EIS Information: (Statute: A.R.S. 41-1055 Rule: R1-6-201(A)(3) (NFRM)

1. **Identification of the rulemaking and summary of the economic, small business and consumer impact statement**
    - The conduct and its frequency of occurrence that the rule is designed to change. (How often does it happen, and what is bad?)
    - The harm resulting from the conduct the rule is designed to change and the likelihood it will continue to occur if the rule is not changed. (What is the harm prevented, and how likely is it that the harm will continue if the rule is not changed?)
    - The estimated change in frequency of the targeted conduct expected from the rule change. (Estimate how much the harmful conduct will be reduced as a result of the rulemaking.)
    - An aggregate total of the costs or savings to all affected agencies and businesses. This may include high and low ranges or best and worst case scenarios.
2. **An identification of the persons who will be directly affected by, bear the costs of or directly benefit from the rule making.**
    - This subsection identifies persons that generally have interest in the adoption of the rule (directly benefit) and persons that generally do not want the rule to be adopted (directly bear costs).
    - If the rule change is an additional fee for a trade or business, estimate how many businesses will be affected by the additional cost and who ultimately will pay this fee. (e.g., the business owner or the customer)
3. **A cost benefit analysis of the following:**
    - To comply with this subsection use a matrix or spreadsheet of costs and revenues that will result from the proposed rules.
    - The classifications "minimal," "moderate" and "substantial" increases or decreases in costs and revenues are used by some agencies.
    - A legend for the minimal, moderate and substantial classifications should be included.
    - If the analysis does not contain the calculations used to generate the results, attach a statistical summary to the end of the EIS.
    - The end of the cost/benefit analysis should include:

- A summary of costs and benefits to all sectors, and
- An explanation of how the monetary and/or non-monetary benefits are greater than the costs.

<u>The probable costs and benefits to the implementing agency and other agencies directly affected by the implementation and enforcement of the rule making.</u>

- The probable costs to the implementing agency shall include the number of new full-time employees necessary to implement and enforce the proposed rule. The preparer of the EIS shall notify the joint legislative budget committee of the number of new full-time employees necessary to implement and enforce the rule before the rule is approved by the Council.

- Attempt to quantify an estimate of the costs and benefits to state agencies directly affected by the rule making.
- Otherwise, use high and low ranges for the estimate.
- Recent changes to the APA include the number of new full-time employees (FTEs) necessary to implement and enforce the proposed rule.
- The preparer of the EIS (likely the rulewriter) is required to notify JLBC of the number of FTEs before approval by Council.

<u>The probable costs and benefits to a political subdivision of this state directly affected by the implementation and enforcement of the rule making.</u>

- Attempt to quantify an estimate of the costs and benefits to political subdivisions directly affected by the rulemaking.
- Otherwise, use high and low ranges for the estimate.

<u>The probable costs and benefits to businesses directly affected by the rule making, including any anticipated effect on the revenues or payroll expenditures of employers who are subject to the rule making.</u>

- Consider potential impacts of rules on:
- Staffing levels (i.e. Will people need to be hired? Will people need to be laid off?)
- Cash flow (i.e. Will the rule delay receipts? Increase expenses?)
- Barriers to industry entry (i.e. Increasing business start-up costs)
- Large businesses v. small businesses
- Depending on the rule, many of the above questions may not need to be asked. Conversely, with certain proposed rules, other questions will need to be asked.

- Many of these questions can be answered by an industry participant or the persons in your agency that actively regulate the participants.

A general description of the probable impact on private and public employment in businesses, agencies and political subdivisions of this state directly affected by the rule making.

- "Employment" includes direct employment impact and secondary employment impact on businesses that will be marginally affected by the new rule.

A statement of the probable impact of the rule making on small businesses.

(a) An identification of the small businesses subject to the rule making.

Under A.R.S. § 41-1001(21):

"Small business" means a concern, including its affiliates, which is [1] *independently owned and operated*, which is [2] *not dominant in its field* and which [3] *employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year*. (Emphasis added.)

- Include a listing of or a description of directly affected small business and secondary or marginally affected small business

(b) The administrative and other costs required for compliance with the rule making.

- Include an estimate for additional personnel and outside expenses, such as legal/consulting fees and the like, that would result from the proposed rule.

(c) A description of the methods prescribed in A.R.S. § 41-1035 that the agency may use to reduce the impact on small businesses.

- Recommendation: Use the definition of "small business" in A.R.S. § 41-1001.
- Identify other methods that the agency may use to reduce the impact on small businesses, including alternative methods that may reduce the impact.
    - When describing these methods, also include why any alternative methods were not incorporated into the rule.
    - If the method with the least impact on small business is not used, explain why.
- Ideally, the proposed rule should have the least burden/impact on business while accomplishing the regulatory objective.

(i) Establishing less costly compliance requirements in the rule making for small businesses.

(ii) Establishing less costly schedules or less stringent deadlines for compliance in the rule making.

(iii) Consolidating or simplifying the rule's compliance or reporting requirements.

(iii) Exempting small businesses from any or all requirements of the rule making.

(d) The probable cost and benefit to private persons and consumers who are directly affected by the rule making.

- If a *quantitative* estimate is not possible (as is often the case), substitute a *qualitative* explanation.

A statement of the probable effect on state revenues.

- Identify additional or reduced costs to state agencies or an increase or decrease in state tax revenues resulting from the rule changes.
    - Increases in business costs or decreases in business revenues may result in decreased business activity, which may lower state tax revenues.
    - An increase in state tax revenues may result from additional business activity as a result of the proposed rule.
- If the rulemaking will have a minimal effect, state the effect and move on.
    - **A description of any less intrusive or less costly alternative methods of achieving the purpose of the rule making.**
- Expect significant examination into the availability of less intrusive and/or less costly alternative.
    - **A description of any data on which a rule is based with a detailed explanation of how the data was obtained and why the data is acceptable data. An agency advocating that any data is acceptable data has the burden of proving that the data is acceptable. For the purposes of this paragraph, "acceptable data" means**

empirical, replicable and testable data as evidenced in supporting documentation, statistics, reports, studies or research.

- Required as of 2012.
- This subsection puts the burden on agencies to provide all the data on which a rule is based to anyone who wants to object to a rulemaking, and make the agency defend the use of the data in the rulemaking.

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 9. DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER POLLUTION CONTROL

Economic, Small Business and Consumer Impact Statement

(for R18-9-704 Reclaimed Water Runoff)

A. Brief summary of the information included in the economic, small business and consumer impact statement:

The proposed changes should benefit reclaimed water permittees. Reclaimed water permittees will have the choice to use reclaimed water under certain conditions, without the need for control measures to prevent runoff. Using reclaimed water allows a permittee to offset demands on the potable water supply. Reclaimed water permittees will have some additional costs of an AZPDES permit fee and complying with any control measures or treatment required in the AZPDES permit. The reclaimed water permittee will be able to consider whether additional reclaimed water usage outweighs the AZPDES permitting costs.

B. Name and address of agency employees who may be contacted to submit or request additional data on the information included in the economic, small business and consumer impact statement:

Name:	Wendy LeStarge
Address:	Arizona Department of Environmental Quality
	Water Quality Division
	1110 W. Washington Street
	Phoenix, Arizona 85007
Telephone:	(602) 771-4836 (Toll-free number in Arizona: (800) 234-5677)
Fax:	(602) 771-4834
E-mail:	lestarge.wendy@azdeq.gov

C. Identification of persons who will be directly affected by, bear the costs of or directly benefit from the rulemaking:

Reclaimed water permittees will be directly affected by the rulemaking. Reclaimed water quality standards and allowable uses are established in 18 A.A.C. 11, Article 3. Article 3 establishes five classes of reclaimed water based on protection of public health and groundwater quality (A+, A, B+, B, and C). Class A+ reclaimed water has undergone the most treatment of a minimum of secondary treatment, nitrogen removal treatment, and high level disinfection. Class C reclaimed

water has undergone the minimum treatment of secondary treatment, and some disinfection. Allowable end uses correspond with the water quality class designations. End uses include crop irrigation, residential and school ground landscape irrigation, toilet and urinal flushing, and recreational impoundments. Using reclaimed water allows a permittee to offset demands on the potable water supply.

Currently there are eleven reclaimed water individual permits, 396 Type 2 reclaimed water general permits, and 58 Type 3 reclaimed water general permits. Reclaimed water permittees will have the choice to use reclaimed water under certain conditions of runoff, if the runoff can be permitted under an AZPDES permit. Reclaimed water permittees will have some additional costs of an AZPDES permit fee and complying with any control measures or treatment required in the AZPDES permit. The reclaimed water permittee will be able to consider whether additional reclaimed water usage outweighs the AZPDES permitting costs.

D. Cost-benefit analysis of probable costs and benefits to ADEQ and other agencies:

ADEQ is the main agency impacted by the proposed changes. ADEQ already issues reclaimed water permits and AZPDES permits so it anticipates that the rulemaking will have only a minor impact.

E. Cost-benefit analysis of probable costs and benefits to political subdivisions:

Political subdivisions and government entities that are reclaimed water permittees could be impacted. There are approximately 101 reclaimed water permittees that are public entities, such as cities and towns, counties, improvement districts, and schools. Costs and benefits should be similar as to businesses, and are discussed below.

F. Cost-benefit analysis of probable costs and benefits to businesses:

Businesses that are reclaimed water permittees could be impacted. There are about 364 privately owned reclaimed water permittees, including homeowner associations, golf course, and home developers.

Reclaimed water permittees will have the choice to use reclaimed water under certain conditions of runoff, if the runoff can be permitted under an AZPDES permit. Permittees will no longer have to set up unnecessary controls to prevent all runoff. Using reclaimed water allows a permittee to

offset demands on the potable water supply. This proposed rule gives reclaimed water permittees additional options for applying reclaimed water to sites where it could not apply before because there would be some runoff.

Permittees that choose to apply reclaimed water and have runoff will have to obtain an AZPDES permit and will incur some additional costs of an AZPDES permit fee and complying with any control measures or treatment required in the AZPDES permit. Under A.R.S. § 49-255.01, any discharge to waters of the U.S. requires coverage under an AZPDES permit, unless excluded from permit requirements under statute or rule. Discharges made to waters of the U.S. via Municipal Separate Stormwater Sewer Systems (MS4s) or other conveyances also require coverage. AZPDES permits impose some limitations on pollutants that are discharged and are issued for no more than five years.

ADEQ is not requiring a specific AZPDES permit (or NPDES permit if issued by EPA), in order to allow the circumstances of the discharge to determine the appropriate permit (such as volume of discharge, location of discharge, or class of the reclaimed water). ADEQ believes the most likely permit to be used is the De Minimis General Permit (DMGP). The DMGP allows certain short-term and/or low volume discharges that meet the applicable surface water quality standards, are generally of limited flow and/or frequency, and do not last continuously for longer than 30 days unless approved in advance by ADEQ. Fees range from $250 from a one-time single source discharge to $500 for an area wide or project wide discharge. An annual fee of the same amount as the initial fee is assessed for permitted discharges over one year.

The DMGP sets some limitations such as for the amount of chlorine and E. coli that can be in the discharge water. Some classes of reclaimed water could potentially exceed the limits, so sampling may be required. A reclaimed water permittee will be able to consider if the potential costs of permit fees, additional treatment, or sampling outweigh the benefit of additional usage. For permittees that chose not to exercise the option, the rulemaking will not impose any additional cost.

G. Probable impact on public and private employment:

ADEQ does not anticipate that private or public employment will be directly affected by these rules.

H. Probable impact on small businesses:

ADEQ would use the small business definition in A.R.S. § 41-1001(21) of "a concern, including its

affiliates, which is independently owned and operated, which is not dominant in its field and which employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year." Based on this definition, ADEQ estimates that more than half of the 364 privately-owned reclaimed water permittees are a small business.

1) **The administrative and other costs required for compliance with the proposed rule making.**
   This rulemaking removes a prohibition and allows some additional uses for a reclaimed water permittee. For permittees that choose to exercise the option and have some runoff of reclaimed water, they are required under A.R.S. § 49-255.01 to have permit coverage. AZPDES permit coverage imposes some costs, which a reclaimed water permittee can decide if the benefits outweigh the costs.
2) **A description of the methods prescribed in section 41-1035 that the agency may use to reduce the impact on small businesses, with reasons for the agency's decision to use or not to use each method.**
   (i) Establish less costly schedules or less stringent deadlines for compliance, or consolidate or simplify the rule's compliance or reporting requirements in the proposed rule making.
   ADEQ is removing an outright prohibition and allowing discharge from runoff of reclaimed water if it is authorized by an AZPDES permit. Coverage under a NPDES or AZPDES permit is required under A.R.S. § 49-255.01 and the federal Clean Water Act for any discharge to waters of the U.S.
   (ii) Establish less costly compliance requirements, including establishing performance standards to replace design or operational standards in the proposed rule making.
   ADEQ's laws, rules, and permits must comply with federal Clean Water Act requirements.
   (iii) Exempt small businesses from any or all requirements of the proposed rule making.
   Coverage under a NPDES or AZPDES permit is required under A.R.S. § 49-255.01 and the federal Clean Water Act for any discharge to waters of the U.S.
3) **The probable cost and benefit to private persons and consumers who are directly affected by the proposed rule making.**
   ADEQ does not anticipate that the rulemaking will directly impact private persons or consumers.

I. Probable effect on state revenues:

There could be a slight increase on state revenues due to increased AZPDES permit fees.

J. Description of less intrusive or less costly alternative methods of achieving the proposed rulemaking:

ADEQ is implementing a less intrusive method by removing an existing prohibition and allowing permittees the option to have runoff of reclaimed water that is permitted under an AZPDES permit.

K. Explanation of the limitations of the data available for this economic small business and consumer impact statement.

ADEQ generally does not track in a database certain information on permittees, such as whether publicly or privately owned and the type of reuse activity. Some of the information came from an informal review of past applications and permits.

R18-2-401	Amend and add definitions to comply with federal requirements
R18-2-402	Amend permit issuing procedures to reflect federal requirements and address EPA objections. Update cross references.
R18-2-403	Amend to comply with federal requirements providing for EPA oversight in permitting activities.
R18-2-404	Amend to comply with federal requirements and allow for the emissions of NOx and VOC to offset Ozone.
R18-2-405	Amend to comply with the federal requirements.
R18-2-406	Amend to comply with federal requirements. Reorganize to better distinguish the differences in NSR requirements for attainment and nonattainment areas.
R18-2-407	Amend to comply with federal requirements.
R18-2-408	Amend to comply with federal requirements and update references.
R18-2-410	Amend to comply with federal requirements. Reorganize where and relocate all visibility requirements previously in other locations to this section.
R18-2-411	Add new section with federal requirements addressing sources located in an attainment area's impact on NAAQS violations in another area.
R18-2-412	Amend to comply with federal requirements.
R18-2-502	Amend to eliminate outdated minor NSR provision.
R18-2-503	Amend to reflect MyDEQ procedures.
R18-2-504	Amend to add minor NSR public participation requirements.
R18-2-507	Repeal to reflect unenforceability of referenced Article 17.
R18-2-508	Repeal outdated permit shield provision.
R18-2-512	Amend to reflect MyDEQ procedures.
R18-2-513	Amend to reflect MyDEQ procedures.
R18-2-514	Added to reflect MyDEQ procedures.
R18-2-515	Added to clarify minor NSR procedures for general permits.
R18-2-1205	Amend to remove deduction of ten percent of emissions reductions deposited in emissions bank.

7. A reference to any study relevant to the rule that the agency reviewed and proposes either to rely on or not to rely on in its evaluation of or justification for the rule, where the public may obtain or review each study, all data underlying each study, and any analysis of each study and other supporting material:

Not applicable

8. A showing of good cause why the rulemaking is necessary to promote a statewide interest if the rulemaking will diminish a previous grant of authority of a political subdivision of this state:

Not applicable

9. A summary of the economic, small business, and consumer impact:

The following discussion addresses each of the elements required for an economic, small business and consumer impact statement (ESBCIS) under A.R.S. § 41-1055.

An identification of the rule making.

The rulemaking addressed by this ESBCIS is the adoption of amendments designed to bring ADEQ's new source review (NSR) rules into conformance with federal requirements. This rulemaking will remedy the deficiencies identified by EPA in the LA/LD and generally bring Arizona's NSR program into conformity with federal requirements. The changes are described in greater detail in section 5 of the preamble.

There are two updates to the national ambient air quality standards that EPA has adopted since ADEQ last amended Article 2 that are included in this rulemaking and may need to be addressed in NSR applications and permitting decisions. The first is the $PM_{2.5}$ primary ambient air quality standard, which was amended by EPA in 2012 and appears at R18-2-201. The second is the ozone eight-hour average primary and secondary ambient air quality standard and the removal of the ozone one-hour standard, which was amended by EPA in 2015 and appears at R18-2-203. These changes may result in increased compliance cost for sources and increased administrative costs for ADEQ.

The remainder of the changes are procedural or technical in nature and should have at most a trivial economic impact on the agency, businesses or consumers.

An identification of the persons who will be directly affected by, bear the costs of or directly benefit from the rule making.

The persons that will be directly affected by and bear the costs of the rulemaking will be businesses that construct or modify stationary sources that are subject to major or minor NSR.

The types of Arizona business operations subject to major NSR typically include Portland cement plants, iron and steel mills, primary copper smelters, hard-rock mining operations, petroleum refineries, lime plants, fiberglass production facilities, wood furniture manufacturers, paper mills and fossil-fuel power plants. Major sources tend to be large facilities operated by publicly owned corporations and employing hundreds or thousands of employees.

Major sources may also be subject to minor NSR. Minor NSR may apply to smaller business operations or operations that, although substantial in scale, tend to have emissions below the major source thresholds. These include rock quarrying and crushing operations, concrete batch plants, asphalt plants, semiconductor manufacturers, aircraft engine and parts manufacturers, landfills and petroleum bulk stations and terminals.

The above list is not exhaustive. Any business that engages in pollutant emitting activities is potentially subject to NSR. Typically pollutant-emitting activities include fuel combustion to produce energy or as part of a process, the use of solvents, the application of surface coatings (such as paints and varnishes), the storage of fuels and other organic liquids and the handling of materials likely to give rise to airborne dust. Tailpipe emissions from mobile sources are not considered in determining NSR applicability.

A cost benefit analysis of the following:

(a) The probable costs and benefits to the implementing agency and other agencies directly affected by the implementation and enforcement of the rule making.

ADEQ's cost of implementing the amended NSR requirements will likely be minimal. One component of the major NSR amendments that could potentially impact ADEQ's cost of administering the air quality permit program is the inclusion of the new national ambient air quality standards: the 2012 $PM_{2.5}$ standard and the 2015 eight-hour primary and secondary ozone standard. However, the standards constitute an increase in the stringency of existing standards and likely will not result in any modeling or review time beyond that which is already required.

(b) The probable costs and benefits to a political subdivision of this state directly affected by the implementation and enforcement of the rule making.

The costs to political subdivisions subject to permitting under ADEQ's rules from these proposed amendments should be minimal. In general, the types of sources operated by political subdivisions are very unlikely to be subject to major NSR. The costs of the procedural and technical changes to minor NSR and the registration program proposed in this rulemaking are likely to be minimal.

ADEQ considers any impacts to sources in counties with their own pollution control programs to be indirect.

(c) The probable costs and benefits to businesses directly affected by the rule making, including any anticipated effect on the revenues or payroll expenditures of employers who are subject to the rule making.

As discussed in section 5 of the Preamble, the amendments to ADEQ's major NSR rules are necessary to comply with federal requirements for the program. If ADEQ failed to adopt these amendments, they would ultimately apply to sources in Arizona either through the adoption of a federal implementation plan (FIP) or the application of 40 CFR Part 51, Appendix S (in the case of nonattainment NSR). In addition, Title I, Part D of the Clean Air Act imposes a limited time from for ADEQ to adopt the major NSR amendments. Failure to meet the statutory timeframe will result in sanctions by the federal government, as described above.

Thus, failure to adopt these amendments would not in the long run result in the avoidance of any costs of compliance, but would result in a substantial negative impact on the state's economy.

In any case, the only substantial cost to businesses that could result from this rulemaking would be the cost to new or modified major sources of complying with the updated ozone and $PM_{2.5}$ NAAQS. As noted in the 2012 rulemaking, these costs are impossible to quantify but unlikely to be incurred:

> [W]hen modeling demonstrates an ambient impact resulting in non-compliance with an ambient standard (NAAQS or increments), mitigation beyond the level of control technology already required by major NSR is necessary. The cost of mitigation can be substantial but is highly dependent on the nature of the particular project and cannot be reliably estimated for purposes of the ESBCIS. Moreover, because major NSR automatically requires a very stringent level of control (BACT or LAER), mitigation is rarely necessary. Mitigation necessary to address non-compliance with any of the new standards imposed in the major NSR amendments will be an even rarer occurrence. Thus, the major NSR amendments are unlikely to result in additional mitigation costs.

A general description of the probable impact on private and public employment in businesses, agencies and political subdivisions of this state directly affected by the rule making.

ADEQ does not believe that the additional costs to businesses subject to the amended NSR requirements, as described above, will be substantial enough to deter the construction of expansion of business operations. Accordingly, there should be no impact on private employment or on the employment of any political subdivision subject to NSR.

A statement of the probable impact of the rule making on small businesses.

(a) An identification of the small businesses subject to the rule making.

Under A.R.S. § 41-1001(21):

"Small business" means a concern, including its affiliates, which is [1] *independently owned and operated*, which is [2] *not dominant in its field* and which [3] *employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year.* (Emphasis added.)

Most registration sources will likely qualify as small businesses, as will many sources subject to minor NSR. It is unlikely that any major sources would qualify.

(b) The administrative and other costs required for compliance with the rule making.

ADEQ anticipates that small businesses will incur little to no additional costs as a result of the procedural and technical changes to minor NSR and the registration program proposed in these amendments.

(c) A description of the methods that the agency may use to reduce the impact on small businesses.

(i) Establishing less costly compliance requirements in the rule making for small businesses.

Not applicable.

(ii) Establishing less costly schedules or less stringent deadlines for compliance in the rule making.

Not applicable.

(iii) Exempting small businesses from any or all requirements of the rule making.

Not applicable.

(d) The probable cost and benefit to private persons and consumers who are directly affected by the rule making.

Some businesses may pass some of the additional costs estimated on to consumers. ADEQ anticipates the impact will be negligible because the amendments will not substantially increase existing air quality compliance costs.

A statement of the probable effect on state revenues.

Since the costs of the amendments will be recoverable through air quality permit fees, there will be no net effect on state revenues.

A description of any less intrusive or less costly alternative methods of achieving the purpose of the rule making.

As discussed above in section 5, ADEQ is adopting amendments that the Department believes to be the minimum necessary to comply with federal NSR requirements. No less intrusive or costly alternatives are available.

10. A description of any changes between the proposed rulemaking, to include supplemental notices, and the final rulemaking:

ADEQ is making only minor clarifying changes to the proposal, as described in detail in the responses to comments 1-4, 8, 10, 12 and 17.

11. An agency's summary of the public or stakeholder comments made about the rulemaking and the agency response to the comments:

Comment 1: R18-2-101.131: For purposes of clarification, the reference to "under R18-2-302(B)(2)" (applicability provisions for Class II permits based on "significant" emission rates) might be better placed after "in reference to a significant increase" rather than after "a stationary source's maximum to emit with elective limits." (Arizona Mining Association [AMA])

Response: ADEQ appreciates the suggestion, but "under R18-2-302(B)(2)" does not modify "significant emissions increase." The definition in R18-2-101(131) is intended to specify the four different contexts to which the significance thresholds in the definition apply: (1) determining whether an emissions increase is significant for purposes major NSR, (2) determining whether a net emissions increase is significant for purposes of major NSR, (3) determining whether a stationary source's potential to emit a particular pollutant is significant for purposes of determining major NSR applicability to the pollutant, and (4) determining whether a stationary source's maximum capacity to emit with elective limits is significant for purposes of determining Class II permit applicability. The phrase "under R18-2-302(B)(2)" can only apply to the last item. In an attempt to make this definition clearer, however, ADEQ is substituting "as defined in R18-2-301(13)" for "under R18-2-302(B)(2)."

Comment 2: R18-2-301.13: Because "maximum capacity to emit with elective limits" as it is used in revised applicability provisions could be construed as applicable only to the situation where elective limits were included in a source's registration under R18-2-302.01(F), there could be confusion in evaluating applicability (e.g., a source subject to a Class II permit that never had a registration or a source that previously had a registration, but it did not contained elective limits). Although clarification can be found in the term's definition, perhaps some of the potential confusion could be avoided by replacing "maximum capacity to emit with elective limits" with "maximum capacity to emit with any elective limits." This change would help clarify that applicability is based on maximum capacity to emit, including elective limits if they were established. Of course, such references would then need to be revised throughout the revised rules. (AMA)

Response: ADEQ agrees with this comment and has made this change in the final rule.

Comment 3: R18-2-302.01(A)(6): This provision requires identification of the method used to determine "maximum capacity to emit" specified under R18-2-302(B)(3)(a) or (d) or subsection (G)(1)(a) of this Section, but Subsection (G)(1)(a) refers to "maximum capacity to emit with elective limits." The AMA recommends inserting "maximum capacity to emit with elective limits specified under" before "subsection (G)(1)(a) of this Section." (AMA)

Response: ADEQ agrees with this comment and has made this change together with some additional revisions to improve the clarity of this provision.

Comment 4: R18-2-302.01(B)(4): Because this is a registration provision, it appears that "permit or permit revision" should be replaced with "registration or registration revision." (AMA)

Response: ADEQ agrees with this comment and has made this change in the final rule.

Comment 5: R18-2-302.01(C)(4): As explained in more detail below, the "performance of the screening model pursuant to subsection (C)(3)" should not be the sole basis for the Director's determination resulting in denial of an application. The federal requirements for minor NSR programs at 40 C.F.R. § 51.160 do not expressly require modeling or mandate that it be the sole criteria for determining whether a source would "interfere with attainment or maintenance" of a NAAQS. Furthermore, a conservative screening model does not necessarily demonstrate that a source's emissions will interfere with attainment or maintenance of a NAAQS. The AMA therefore requests removal of "based on performance of the screening model pursuant to subsection (C)(3)." (AMA)

Response: Under R18-2-302.01(C)(4), the screening model run is not used to "demonstrate" that a source will interfere with attainment or maintenance of a NAAQS. Rather, it is used to determine whether a source will be required to obtain a Class II permit rather than a registration. ADEQ believes this is appropriate. If screening model results indicate that a source's emissions will interfere, the source will have two alternatives: First, the source can implement additional control measures to reduce its projected impact, in which case enforceable emission limits reflecting those controls will need to be imposed. See R18-2-334(C)(2)(c). Second, the source can perform a more refined modeling analysis to demonstrate that the interference projected by the screening

9. A summary of the economic, small business, and consumer impact:

The following discussion addresses each of the elements required for an economic, small business, and consumer impact statement (EIS) under A.R.S. § 41-1055.

An identification of the rule making.

The rulemaking addressed by this EIS consists of new rules added to the new Article 13 (R18-2-B1301; R18-2-B1301.01; R18-2-B1302; R18-2-C1301 (Reserved), and R18-2-C1302). The purpose of the amendments and new rulemaking is to bring nonattainment areas in the State of Arizona into compliance with new air quality standards for lead and sulfur dioxide pollution.

This EIS addresses the impact of the 2008 lead NAAQS and the 2010 sulfur dioxide NAAQS that requires the owner and operators of copper smelters, Asarco and Freeport-McMoRan Miami Inc., to install new and improved air pollution control equipment, apply for a new permit, and comply with new emission limits. The new NAAQS may result in increased compliance costs for Asarco and Freeport-McMoRan Miami Inc. and minor increased administrative costs for ADEQ.

An identification of the persons who will be directly affected by, bear the costs of or directly benefit from the rule making.

The persons who will be directly affected by and bear the costs of this rulemaking are the owners and operators of the Miami and Hayden Smelters, which are Freeport-McMoRan Miami Inc. and Asarco, respectively. There are no other smelting facilities in the state of Arizona affected by this rulemaking.

The persons who will benefit from this rulemaking are the residents of Hayden and Miami, as well as the employees of Asarco and Freeport-McMoRan Miami Inc., due to the improved air quality that will result from this rulemaking and the corresponding control technology Asarco and Freeport-McMoRan Miami Inc. will be implementing to control lead and sulfur dioxide pollution.

A cost benefit analysis of the following:

(a) The probable costs and benefits to the implementing agency and other agencies directly affected by the implementation and enforcement of the rule making.

ADEQ estimates that the current number of full-time employees assigned in the Permits and Compliance Sections of the Air Quality Division at ADEQ are adequate to implement and enforce the 2008 lead NAAQS in the Hayden nonattainment area and the 2010 sulfur dioxide NAAQS in the Hayden and Miami nonattainment areas. The costs of the rules to the implementing agency will therefore be minimal. Furthermore, permits for sources in the nonattainment areas are revised every five years, with minor revisions occurring periodically. Under A.A.C. R18-2-301(2) and R18-2-326(B)(1)(a), the permit applicant—in this case, Asarco and Freeport-McMoRan Miami Inc.—will ultimately be required to reimburse ADEQ for the cost of revisions as part of permit fees.

ADEQ has permitting, enforcement, and compliance jurisdiction in the Hayden and Miami nonattainment areas, and therefore, no other state agencies will be affected by this rulemaking.

(b) The probable costs and benefits to a political subdivision of this state directly affected by the implementation and enforcement of the rule making.

No political subdivision of the state operates a smelter of metal ore like copper. Under A.R.S. § 49-402(A)(2), ADEQ has original jurisdiction over all "sources, permits, and violations which pertain to…smelting of metal ore." The costs of enforcing these new rules applicable to the Asarco and Freeport-McMoRan Miami Inc. copper smelters are likely to be minimal and will be recoverable through permit fees acquired from Asarco and Freeport-McMoRan Miami Inc.

(c) The probable costs and benefits to businesses directly affected by the rule making, including any anticipated effect on the revenues or payroll expenditures of employers who are subject to the rule making.

The rules that are the subject of this preamble and EIS are necessary to comply with federal requirements for the SIP program under the CAA. If ADEQ fails to adopt these rules, the federal requirements will apply to the copper smelters through the adoption of a Federal Implementation Plan (FIP) issued by EPA under Section 110(c) of the CAA. However, the issuance of a FIP would likely require more strict emission limits and controls for the copper smelters, and further delay the areas' attainment of the lead and sulfur dioxide NAAQS as expeditiously as practicable, as required by the CAA.

If ADEQ fails to submit approvable SIPs, the nonattainment areas would be subject to sanctions under CAA Section 179(b), which can include a prohibition of highway funds and emission offsets requirements for other facilities. Therefore this rulemaking is an effort to not only curb air pollution in Arizona, but to also avoid federal consequences.

Lead and sulfur dioxide pollution cause extreme health risks and burdensome healthcare costs. Such related costs and benefits obtained from controlling lead and sulfur dioxide pollution are discussed further below.

The effects of lead air pollution

According to EPA, lead is emitted into the air from a wide variety of source types. 73 *Fed. Reg.* 29184, 29190 (2008). Source types include aviation fuel, industrial boilers, iron and steel foundries, and metal ore smelters. Once deposited out of the air, lead can be disturbed and re-suspended into the air. For example, if dust containing particles of lead settles on a road, the lead can become airborne when a truck drives on the road. Lead pollution in the air can be exceptionally troublesome due to its ease of transport in smaller particle sizes. Lead also subsists in the environment for a very long time, making full remediation difficult.

Lead can enter the human body through many routes, but it is primarily inhaled when it is a component of air pollution. In its review of scientific literature for the 2008 lead NAAQS, EPA examined air-related lead exposure through:

1. Inhalation of airborne lead, including re-suspended lead particles

2. Ingestion of lead deposited as indoor or outdoor dust or soil, dietary items (like crops and livestock), and drinking water

EPA recognizes that "lead has been demonstrated to exert 'a broad array of deleterious effects on multiple organ systems via widely diverse mechanisms of action.'" 73 *Fed. Reg.* 29184, 29197 (2008). Furthermore, a "safe" level of lead in the human body

that causes little to no harm has yet to be determined. In promulgating the 2008 lead NAAQS, EPA focused primarily on neurological effects in children and cardiovascular effects in adults that "are currently clearly of greatest public health concern."

Health experts agree that the developing nervous system of a child is the most sensitive to lead exposure. EPA states, "Functional manifestations of lead neurotoxicity during childhood include sensory, motor, cognitive, and behavioral impacts." 73 *Fed. Reg.* 29184, 29198 (2008). Studies have observed lower IQ, reduced academic achievement, and decreased graduation rates in adolescents exposed to lead. Lead exposure is associated with more negative ratings by teachers and/or parents for children exhibiting inattentiveness, impulsivity, distractibility, and lack of concentration. Higher concentrations of lead in the blood are also linked to impaired memory and visual-spatial skills. Additional studies show early exposure to lead in adolescents may result in an increased likelihood of antisocial and criminal behavior later in life. Since children are exposed to lead early, it has more time to accumulate in the blood supply and bones, hindering overall development and growth.

Lead exposure in adults can cause coronary heart disease, strokes, premature death, and hypertension. Furthermore, lead bioaccumulates in the body, causing persistent, long-term health problems. Lead exposure can also cause kidney disease, anemia, decreased sperm count, increased blood pressure, and interference with vitamin D metabolism. In the body of a pregnant woman, lead can easily cross the placenta, resulting in continued fetal exposure during pregnancy with lasting neurological impacts after birth. Pregnant women who are exposed to even low levels of lead are at high risk for premature birth.

Other symptoms caused by lead exposure include: irritability; shortened attention span; fatigue; impaired growth; loss of appetite; learning disabilities; headaches; seizures; nausea and vomiting; and severe abdominal pain.

A discussion of the monetary costs and health-based benefits of the proposed rulemaking for lead follows.

Lead emissions controls and costs

The CAA prohibits the EPA from considering costs in setting or revising the NAAQS for any pollutant. However, in promulgating the 2008 lead NAAQS, EPA analyzed the associated costs for pollution control equipment and benefits associated with improved public health. EPA estimates that full implementation of the lead NAAQS by sources across the U.S. in 2016 alone would cost approximately $150 million to $2.8 billion. The health benefits far outweigh these costs, estimated between $3.8 billion to $6.9 billion. 73 *Fed. Reg.* 66964 (2008).

As part of the consent decree, Asarco will implement the Converter Retrofit Project at its Hayden copper smelter to reduce lead and sulfur dioxide emissions. The project will replace the existing five 13-foot diameter copper converters with three 15-foot diameter converters that operate more efficiently. Improved primary and secondary hooded ventilation systems will also be installed above the smelting equipment to capture process off-gases. A new tertiary hooding system will further prevent emissions from escaping the smelting building. An upgraded vent gas baghouse will collect particulate and gaseous emissions coming from the converter dryers and flash furnace.

In addition to the Converter Retrofit Project, Asarco will also be implementing additional control technology for leaded fugitive dust sources. For example, solids from the acid plant scrubbers that process emissions from the flash furnace and copper converters will be dried in a fully enclosed system that is maintained under negative pressure instead of being dried in open piles outside. Materials like concentrate and reverts will no longer be stored in open piles outside, but rather on concrete pads with fences to block the wind and water sprays to minimize fugitive emissions. Unpaved roads will also be sprayed with chemical dust suppressants and paved roads will be sprayed with water to control leaded dust emissions. In addition to complying with the consent decree, these modifications will also contribute to the control strategy for the Hayden lead nonattainment area SIP.

In 2015, Asarco's Hayden operations emitted over three tons of lead emissions. In 2019, that amount is projected to decrease by half to roughly 1.5 tons. The cost of the retrofit project is estimated to be $110 million.

Benefits of lead emissions controls

The primary benefit of installing the emissions control technologies is an overall reduction in lead in ambient air, which in turn, decreases health and welfare risks from exposure.

Health issues cause more hospital stays and sick time taken from work, putting more burden on health care systems and the economy. EPA estimated between $3.8 billion to $6.9 billion of benefits can be contributed to the new lead NAAQS, reflecting public health improvements and an expected increase in lifetime earnings as a result of avoiding IQ loss.

This rulemaking will also help the State of Arizona avoid federal sanctions implemented under the CAA. If the State fails in submitting the rules and SIP revision for the Hayden lead nonattainment area, EPA has the authority to prohibit highway funding and increase costly emission offset requirements for new or modified facilities.

This rulemaking is necessary because of the health benefits derived from the improved controls implemented at the copper smelter and to avoid federal consequences.

The effects of sulfur dioxide pollution

According to the Agency for Toxic Substances and Disease Registry (ATSDR), sulfur dioxide is a colorless gas with a pungent odor. Sulfur dioxide is a liquid when under pressure; it easily dissolves in water and cannot catch fire. Sulfur dioxide in the air results primarily from activities associated with the burning of fossil fuels (coal, oil) such as at power plants or from copper smelting. Once released into the environment, sulfur dioxide moves to the air where it can convert to sulfuric acid, sulfur trioxide, and sulfates.

Short-term exposures to high levels of sulfur dioxide can be life-threatening. Exposure to 100 parts per million parts of air (ppm) is considered immediately dangerous to life and health. Previously healthy nonsmoking miners who breathed sulfur dioxide released as a result of an explosion in an underground copper mine developed burning of the nose and throat, breathing difficulties, and severe airway obstructions. Long-term exposure to persistent levels can also affect health. Lung function changes have been observed in some workers exposed to 0.4 - 3.0 ppm of sulfur dioxide for 20 years or more. However, these workers were also

exposed to other chemicals, making it difficult to attribute their health effects to sulfur dioxide exposure alone. Additionally, exercising asthmatics are sensitive to the respiratory effects of low concentrations (0.25 ppm) of sulfur dioxide.

Typical outdoor concentrations of sulfur dioxide may range from 0 to 1 ppm. Occupational exposures to sulfur dioxide may lawfully range from 0 to 5 ppm under state OSHA (Occupational Safety and Health Administration) regulations. During any 8-hour work shift of a 40-hour work week, the average concentration of sulfur dioxide in the workplace may not exceed 5 ppm.

Most of the effects of sulfur dioxide exposure that occur in adults (i.e., difficulty breathing, changes in the ability to breathe as deeply or take in as much air per breath, and burning of the nose and throat) are also of potential concern in children, but it is unknown whether children are more vulnerable to exposure. Children may be exposed to more sulfur dioxide than adults because they breathe more air for their body weight than adults do. Children also exercise more frequently than adults. Exercise increases breathing rate. This increase results in both a greater amount of sulfur dioxide in the lungs and enhanced effects on the lungs. One study suggested that a person's respiratory health, and not his or her age, determines vulnerability to the effects of breathing sulfur dioxide.

Sulfur dioxide emissions controls and costs

Freeport-McMoRan Miami Inc.

The construction work being performed at the Freeport-McMoRan Miami Inc. Miami smelter includes process changes along with environmental upgrades to achieve sulfur dioxide emission reductions so that the Miami area will meet the new ambient air quality standards. The Miami Smelter emission control upgrades include new converter mouth covers, a new Aisle Scrubber, additional capture systems, and upgrades to the Acid Plant Tail Gas and Vent Fume Scrubbers to use caustic for sulfur dioxide removal to ensure attainment of EPA's more stringent sulfur dioxide NAAQS. At this time, the cost of the project is estimated to be $250 million.

Asarco-Hayden

The Converter Retrofit Project and associated controls discussed above for lead pollution will also greatly mitigate sulfur dioxide emissions. As mentioned earlier, the project involves replacement of the existing five 13-foot diameter converters with three 15-foot diameter converters. Corresponding modifications will be made to the converter aisle in order to accommodate the larger converters. The retrofit includes installation of a new converter primary gas system. New secondary hoods will also be installed and designed to fit the new, larger converters and new primary hoods. The new secondary hoods will direct sulfur dioxide ventilation gases during blowing operations to the acid plant instead of a baghouse, improving control. Other upgrades include installation of a new converter aisle tertiary gas collection system, enhanced lime injection at the secondary and new vent gas baghouse to further control sulfur dioxide emissions, and improvements to the acid plant. Overall, the retrofit is projected to reduce current sulfur dioxide emissions by 90 percent, with a total sulfur dioxide capture rate of 99.5 percent of the sulfur dioxide produced during the copper smelting process. The cost of the converter retrofit project is estimated to be $110 million.

Benefits of sulfur dioxide emissions controls

One of the primary benefits of installing the emissions control technologies is an overall reduction in sulfur dioxide emissions. EPA first set health based standards for sulfur dioxide in 1971 at a 24-hour primary standard at 140 parts per billion (ppb) and an annual average standard at 30 ppb. In 1996, EPA reviewed the sulfur dioxide NAAQS and chose not to revise the standards. The 2010 revision to the sulfur dioxide NAAQS established a new one-hour standard at a level of 75 ppb. 75 *Fed. Reg.* 35520 (2010).

Lowering the standard will result in health benefits by lowering exposure to sulfur dioxide, specifically short-term exposure. Initial respiratory reactions to sulfur dioxide include narrowing of the airways in the lungs and difficulty breathing. Individuals with sensitive or comprised respiratory systems, such as children, the elderly, and individuals with respiratory related illnesses are more susceptible to these reactions. These negative reactions commonly result in increased emergency room and hospital visits. The revised NAAQS is designed to lower emissions and reduce exposure to high levels of sulfur dioxide by lowering the level of the standard and establishing new averaging time frame. EPA estimates that a level of 75 ppb for sulfur dioxide will result in cost benefits between $13 billion and $33 billion from reduced emergency room visits, hospitalizations, lost work days, and cases of aggravated asthma and bronchitis.

In addition to direct impacts, sulfur dioxide is also a precursor to particulate matter that is 2.5 micrometers in diameter, which can penetrate deep into the lungs and cause serious health effects including increases in cardiovascular illness and mortality.

Additional benefits of this rulemaking include continued oversight and control of air emissions by ADEQ. As stated earlier for lead pollution, without approval of this rulemaking and SIPs, the CAA specifies that EPA must develop a federal implementation plan (FIP) to regulate sources within the planning area. In addition to a FIP, the Hayden and Miami nonattainment areas would also be subject to highway sanctions and offsets. Highway sanctions are prohibitions on certain transportation projects or grants within the planning area. Offset sanctions are requirements for new or modified sources to have a ratio of emissions reductions to increased emissions at a level of at least two to one. Both ADEQ and the business community will benefit from continued regulation at the state level as a result of avoiding federal sanctions.

A general description of the probable impact on private and public employment in businesses, agencies and political subdivisions of this state directly affected by the rule making.

ADEQ anticipates that employment impacts will be minor. ADEQ does not expect short- or long-term employment, production, or industrial growth in Arizona to be negatively impacted by this rulemaking. Furthermore, no sources are expected to close from the implementation of this rulemaking.

Asarco-Hayden Operations

Asarco estimates that 10 contractors and 100 full-time employees will be needed in order to complete the retrofit project. Some of the contractors will be hired for planned maintenance outages during the construction period. Roughly 50 percent of the contrac-

tors will be hired from Arizona and the other 50 percent from the Southwest in general. Procurement of equipment for the retrofit project is scheduled to begin in 2015, with full completion of the project scheduled by the fourth quarter of 2018. Asarco is not planning to create any new full or part-time positions at the company as a result of this project.

Freeport-McMoRan Miami Inc. – Miami Operations

Through the various phases of the construction project described above, Freeport-McMoRan Miami Inc. expects to have over 500 contractors/individuals working on the construction; although this number will vary over the construction period. This estimate does not include contractors required for planned maintenance outages during the same time frame. While the number of contractors required for planned maintenance outages is contingent upon the work to be completed during the outage, it usually requires between 500 and 1,000 contractors.

Because of the increased demand for contractors, Freeport-McMoRan Miami Inc. anticipates a short-term increase in employment by the contractors throughout the project. Contractors will be selected on an as needed basis; some local and specialty contractors from outside the State may be necessary. No new positions will be created within the Freeport-McMoRan Miami Inc. Miami smelter for this project.

Construction will occur in two major phases. Phase 1 started with ADEQ's approval of the smelter's significant permit revision authorizing the proposed construction. Phase 2 will begin shortly after internal approval to move forward is received and Freeport-McMoRan Miami Inc. anticipates the project will be completed eight quarters after that approval is received.

A statement of the probable impact of the rule making on small businesses.

(a) An identification of the small businesses subject to the rule making.

Under A.R.S. § 41-1001(21):

"Small business" means a concern, including its affiliates, which is [1] *independently owned and operated*, which is [2] *not dominant in its field* and which [3] *employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year.* (Emphasis added.)

The lead and sulfur dioxide-related rules will apply only to the companies that own and operate copper smelters in Hayden and Miami, which is currently Asarco and Freeport-McMoRan Miami Inc., respectively. These companies do not qualify as small businesses.

As of 2014, Asarco's Hayden operations employed over 600 people. Asarco is a subsidiary of Grupo Mexico, a public company, and one of the major copper producers in the world. According to its 2014 annual report, Grupo Mexico's net profit was $1.7 billion. Grupo Mexico nor Asarco's Hayden operations meet the definition of a "small business" under A.R.S. § 41-1001(21).

As of this rulemaking, Asarco currently contracts with Smithco Enterprises, LLC, an operation that processes smelter byproducts like reverts for Asarco. Smithco's business relies heavily on Asarco's copper smelter. Several control measures required by this rulemaking (and the consent decree) will apply to some of Smithco's operations. However, Asarco is paying for the control measures as part of the consent decree with EPA. Therefore, this rulemaking will not have a direct impact on Smithco.

In 2015, Freeport-McMoRan Miami Inc., also a public company and top producer of copper in the world, reported a $15.8 billion revenue. Also in 2015, its Miami mine and smelter produced 43 million pounds of copper. As of 2016, roughly 760 people are employed at Freeport's Miami operations. Freeport-McMoRan Miami Inc. Miami operations do not meet the definition of a "small business" under A.R.S. § 41-1001(21).

(b) The administrative and other costs required for compliance with the rule making.

Not applicable.

(c) A description of the methods that the agency may use to reduce the impact on small businesses.

Not applicable.

(d) The probable cost and benefit to private persons and consumers who are directly affected by the rule making.

Not applicable.

A statement of the probable effect on state revenues.

Since any costs associated with the rulemaking will be recoverable through air quality permit fees, there will be no net effect on state revenues.

A description of any less intrusive or less costly alternative methods of achieving the purpose of the rule making.

ADEQ was not able to identify any less intrusive or costly alternative methods for achieving the purpose of the rulemaking—attainment of the 2008 lead NAAQS and 2010 sulfur dioxide NAAQS. The smelters owned by Asarco and Freeport-McMoRan Miami Inc. are the primary source of emissions and are responsible for installing adequate control technologies that will bring the areas into compliance.

A description of any data on which a rule is based with a detailed explanation of how the data was obtained and why the data is acceptable data. An agency advocating that any data is acceptable data has the burden of proving that the data is acceptable. For the purposes of this paragraph, "acceptable data" means empirical, replicable and testable data as evidenced in supporting documentation, statistics, reports, studies or research.

To support the emission limits and control requirements in both rules, ADEQ conducted air quality modeling using data obtained from Asarco, Freeport-McMoRan Miami Inc., and air quality monitors. ADEQ followed EPA Guidance in conducting the modeling.

Before conducting the air quality modeling, ADEQ identified lead and sulfur dioxide pollution sources in the Hayden nonattainment area and sulfur dioxide pollution sources in the Miami nonattainment area. To do this, ADEQ obtained emissions data from

EPA's National Emission Inventory (NEI). After analyzing the emissions data, ADEQ determined that no other sources or combination of sources contributed as much as the Asarco smelter in the Hayden nonattainment area and the Freeport-McMoRan Miami Inc. smelter in the Miami nonattainment area.

ADEQ used the emissions data, in addition to meteorological and topographical data, to develop emissions limits that demonstrate attainment. Since the copper smelters in both areas were identified as the primary sources of emissions, the modeling efforts concentrated on the facilities' operations. The emission limits derived from the modeling are conservative and factor in the emission control equipment efficiency as well as peak smelter production levels.

The modeling Technical Support Documents outline ADEQ's methods, approach, and empirical results. The documents for both nonattainment areas are available for review at ADEQ's Records Center. See section 7 of this preamble for more information.

10. A description of any changes between the proposed rulemaking, to include supplemental notices, and the final rulemaking:

No substantive changes have been made to the rules. Non-substantive grammatical, formatting, and consistency changes have been made throughout the rules, including those resulting from the Governor's Regulatory Review Council.

As published in the Notice of Proposed Rulemaking, R18-2-715 and -715.01 are being amended. As a result of additional Agency review and stakeholder comments, R18-2-715.02 is also being amended. This amendment will clarify the applicability of the relevant effective dates of the rules to the appropriate planning area. This change is not substantive and only serves to clarify the applicability of the effective dates to ensure compliance.

11. An agency's summary of the public or stakeholder comments made about the rulemaking and the agency response to the comments:

On Monday, January 9, 2017, at 2:00 p.m. at ADEQ's Phoenix Offices, the Arizona Department of Environmental Quality conducted a public hearing on the NPRM. The public comment period for the rules began on Monday, December 5, 2016, and closed on Monday, January 9, 2017, at 5:00 p.m. No oral comments were received during the public hearing. The Arizona Department of Environmental Quality (ADEQ) received written comments from the current owner and operators of the copper smelters, ASARCO LLC and Freeport McMoRan, as well as the Environmental Protection Agency (EPA). These comments are summarized and addressed below.

Comments on only R18-2-B1301, Lead Rule

I. Revise the main stack emission limit to conform to the NAAQS averaging period

1) Comment: Under proposed R18-2-B1301(C), lead (Pb) emissions from the main stack cannot exceed 0.683 pound of lead per hour (pph). Asarco comments that "the limit is designed to ensure attainment of the lead NAAQS, which is set at 0.15 micrograms per cubic meter Pb in total suspended particles as a 3-month average," and asserts that "SIP limits should be tied to the averaging time of the corresponding NAAQS."

Asarco proposes that the emission limit in the rule be revised to 0.683 pound of Pb per hour, 3-month average, rolled each calendar month. Asarco asserts that the revised limit "is protective of the NAAQS and consistent with Asarco's modeling approach in the attainment demonstration." In a supplemental comment, Asarco included proposed language to be added to R18-2-B1301(F)(1). Essentially, the proposed rule language requires Asarco to calculate compliance with the proposed three-month rolling average limit using data from a three-month averaging period. The language also implies that Asarco can conduct additional main stack tests within a three-month period and then average the results.

(Comment submitted by ASARCO LLC)

Response: In ADEQ's attainment demonstration, lead emissions from the main stack were modeled at a constant rate of 0.683 pph, which is consistent with the current emission limit in the rule. This approach was taken due to a lack of main stack emissions data. Specifically, no data exists showing how main stack emissions vary over time. Currently, the only emissions data available comes from the facility's annual stack test, which is a brief representation of main stack emissions.

Asarco requests an emissions limit structure that would average the main stack emission rate over a three month period if the 0.683 pph limit were to be violated during one or more tests. Thus, Asarco could experience main stack emission rates higher than 0.683 pph during some testing periods, and still comply, as long as over a three month period, the average of all test results were below the limit. This varying emission rate approach is inconsistent with the attainment demonstration, in that, there is no fluctuation of the main stack emission rate in the model. A main stack emission rate greater than 0.683 pph was not modeled, therefore, attainment of the NAAQS at an emission rate greater 0.683 pph has not been demonstrated. Given this lack of support, ADEQ is not comfortable with the proposed compliance demonstration.

Furthermore, the rule and modeled limit represent Asarco's Potential To Emit (PTE) for the main stack. This is consistent with EPA's modeling guidance for the lead NAAQS (see memo from Scott Mathias, *2008 Lead (Pb) National Ambient Air Quality Standards (NAAQS) Implementation Questions and Answers*, July 8, 2011, EPA, Office of Air Quality Planning and Standards). This guidance states, "The emissions rate to input into AERMOD for attainment demonstrations is based on the maximum allowable or permit limit emissions, often 1-hour limits." Asarco's PTE limit is the maximum allowable or permit limit.

The guidance also states, "In general, the maximum hourly emission rate (PTE) should be used as the basis for establishing emission limits and for model input. This approach is appropriately conservative for emissions units that 1) could be operated at a relatively high capacity factor (% of available capacity) over the applicable averaging period, 2) are associated with *non-continuous compliance monitoring methods (e.g. periodic source testing)*, and 3) have emissions that are not well correlated with production or other measurable surrogate monitoring parameters" (emphasis added). Under the rule, Asarco is required to conduct main stack testing once a year and is a source that conducts non-continuous compliance monitoring, as mentioned from the guidance above. PTE therefore should serve as the basis for the emissions limit. If Asarco would prefer to have an emission limit that conforms to the NAAQS, then additional emissions data is needed, which can only be achieved through more frequent stack testing or Contin-

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 9. DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER POLLUTION CONTROL

Economic, Small Business, and Consumer Impact Statement

The following discussion addresses each of the elements required for an economic, small business and consumer impact statement under A.R.S. § 41-1055.

A. An identification of the rulemaking.

This rulemaking is generally anticipated to encourage usage of reclaimed water, increase business opportunities, and pave the way for water resource conservation and savings. This rulemaking allows for activity that has long been prohibited and does not limit already occurring activities. Under the 2001 reclaimed water rules, no one has been allowed to provide even treated reclaimed water for human consumption, except as allowed by substantive policy. ADEQ is modifying this prohibition to allow for the distribution of highly treated reclaimed water in order to augment Arizona's water supply and to spark innovation. In addition, rule modifications to large scale gray water use modifications will also allow for activity previously limited by implementation requirements. The other rule modifications, including rule clarifications and rule restructure, should have limited, if any, economic effects.

B. An identification of the persons who will be directly affected by, bear the costs of, or directly benefit from this rulemaking.

Recycled water permittees will be directly affected by this rulemaking, including those who use reclaimed water and gray water for beneficial use.

The types of facilities that these rules generally apply to include wastewater treatment plants, irrigation districts, other reclaimed water end users, and residential and large-scale gray water users.

Type 2 permittees include, as examples, schools, retail centers, HOAs, other residential communities and subdivisions, school districts, municipalities, construction companies, churches, and correctional facilities. The table below shows the numbers of currently active Type 2 general reclaimed permits:

Use Category	Active Type 2 General Permits
Agriculture Irrigation	9
Construction and/or Dust Control	9
Golf Course Irrigation	46
Landscape Impoundment	4
Landscape Irrigation	275
Pasture for animals (dairy)	1
Pasture for animals (non-dairy)	3
Recreational Impoundments (lakes)	2
Restricted Access Landscape Irrigation	6
Silviculture	1
Multiple uses	45
Total Type 2 General Reclaimed Permits	***401***

ADEQ also currently has 52 active Type 3 reclaimed water permits for water agents or blending facilities, which mainly include municipalities, political subdivisions, and utilities.

There are 10 active individual recycled water permits under ADEQ. This includes:

- 7 industrial permits, including permits for correctional facilities, power plants, food processing facilities, and mines;
- 3 individual gray water permits including for colleges, correctional facilities, municipalities, and industrial operations such as food canning, mining, and power plants; and
- 2 individual reclaimed permits, one for a municipality and one for a county.

There are many Type 1 gray water users in the state, but the exact or even approximate number is unknown as no written or recorded permit is required in order to be in compliance with the rules.

There are currently 6 Type 3 gray water permits, including for R.V. parks, recreational parks, and residential communities. The Type 3 gray water provisions as modified may encourage similar facilities, including hotels, to consider applying for this type of permit in the future.

Other potential permittees include those who may choose to apply for an advanced reclaimed water treatment facility individual permit. These permittees will likely consists of those who wish to capitalize on new technology to maximize the use and conservation of water. ADEQ anticipates that as these innovators demonstrate and prove current technologies, and the technologies become less

expensive, more water treatment facilities will start to take advantage of the economic benefit opportunities that these rules provide

C. A cost benefit analysis of the following:

a. The probable costs and benefits to the implementing agency and other agencies directly affected by the implementation and enforcement of the rulemaking.

ADEQ is the main agency impacted by the proposed changes. ADEQ already issues reclaimed and gray water permits. ADEQ expects that processing a permit for advanced water treatment facilities will cost no more than the cost to process aquifer protection permits for large-scale wastewater treatment plants. Likewise, ADEQ does not anticipate any increase in state costs to analyze Type 3 gray water or other individual reclaimed permits.

ADEQ does not anticipate the number of applications for new permits, including for advanced water treatment facility permits, individual reclaimed/gray water permits, or Type 3 gray water permits, to drastically increase as a result of these rules. Therefore, ADEQ does not currently expect this rule to greatly increase the number of permits it must process, and ADEQ expects permit fees to support most of any extra permit processing costs. Upon finalization of the rule, the agency does not expect it will need to greatly increase resources to support the program, at this time. Initially, no new full time employees will be devoted to support the program. The permit fees for aquifer protection, reclaimed, and gray water are fixed, however, and do not adjust with any sort of inflationary index, which may cause issues at a future date. As the agency gains experience and data to measure impacts, ADEQ intends to analyze and address this issue at a future date as a part of regular periodic water quality division-wide analysis of fees. Therefore, ADEQ expects minor economic impacts to result from this rulemaking at this time.

b. The probable costs and benefits to a political subdivision of this state directly affected by the implementation and enforcement of the rulemaking.

Political subdivisions and government entities that are reclaimed water permittees are impacted by the rule, but any economic impacts should be minimal. There are approximately 90 reclaimed water permittees that are public entities, such as municipalities, towns, counties, and associated organizations, such as schools. Costs and benefits should be similar as to businesses, and are discussed below.

c. The probable costs and benefits to businesses directly affected by the rulemaking, including any anticipated effect on the revenues or payroll expenditures of employers who are subject to the rulemaking.

Gray Water Modifications

This rule modifies gray water best management practices for Type 1 and Type 3 permits. ADEQ does not expect the costs to comply with the Type 1 rule to be any more expensive than the previous gray water use requirements. However, when Type 3 gray water users wish renew their permits, there will likely be a minimal consulting or engineering cost to ensure compliance with the new permit requirements. While this may minimally affect each permittee, consultants, engineers, and law firms may minimally or moderately benefit from this rulemaking from their clients in the aggregate in the future if their services are needed to comply with this rule. More potential large-scale gray water users may also benefit from water cost savings from this rulemaking. Only seven Type 3 gray water permits exist because the current use requirements essentially preclude the objective of the permit, which is to irrigate the land for beneficial use. Instead, current Type 3 gray water facilities must disperse the water to mirror the trench disposal requirements for on-site waste wastewater facilities, which limits the ability of a gray water permittee to use the water for simple irrigation or composting purposes. Given that this rule provides reasonable best management practices in place of the on-site trench disposal methodology, the ability to use gray water on a large scale should increase. This ability may translate to increased use of gray water for water that a business may otherwise have to pay for. This may result in incremental conservation of water and serve to address community water augmentation and water security planning.

Any additional costs to businesses subject to the amended gray water rules will be minimal and are not expected to deter any expansion of business operations. In fact, ADEQ expects this rule to have the opposite effect overall. Likewise, there should be no negative impact on employment in this state.

New Permit for Advanced Reclaimed Water Treatment Facility

The new rule allows for activity that was previously prohibited, namely treating reclaimed water and distributing it for human consumption. In order for this activity to be carried out safely, ADEQ will require an individual reclaimed water permit. This type of facility is unlike most other current reclaimed water facilities, but ADEQ expects the cost of the permit to be similar to that of

an individual APP permit for a large wastewater treatment facility. According to billing records, the cost of these types of permits generally range between $10,000 - $15,000.

Advanced reclaimed water treatment is a voluntary activity which may be pursued to augment Arizona's water supply for environmental reasons, and it may soon become profitable given the high value of potable water in Arizona. This rule will also allow for increased water security and an additional long-term dependable water source as a part of a larger plan to augment Arizona's water supply and promote continued economic growth.

Based on Southern California figures as reported in WateReuse Research Foundation's *The Opportunities and Economics of Direct Potable Reuse*, the total cost of treating reclaimed water to produce potable water, including treatment, conveyance and brine management may run between $820 acre-foot and $2000 acre-foot. This cost is likely lower than imported water supply and brackish groundwater supply options. The price of direct potable use overall may be more expensive than other current conservation options, but conservation typically requires increasingly more expensive technologies and resources as the level of acre-feet saved increases. In other words, there is a mathematical limit to the benefits of conservation, whereas advanced water treatment may continue to provide increased supply and benefit with more limited additional resources.

Newspaper Notice Removal

The rule eliminates the requirement for the state to publish permit public notices in newspapers, but rather requires notice be given on the Department's website. As an example, a public notice published in a statewide newspaper may cost approximately $1,000. This cost is passed along to the permittees in their final permit processing bills. Hence, the change could save thousands of dollars a year for ADEQ permitting customers. However, this modification of the notice requirement could affect newspaper companies negatively, as government-required newspaper notices are a source of income for these companies.

D. A general description of the probable impact on private and public employment in businesses, agencies, and political subdivisions of this state directly affected by this rulemaking.

ADEQ does not anticipate any significant impact on employment in this state as a result of this rulemaking.

E. A statement of the probable impact of the rulemaking on small businesses.

ADEQ does not expect this rulemaking to significantly increase burdens on small businesses. Some additional design, engineering, or consulting costs may be required for a renewing permittee to comply with the Type 3 gray water requirements under this rule. Additionally, consultants, suppliers, engineers, and lawyers with small businesses may indirectly benefit from additional work contracted as a result of the permitting and construction associated with new Type 3 gray water facilities or new advanced reclaimed water treatment facilities.

a. An identification of the small businesses subject to this rulemaking.

Under A.R.S. § 41-1001(21):

"Small business" means a concern, including its affiliates, which is [1] independently owned and operated, which is [2] not dominant in its field and which [3] employs fewer than one hundred full-time employees or which had gross annual receipts of less than four million dollars in its last fiscal year. (Emphasis added.)

The types of businesses affected are the same as those listed in the section above that identifies those persons affected by the rulemaking. Construction, landscaping, golf courses, and retail centers are some examples of possible small businesses affected by this rulemaking. ADEQ is unaware of any small businesses that do not want this rule to proceed.

b. The administrative and other costs required for compliance with the rulemaking.

This rule does not prescribe significant changes in administrative or compliance costs for existing reclaimed water or Type 1 gray water users.

New Type 3 gray water permittees, which may include small businesses, will likely need to consult designers, engineers, or consultants to comply with the new rule modifications. However, the costs will likely be no more or less than the consultant costs for the trench disposal requirements that have existed since 2001. Therefore, ADEQ does not expect the new Type 3 gray water requirements to increase compliance costs for new businesses, including small businesses. However, upon renewal, each of the 6 existing Type 3 gray water facilities will be required to renew according to the rules established in this rulemaking. This will entail some design costs as discussed above. These facilities are not impacted immediately as they have until their existing permit expires in order to comply with the new regulations.

New advanced reclaimed water treatment facilities will entail significant investment in permitting, engineering, construction, and long-term operation costs.

For both Type 3 gray water users and advanced reclaimed water treatment facilities, potential permittees will need to analyze the possible return on investment for their particular business.

c. A description of the methods that the agency may use to reduce the impact on small businesses.

(i) Establishing less costly compliance requirements in the rulemaking for small businesses.

ADEQ is consolidating most generally required reporting under this rule to be made once annually by January 31st instead of by the permit anniversary date. ADEQ anticipates this to have a minimal positive impact on small businesses. ADEQ is providing an exception to the prohibition of providing reclaimed water for human consumption by allowing an advanced reclaimed water treatment facility to be permitted to treat reclaimed water and distribute the potable product for human consumption.

(ii) Establishing less costly schedules or less stringent deadlines for compliance in the rulemaking.

Current permits are grandfathered into the recycled water program so that existing reclaimed and gray water permits shall follow the rules as they exist under current permits until such permits expire. Any renewed permit will be renewed under the new rules. This was done to allow the regulated community time to evaluate the new rule structure any changes needed to their processes before the new rules apply. The new rules are not, however, expected to cause significant changes for small businesses.

(iii) Exempting small businesses from any or all requirements of this rulemaking.

To protect human health and the environment, ADEQ cannot exempt small businesses from requirements of this rulemaking.

d. The probable cost and benefit to private persons and consumers who are directly affected by this rulemaking.

ADEQ does not anticipate any immediate significant economic cost or benefit to private persons or consumers. The modifications in Type 1 gray water use requirements are essentially clarifications and are expected to at most minimally affect residential gray water users. An

intangible benefit of these rules may be the ability of the public to support businesses that conserve more water through gray water use or that lead the nation in protecting water resources by producing potable water from reclaimed water.

F. A statement of the probable effect on state revenues.

ADEQ does not expect any significant increase or decrease state revenues as a result of this rule.

G. A description of any less intrusive or less costly alternative methods of achieving the purpose of the rulemaking.

ADEQ does not know of any less intrusive or less costly alternative methods of expanding gray water use and allowing for treatment of reclaimed water to produce potable water, while still protecting human health and the environment.

H. A description of the limitations of the data available for this economic small business and consumer impact statement.

ADEQ generally does not track in a database certain information on permittees, such as whether a facility is publicly or privately owned. Some of the information came from an informal review of active permits and past billing histories.

9. <u>The summary of the economic, small business, and consumer impact:</u>

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 Load (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 Outstanding Arizona 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 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. Cost per treatment gallon is approximately $4.40, 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 algal 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 run approximately $ 4.0 million, and reduces 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 down 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, and requiring 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 cost 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, 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 employment is 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.

In 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.