gallons of waste stream concentrate. The relatively small amount of waste stream concentrate can be disposed of in impoundments or, reduced to a dry solid through a process that makes solid crystal from the concentrate, which can then be disposed. The high quality water can be recycled within the plant or discharged under a permit. Brine concentrators can treat about 700 gallons per minute or 1.2 million gallons per day. A limiting factor is the cost of power to operate, which can range from 60-100 kilowatts per hour per 1,000 gallons of source water. These brine concentrators are reliable and not difficult to operate, but do require trained personnel to operate, as well as laboratory support.

Standard reverse osmosis (RO) is a separation process that uses pressure to force a solution through a membrane that retains the concentrate on one side and allows the higher quality water to pass to the other side. The membranes are specific to the pollutants of concern. Depending on the quality of water needed, RO systems can be constructed for multiple passes or arranged in series to achieve the necessary water quality. The concentrate is then disposed of in impoundments or by other means.

High Efficiency Reverse Osmosis (HERO) is a newer RO process that consists of three separate steps, but upon completion, the RO water (good water) is available for recycling within the plant as makeup water or can be discharged or injected into the aquifer under a permit. The concentrated RO water can be disposed of in impoundments or sent to a crystallizer to produce dry solid for landfilling. The HERO process has a lower energy requirement but does require specialized personnel to operate the system. The Griffith Energy Project near Kingman installed a HERO-based system in 2001. The plant is a 500 megawatt gas-fired, combined cycle unit. The Griffith facility is approximately the same size as the Salt River Project K-7 plant in South Tempe and half the size of the Salt River Project Santan plant in Gilbert. Initial findings at Griffith confirm the ability of the HERO system to reduce

the volume of wastewater by nearly 90 percent. The system was designed to handle approximately 300 gallons per minute.

A cost comparison of the HERO with Evaporation Pond and Brine Concentrator with Evaporation Pond shows:

	HERO w/ Evaporation Pond $ x 1000	Brine Concentrator w/ Evaporation Pond $ x 1000
Total Direct Costs	6,450	7,375
Total Installed Costs[1]	8,400	9,365
Total Operating Costs (annual)	430	978

[1] includes direct and indirect costs

D. Estimated Costs and Benefits to Private and Public Employment.

Private and public employments are not affected directly by these rules.

E. Estimated Costs and Benefits to Consumers and the Public.

It is easy to describe qualitatively the benefits of clean water as a source for drinking water, bathing, cooking, washing clothes, and the inherent value of Arizona's rivers and lakes that are safe for swimming, fishing, boating, wading, or other water-based recreation. There is also value in maintaining aquatic and riparian ecosystems that are dependent on surface water. However it is much more difficult to quantify these benefits in monetary terms. Because these are comprehensive rule changes, it would be next to impossible to separate the benefits derived from each rule change from the overall benefit that surface water quality standards have in achieving clean water. There are some monetary examples, however, that help to demonstrate the value and benefit of these rules for ensuring clean water.

Recreation

According to the Arizona Department of Tourism, some of the top Arizona attractions revolve around water. The following table shows the 2007 attendance for some of Arizona's top water related-attractions.

ATTRACTION	ATTENDANCE
Tempe Town Lake	2,782,000
Glen Canyon National Recreation Area	1,894,114
Lake Mead National Recreation Area	1,824,297
London Bridge	1,500,000
Lake Pleasant Regional Park	697,479
Lake Havasu State Park	329,529
Slide Rock State Park	305,759

Clean water is an essential component that clearly relates to these economically important recreational activities. One example of the benefit of water quality standards for the designated use of full or partial body contact is the Ironman Marathon held in Tempe. The swimming portion of the marathon is a 2.4 mile swim in Tempe Town Lake. The 2008 Ironman had just over 2,000 participants from all over the world, competing for a $75,000 prize. According to the Tempe Convention and Visitors Bureau, the Ironman competition generated approximately $5.1 million in 2007.

Fishing

A 2002 study on the economic importance of fishing and hunting, sponsored by Arizona Game and Fish (AZGFD), showed that more than 255,000 anglers spend an estimated $831.5 million on equipment and trip-related expenditures annually. This spending supports more than 17,000 jobs, provides residents with $314 million in salary and wages, and generates more than $58 million in

state tax revenue. Based on AZGFD's 2006-2007 Annual Report, 483,642 fishing licenses were purchased for 2006, generating part of the $14,740,686 revenue of hunting and fishing license sales for 2006.

Part of AZGFD's fishing program includes the Urban Fishing Program, which is supported by the sale of Urban Fishing Licenses and from fees from the city parks and recreation departments. During 2007, over $500,000 was spent on stocking over 200,000 pounds of keeper-size channel catfish, rainbow trout, and sunfish. Last year, over 55,000 urban anglers participated in fishing and accounted for over 650,000 angler recreation days. The number of urban fishing licenses for 2006 was 32,837. A constant challenge in Arizona's warm urban lakes is to monitor and manage pH levels and algae to ensure fish can be stocked. Out of the 21 urban lakes listed as part of the Urban Fishing Program, ten are surface waters protected under these rules.

Other Monetary Benefits

Agriculture is another measure where clean water is an absolute necessity for ensuring agricultural productivity. As noted by the Arizona Department of Agriculture, Arizona agriculture produces cotton, durum wheat, alfalfa, various produce like head lettuce, leaf lettuce, broccoli, cantaloupe, watermelon, and citrus. Livestock also plays a big role in Arizona, both with cattle and sheep. The Department of Agriculture reports that agricultural sales in Arizona generate $2.2 trillion annually, with Yuma County generating $1,303,492,000. Although a percentage of agricultural productivity depends on groundwater, surface water quality standards help maintain and protect surface water quality for irrigation and livestock watering.

Another example of the value of clean water is the worth placed on Colorado River water, as demonstrated through the Central Arizona Project (CAP). One of Arizona's main sources of water is the Colorado River, in which water is transported through the CAP. This 336 mile long canal provides, on average, 1.4 million acre-feet (one acre-foot roughly equals 326,000 gallons) of water each year to nearly 2 million citizens and businesses in central and southern Arizona. In 2007, CAP delivered 1,700,203 acre-feet to its customers, generating $108.8 million in water operations and maintenance charges. Agricultural, and municipal and industrial water usage accounted for 975,635 acre-feet. CAP water rates for long-term contract customers is at $91 per acre-foot.

Quantifiable benefits also can be demonstrated as the cost avoided, such as for clean-up. The Department recently awarded a $54,978 grant to fund water quality improvement in Pima County for Lakeside Lake. This lake, filled mainly by reclaimed water, is a popular recreational and fishing location, but the lake has become increasingly eutrophic over the years. These conditions have resulted in noxious algal blooms, high pH, low dissolved oxygen, limited stocking, and periodic fish kills. A marked decline in water quality and several fish kills since the early 1990s led to citizen complaints and increased attention on the part of the City of Tucson, AZGFD, the University of Arizona, and the Department. The City of Tucson reports they spent $250,000 for installing an aeration system on the bottom of the lake, meant to improve water quality and alleviate stress on fishes. Declining conditions led AZGFD to stock trout only in the cooler months and catfish and other warm-water species in the summer months. Under the grant, Tucson will improve water quality in the lake by reducing drainage from surrounding park lands into the lake, providing bait disposal locations for people who fish, and occasionally treating the lake with alum, a chemical that will help reduce algae growth. Tucson will also remove debris from the lake and surrounding park.

Deriving both full and partial body contact criteria for non-carcinogenic compounds, changing the relative source contribution from 100 percent exposure to 20 percent, also results in more protective standards. The benefit of water quality standards for the designated use of full or partial body contact can be demonstrated as revenue lost, for instance, when Slide Rock Park closes due to exceedances of *E. coli*, which has occurred on average of 12 times annually.

Adding treatment, such as nitrification/denitrification, typically produces a better effluent quality, meaning lower level of pollutants, such as nitrates, but also other pollutants such as personal care products. Better effluent quality also allows more options for reuse, such as for irrigation purposes. Even though the Casa Grande Water Reclamation Facility expansion will cost $67,129,710, there is a recognized benefit of $14.5 million in total capital cost reduction in improving treatment for the overall liquids and solids process optimization.

Health Benefits

The most important benefit derived from the surface water quality standards is to the protection of humans for drinking water, swimming, and fish consumption. Deferred and avoided health care cost benefits associated with this rulemaking's incremental human health protections are real but unquantified. One change to the methodology for deriving standards for non-carcinogens for each of the human health designated uses, is the use of a relative source contribution (RSC) of less than 100 percent. The RSC is the amount of exposure from various sources or routes, such as drinking, swimming, or fish consumption. Setting the RSC at less than 100 percent acknowledges there may be additional routes of exposure for a pollutant besides that particular designated use. For example, humans can be affected by arsenic from a variety of sources including oral, dermal and aerial.

For example, in deriving the fish consumption criteria, the Department has adopted EPA's recommendations that resulted in two changes: 1) it increased the default fish consumption number from 6.5 to 17.5 grams/day to more adequately protect the general population of fish consumer, and 2) it changed the relative source contribution from 100 percent to 20 percent, acknowledging there may be additional routes of exposure for a pollutant besides ingestion of fish. Part of the changes regarding fish consumption include a new fish tissue standard for methylmercury (MeHg), an organic compound of mercury that bioaccumulates in fish and is one of the most toxic substances known to man. While MeHg has been linked to a variety of health effects, the primary risk arises from its toxicity to the nervous system, including the brain. Numerous health studies have demonstrated that methylmercury is a potent neurotoxin, particularly in developing organisms [EPA, 1997; ATSDR, 1999; NAS, 2000.]

Unborn children are as much as 10 times more susceptible than adults to its detrimental effects. The most common source of exposure to MeHg is from eating fish that contain the mercury. Upon ingestion by humans, MeHg is absorbed through the gastrointestinal tract and easily penetrates the blood-brain and placental barriers. Most at risk are infants and unborn children whose mothers consume fish containing MeHg during pregnancy or while nursing. If the tissues of a pregnant or breastfeeding woman are contaminated with mercury, a disproportionate amount of that mercury may be passed to the baby, where it can attack the developing nervous system. Chronic exposure to MeHg at elevated concentrations can cause developmental delays and learning disabilities and acute exposures may cause gross cranial defects, cerebral palsy, and a higher infant mortality rate.

One example of costs of MeHg exposure is developmental impacts on children. Using national blood mercury prevalence data from the Center for Disease Control, it is estimated that between 316,588 and 637,233 children each year have cord blood mercury levels greater than 5.8 μg/L, a level associated with loss of IQ. The resulting loss of intelligence causes diminished economic productivity that persists over the entire lifetime of these children. This lost productivity is the major cost of methylmercury toxicity, amounting to $8.7 billion annually, with a range of $2.2 to 43.8 billion (all costs are in 2000 US dollars) (Trasande et al, 2005).

Adoption of the fish tissue standard is protective of human health and will aid the Department in notifying the public when it is not safe to consume fish from certain waterbodies. Costs avoided include reduced infant mortality and direct costs of medical care for exposure to mercury and MeHg, specifically neurological care for infants and children. Indirect costs of specialized education for children with learning disabilities may also be avoided.

The Department has also adopted the new Safe Drinking Water MCL for arsenic of 10 ppb for the domestic water source designated use. Inorganic arsenic has been recognized as a human poison since ancient times and EPA has found it to be a Class A carcinogen. Arsenic ingestion has been linked to a multitude of health effects, including cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate. Nonlethal, but high doses, can cause non-cancerous health effects include gastroenterological effects, shock, continuous pain, and vascular effects in humans. Other effects that have been reported include alterations in gastrointestinal, cardiovascular, hematological (e.g., anemia), pulmonary, neurological, immunological and reproductive/developmental function. High dosages of arsenic of 70 to 280 mg for 50% of adults weighing 70 kg are lethal. Increased risks of lung and bladder cancer and of arsenic-associated skin lesions have been observed at drinking-water arsenic concentrations of less than 0.05 mg/L. Children are exposed to arsenic in the same ways that adults are. Since children tend to eat or drink less of a variety of foods and beverages than do adults, ingestion of contaminated food, juice or infant formula made with arsenic-contaminated water may represent a significant source of exposure. There is some evidence that exposure to arsenic in early life (including gestation and early childhood) may increase mortality in young adults.

The 1999 National Academy of Science report found that the lifetime risk of dying from cancer due to arsenic in drinking water is generally lower for people drinking low levels of arsenic in tap water (NAS, 1999). A recent study from Finland (Kurttio et al., 1999) found that Finns who drank water containing low levels pf arsenic (<0.1 ppb) had about a 50 percent lower risk of getting bladder cancer than their countrymen who drank water containing higher levels (>0.1 ppb – 0.5 ppb). People who consumed water with 0.5 ppb arsenic had more than a 140 percent increase in bladder cancer rates, compared to those drinking at levels less and 0.1 ppb. Similar reductions in risk are found for other types of cancers and cardiovascular diseases at increasingly lower levels of arsenic (BEST, 2001). Costs avoided include direct costs of medical care for exposure to arsenic. EPA estimated the value of the benefits of adopting the 10 ppb arsenic standard for drinking water to range from as high as $90 million for bladder cancer to $384 million for lung cancer.

These are two examples of human health and cost benefits that may be expected to result from more protective water quality standards like those adopted in this rulemaking. Though the standards in these rules are incrementally more protective of human heath then the previous standards, the Department believes the overall benefits of the rules outweighs the costs.

Indirect Costs to Consumers and General Public

The Department recognizes that permittees, especially sewage treatment plants, may pass their direct costs onto their customers, taxpayers or both. If sewage treatment plant upgrades are required to comply with new or revised water quality standards, this can result in an indirect cost to some business, industry, and consumers paying higher utility bills for sewer services, or more for commodities. In particular, customers served by sewage treatment plants that discharge to effluent-dependent waters may be affected by the adoption of numeric water quality standards that will limit discharges of ammonia, but only if the discharge is not currently toxic, as described above.

Sewage treatment plant upgrades are typically financed through rate increases or bonding. Publicly-owned sewage treatment plants also have a financing option of low-interest loans through WIFA. Consumers could see increased taxes and municipal debt financing due to public sewage treatment plant compliance with more stringent standards. Municipal operators of sewage treatment plants typically pay the debt service on bonds or WIFA loans through increases in sewer rates and sewer connection fees for customers in the local community. It is difficult to estimate the costs to consumers and the general public, but cost of sewer services will increase for those sewage treatment plants that are required to upgrade treatment.

An example of how a customer may be affected, the Nogales International Wastewater Treatment Plant projects a sewage treatment rate increase from $6.75 to $9.96 for the base fee over a period of 10 years and an increase in the sewer rate from $1.17 to $1.71 for every 1,000 gallons over the same period. The City of Casa Grande has low sewer rates of $11.98 per month, but collects and uses development fees to help pay for new sewage treatment facilities. Pima County estimates that its customers' monthly sewer bills will increase annually for a period of fifteen years, starting at $21.56 and projected to be $46.05. The annual percent change increase that a customer could see ranges from 16.9 to 1.7, with five years at zero. Pima County connection fees would also increase, with the annual percent change ranging from 19.9 to a low of 1.7, again with four years at zero. Connection fees start at $6,364 and are projected to climb to $12,494.

F. Estimated Costs and Benefits to State Revenues.

There are no fees associated with these rules. This rulemaking is expected to have no impact on state revenues.

Requirements of A.R.S. § 41-1035.

The Department defines a small business as a privately-owned permitted facility that discharges less than 1 million gallons per day. The Department calculates that about 25 out of the 160 individual permittees would qualify as a small business. For a sewage treatment plant, this facility would serve a community of no more than 10,000.

1. *Establish less stringent compliance and reporting requirements for small businesses.*

   The rules do not establish any reporting requirements.

2. *Establish less stringent compliance or reporting schedules or deadlines for small businesses.*

The rules authorize schedules of compliance in A.A.C. R18-11-121, which allows a facility time to evaluate, design, and construct treatment or other means of meeting a new standard. (The Department is prohibited by federal law from establishing less stringent compliance schedules for small businesses under 40 CFR 122.47.) The rules do not establish any reporting schedules or deadlines for small businesses.

3. *Consolidate or simplify the rule's compliance and reporting requirements for small businesses*

   The rulemaking does not prescribe reporting requirements.

4. *Establish performance standards for small businesses to replace design and operational standards.*

   The rules do not establish design or operational standards for small businesses.

5. *Exempt small businesses from any or all requirements of the rule.*

   Water quality standards are provisions of state law required by the federal Clean Water Act. The Department has no authority to exempt small businesses from the requirement to comply with surface water quality standards. However, as explained in Section C above, the rules provide other methods for reducing the immediate impact for dischargers, including small businesses, such as the compliance schedules and variances.