NOTICE OF PROPOSED RULEMAKING
TITLE 18. ENVIRONMENTAL QUALITY
CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY STANDARDS

PREAMBLE

1.

Sections Affected	Rulemaking Action
Article 6	New Article
R18-11-601.	New Section
R18-11-602.	New Section
R18-11-603.	New Section
R18-11-604.	New Section
R18-11-605.	New Section
R18-11-606.	New Section

2. **The specific authority for the rulemaking, including both the authorizing statute (general) and the statutes the rules are implementing (specific):**
Authorizing statutes: A.R.S. §§ 49-232(C), 49-233(C), 49-235
Implementing statutes: A.R.S. §§ 49-232, 49-233

3. **A list of all previous notices appearing in the Register addressing the proposed rule:**
Notice of Rulemaking Docket Opening: 7 A.A.R. 5727, December 21, 2001

4. **The name and address of agency personnel with whom persons may communicate regarding the rulemaking:**

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5. **An explanation of the rule, including the agency's reasons for initiating the rule:**

This rulemaking establishes a new Article dealing with the process and methodology required under A.R.S. § 49-232(C) for identifying impaired surface waters. The rulemaking establishes appropriate criteria for data quality assurance and quality control, a process to add or remove waters to the list of impaired waters outside of the normal listing cycle, and public participation procedures. The rules also specify the factors required under A.R.S. § 49-233(C) for prioritizing impaired surface waters that require development of total maximum daily loads.

Background

The water quality of the nation's surface waters is improving in many areas, but some surface waters still do not fully meet standards developed to protect fish, drinking water, and other designated uses. Over the past 30 years, major improvements throughout the United States have been made in controlling direct discharges from industrial and municipal wastewater treatment facilities. Now, the primary problem confronting our waters is polluted runoff from a variety of daily activities. This type of pollution comes from diverse sources such as stormwater from urban areas, sediments from new construction or improper land clearing, fertilizers and pesticides from lawns and agriculture, and increased stream temperature from habitat destruction.

The Clean Water Act requires states to adopt standards for the protection of surface water quality. These standards are designed to maintain water quality that will support the designated uses assigned to a surface water. designated uses include domestic water source; aquatic life support for fishes, associated aquatic life and waterfowl; bathing, swimming, and recreational uses; fish consumption, agricultural irrigation, and livestock watering. While there may be several designated uses assigned to a river, stream, or lake, the Clean Water Act requires the Department to protect the *most sensitive* designated uses assigned to the surfaced water.

The water quality standards employed to maintain these designated uses and protect human health, aquatic life, and wildlife, include numeric criteria for parameters such as bacteria, pH, turbidity, dissolved oxygen, temperature, and certain toxic or carcinogenic compounds, and narrative criteria for parameters such as the growth of aquatic weeds or algae, toxicity, color, and sediment deposits.

Changes in water quality conditions may result from either point source or nonpoint source discharges. Point source discharges have an identifiable surface water entry point such as a wastewater treatment plant discharge pipe, well, or canal. Nonpoint sources contribute pollutants to waters over an extended area, generally in a diffuse manner. Point source discharges are regulated by the federal National Pollutant Discharge Elimination System (NPDES) program, which is the surface water discharge permitting program described in section 402 of the Clean Water Act. (Arizona anticipates that by July 2002, it will have EPA approval to implement the federal NPDES program.) Timber harvesting and agricultural operations such as grazing are examples of activities often related to nonpoint sources of pollution. Nonpoint sources are addressed through the use of voluntary Best Management Practices (BMPs) designed to reduce the water quality impacts of land use activities. Discharge permits and nonpoint source BMPs are the primary means for maintaining or restoring water quality.

The Clean Water Act Requirements

The Clean Water Act was established to restore and maintain the chemical, physical, and biological integrity of the nation's waters to, wherever attainable, provide for the protection and propagation of fish, shellfish, and wildlife; for recreation in and on the nation's waters; and for the development and implementation of programs to control nonpoint sources of pollution. This is commonly referred to as the "fishable, swimmable" goals of the Clean Water Act.

Section 305(b) of the Clean Water Act requires states to prepare and submit to EPA a biennial report that describes the water quality of all surface waters in the state. Each state must monitor water quality and review available data and information from various sources to determine if water quality standards are being met. From this 305(b) Report and other sources of information, the 303(d) List is created. This list identifies those streams that do not meet one or more of its designated uses. These waters are known as "water quality limited segments" or "impaired waters." Identifying a surface water as impaired may be based on an evaluation of physical, chemical, or biological data demonstrating evidence of: a numeric standard exceedance, a narrative standard exceedance, designated use impairment, or on a declining trend in water quality such that the surface water would exceed a water quality standard prior to the next listing period (antidegradation provisions under 40 CFR 130.7(b)(3).)

Section 303(d) of the Clean Water Act requires each state to prepare a list of surface water segments not meeting surface water quality standards or that are not expected to meet state surface water quality standards after implementation of technology-based controls. The draft list is revised and finalized based on public input for submission to EPA. At a minimum, the following sources of data are considered:

Surface waters identified in the 305(b) report, including the Section 314 lakes assessment, as not meeting water quality standards;
Surface waters for which dilution calculations or predictive models indicate nonattainment of standards;
Surface waters for which problems have been reported by other agencies, institutions, and the

public;
Surface waters identified as impaired or threatened in the state's nonpoint assessments submitted to EPA under section 319 of the Clean Water Act;
Fish consumption advisories and restrictions on water sports and recreational contact;
Reports of fish kills or abnormalities (cancers, lesions, tumors);
Water quality management plans;
Safe Drinking Water Act Section 1453 source water assessments; and
Superfund and RCRA reports and the Toxic Release Inventory.

When the 303(d) List and supporting documentation are submitted to EPA for review and approval, the submission constitutes the bulk of the administrative record supporting EPA's approval of the list. The submission contains the 303(d) List, including the pollutants or suspected pollutants impairing water quality, the priorities and the surface waters targeted for TMDL development during the next listing cycle; a description of the process used to develop the 303(d) List; the basis for listing decisions, including the reasons for not including a surface water or segment on the list; and a summary of the response to public comments. Where there are exceedances of standards, 40 CFR 130.7(b)(6)(iv) requires a state to demonstrate "good cause" for not listing a surface water and places the burden of proof on the state to justify excluding a surface water from the list. Such factors include: more recent or accurate data; flaws in the original analysis; more sophisticated water quality modeling or changes in the conditions that demonstration that the surface water is not impaired.

40 CFR 130.7(c)(1) and state statutes require the state to prioritize the identified impaired waters for development of a total maximum daily load (TMDL) for each pollutant. A TMDL is a scientific determination of the maximum amount, or "load," of the specific pollutant that a river, lake, or other surface water can tolerate or assimilate without exceeding surface water quality standard. Once a TMDL is established, that "load" is then allocated between the various identified point and nonpoint sources of that pollutant in the watershed and is implemented through permitting actions such as NPDES permits or through non-regulatory or voluntary efforts for nonpoint source activities.

EPA Guidance on Monitoring, Assessment and Listing Decisions

The 305(b) Report and the 303(d) List are highly visible ways that EPA communicates the health of the nation's waters. On November 19, 2001, EPA published the *2002 Integrated Water Quality Monitoring and Assessment Report Guidance* to assist states in developing these documents in an effort to improve the quality, reliability and consistency of the reporting. The guidance recommends states move toward an integrated report that would satisfy both sections 305(b) and 303(d) of the CWA and provide the following information:

delineation of water quality assessment units based on the National Hydrography Dataset;
status of and progress toward achieving comprehensive assessments of all waters;
the water quality standard attainment status for each assessment unit and the basis for the decision;
additional monitoring necessary to determine status or to develop TMDLs for each pollutant causing impairment;
monitoring schedules for further assessments or TMDL development;
pollutants and/or surface waters still requiring TMDLs; and
TMDL development schedules based on priority ranking.

EPA believes that an integrated report will enhance the ability for states to display, access and integrate data from all components of the water quality program as well as other media programs. The integrated report will also benefit the public by providing a clearer summary of the water quality status and the ability to track waters as they move into different categories based on attainment status, level of available data, progression of monitoring schedules and development and implementation of a TMDL. EPA's guidance recommends states develop a five-part list that categorize surface waters as follows:

Part 1:	Surface waters that are attaining water quality standards and no uses are threatened.
Part 2:	Surface waters that are attaining some of the designated uses, no use is threatened,

and insufficient or no data is available to determine if the remaining uses are attained or threatened.

Part 3: Surface waters where insufficient or no data and information to determine if any designated use is attained.

Part 4: Surface waters that are impaired or threatened for one or more designated uses but does not require the development of a TMDL because:

a. A TMDL has been completed;
b. Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future; or
c. The impairment is caused by pollution but not a pollutant.

Part 5: Surface water that is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL.

EPA's guidance recommends states should categorize waters which are impaired due to pollution, separately from pollutants. The definition of "pollution" in the CWA is very broad: the man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water". Pollutant then is a subset of pollution that address alterations caused by the presence of a pollutant that has numeric criteria and can have a load allocation developed. Pollution would, therefore, constitute alterations that do not involve the introduction of a measurable pollutant. Previous EPA guidance suggested habitat and flow alterations would be examples of impairment under the pollution category.

EPA recognizes that not all states can immediately switch to an integrated approach but encourages states to implement those portions of the guidance they can this listing cycle and strive for complete integration by the next assessment and listing cycle. Arizona has incorporated key concepts of the guidance into this rulemaking in the form of a two-part list:

List 1: The Planning List will contain those surface waters that, for a variety of reasons identified in the rule, do not meet the test of impairment, do not meet the credible data requirements or where technological, regulatory or statutory issues preclude placement on the 303(d) List. Those surface waters in categories 2, 3 and 4 and "threatened waters" from category 5 of EPA's guidance would be added to Arizona's "Planning List".

List 2: The 303(d) List will contain only those waters that are determined to be impaired, per the requirements of the rule, for a pollutant(s) and for which a TMDL must be developed.

Arizona's Current 303(d) List of Impaired Waters

The assessment of streams, lakes, and wetlands to identify "impaired" waters for inclusion on the 303(d) List is an important step in a process intended to ensure that all surface waters in the state have water quality adequate to support all of their designated uses.

The 303(d) List is compiled using all readily available, credible, and scientific data to assess water quality and determine which surface waters are impaired. The draft list is prepared and presented for public comment. After all public comments are reviewed and considered, the final 303(d) List is developed and all the listed waters are prioritized for TMDL development.

Arizona's current 303(d) List was developed and approved by EPA in 1998. The 1998 303(d) List contains 102 surface waters which are impaired for a range of pollutants. These surface waters have been ranked from high to low for the development of TMDLs. ADEQ is aggressively pursing development of TMDLs for surface waters on the 1998 303(d) List. On March 31, 2000, EPA announced that states would not be required to submit a 303(d) List for 2000. On October 18, 2001, EPA published in the Federal Register, that it had revised the date for States to submit the 2002 list of impaired waters from April 1, 2002 to October 1, 2002. The date was revised to provide States the opportunity to incorporate some or all of the recommendations suggested by EPA in the *2002 Integrated Water Quality Monitoring and Assessment Report Guidance,* published in November, 2001.

Current Condition of Arizona's Surface Waters

The 303(d) List contains surface waters that are impaired due to a "pollutant". Under the CWA, *pollutant* means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. EPA and the state also consider certain water quality characteristics, especially those for which there are water quality standards, such as dissolved oxygen, pH, temperature, turbidity and suspended sediment, as pollutants if they result or may result in a surface water not attaining a water quality standard. Based on the 1998 303(d) List and the year 2000 305(b) Assessment Report, Figures 1 and 2 below, show the pollutants commonly affecting Arizona's streams and lakes.

Figure 1. Pollutants Impacting Streams
(Miles of Streams Impacted)

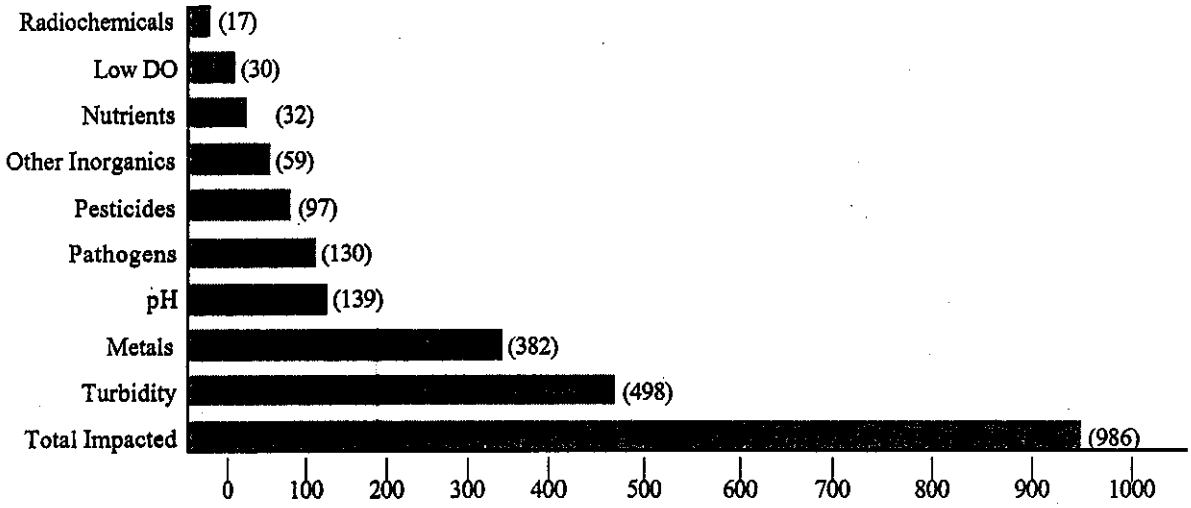
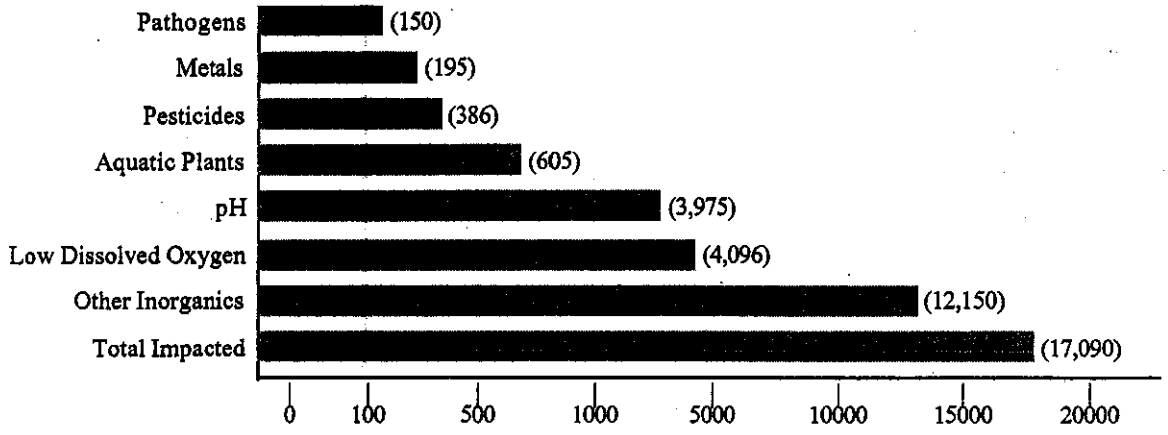


Figure 2. Pollutants Impacting Lakes
(Acres of Lakes Impacted)



Turbidity, which is a measure of the clarity of water, is the most common water quality characteristic causing impairment in Arizona's streams. Turbidity standards are developed to protect aquatic and wildlife designated uses because high turbidity may be associated with habitat degradation due to excessive sedimentation and algal blooms. Sources of sediment are varied but can include erosion from road building, construction, forestry, grazing, and agriculture. Large quantities of sediment can also be deposited in surface

waters during seasonal runoff events. The Department has proposed, in the 2002 triennial review of the surface water quality standards, a new suspended sediment concentration (SSC) standard to replace the turbidity standard. The SSC standard is a recognition by the Department that large sediment loads can be transported during high flow events such as flash floods or monsoons in arid environment, but these loads do not necessarily impair the ecological system.

Many Arizona streams are impaired due to *metals.* Metals can leach from soil or mineralized rock in areas where they are exposed by road cuts, mining activities, or land development. Ore bodies can also naturally contribute metals to streams and lakes through runoff after storm events and through groundwater recharge.

Low dissolved oxygen (DO), high pH, and algal blooms (noxious weeds) or a combination of these often occurs in Arizona's shallow lakes. Low DO and high pH stress aquatic organisms and can contribute to fish kills. High densities of submerged and emergent aquatic vegetation can restrict recreational activities and, because algae consume oxygen in the water at night, sometimes cause fish kills.

Probable sources of pollutants impacting Arizona's streams and lakes that are not meeting their designated uses are shown in Figures 3 and 4 below. Often more than one pollutant impacts a surface water or the impact is due to pollution. The Department attempts to identify probable sources, as part of the 303(d) listing process, but accurate identification generally requires special investigation or a TMDL analysis. Each 305(b) Report shows potential sources of pollutants based on best available information, knowledge of land uses, geology, and best professional judgement.

Figure 3. Probable Pollutant Sources in Streams
(Miles of Streams Impacted)

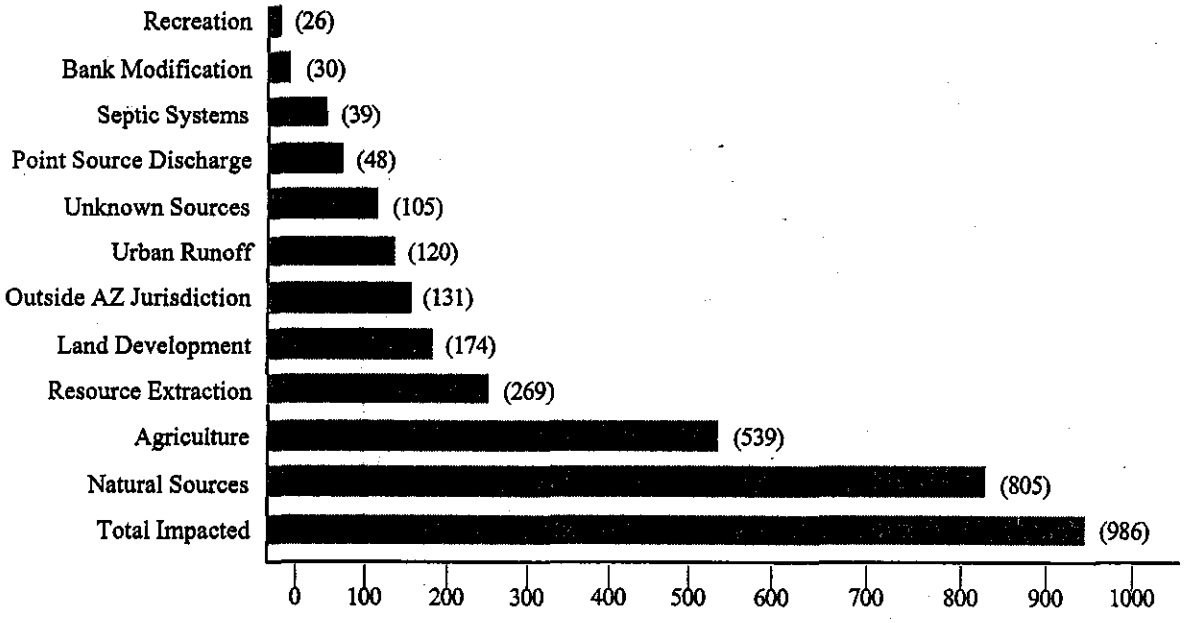
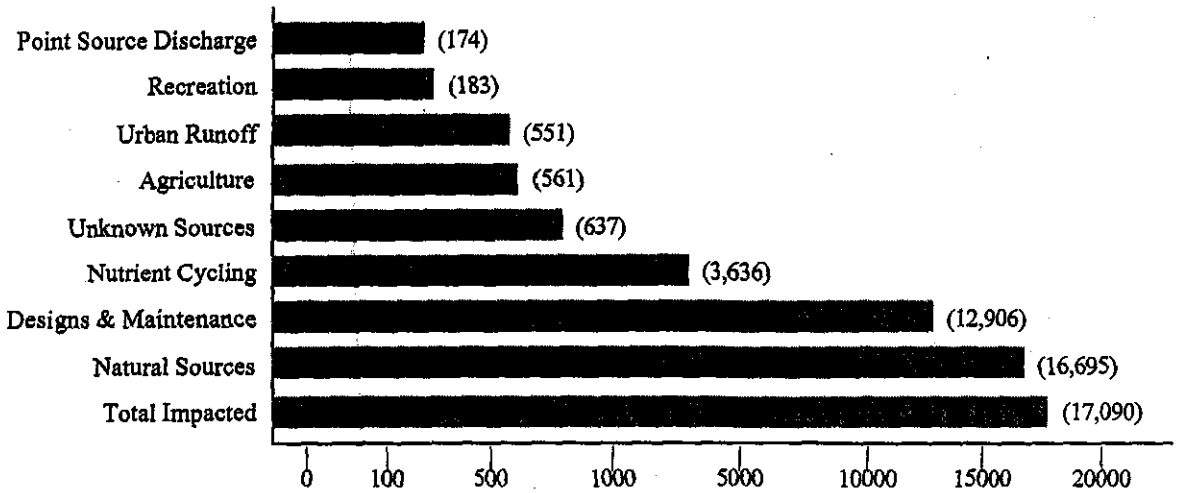


Figure 4. Probable Pollutant Sources in Lakes
(Acres of Lakes Impacted)



Certain pollutants in surface waters are due to *natural background* conditions. In many areas, Arizona's soils are highly erodible or have naturally elevated levels of certain metals. Both the assessment and listing processes have criteria that factor in certain aspects of natural background. The contribution of natural background conditions to a surface water's impairment is investigated during TMDL analysis on the listed water. If impairment is solely due to natural conditions and not as a result of man's activities, it is not a violation of surface water quality standards and the water can be delisted.

Excessive *nutrient loading* and *internal nutrient cycling* are problems in Arizona's lakes. Sources of nutrients include irrigated agriculture, gardening practices, and urban and suburban property development. These nutrients cause algae and other aquatic plants to grow in lakes and deprive aquatic life of vital oxygen. Algae and vegetation growth can make lakes unusable for recreation. The *design and maintenance* of man-made lakes or reservoirs can contribute to impairment. The physical characteristics of the lake such as depth, volume, and flushing rate must be balanced with natural sediment inputs and trophic conditions.

Agriculture activities, both grazing and crop production, are a probable source of pollutants such as turbidity, boron, selenium, nutrients, fecal coliform, and pesticides. Since grazing remains a dominant land use by total acreage in Arizona, it is frequently indicated as a probable source of sediment loading and other pollutants to streams and lakes.

Resource extraction is a major source of metals and low pH. Mining occurs in areas where metal ores are naturally present in rock and in placer deposits, therefore, a portion of the loading is natural background conditions. The activities involved in the resource extraction can contribute other pollutants to streams and lakes such as total dissolved solids, turbidity, and metals.

Arizona's TMDL Program

Arizona has completed 24 TMDLs since 1998 and over 50 TMDLs are in various stages of development. A.R.S. Title 49, Chapter 2, Article 2.1, effective July 18, 2001, establishes the process by which the Department implements the TMDL program and addresses polluted surface waters through the identification of impaired waters, the development of TMDLs, and the implementation of a TMDL reduction program. Key provisions of the program require the state to:

1. Prepare a list of impaired waters at least once every five years to comply with the requirements of section 303(d) of the Clean Water Act;
2. Consider only reasonably current, credible, and scientifically defensible data to determine whether a surface water is impaired;
3. Adopt rules describing the methodology used to identify impaired surface waters, including criteria

for data to be considered current, credible, and scientifically defensible, implementation procedures for determining impairment based on a narrative or biological criterion, statistical or modeling methodologies for identifying impairment, criteria for removing a surface water from the 303(d) List, and factors to prioritize listed surface waters for TMDL development;

4. Include a priority ranking of the impaired waters for TMDL development for each new 303(d) List. The first list submitted under this rulemaking (due to EPA on October 1, 2002) must contain a schedule sufficient to ensure that all required TMDLs will be developed with 15 years from the date EPA approves the list. Surface waters, included for the first time on subsequent lists, must have TMDLs developed within 15 years from the date of initial listing.
5. Develop TMDLs using statistical and modeling techniques that are validated and broadly accepted by the scientific community, and establish TMDLs to meet applicable surface water quality standards, including a reasonable margin of safety, taking into account variables related to the type of surface water, unknowns regarding relationships between effluent limitations, water quality and seasonality;
6. Establish an implementation plan for each TMDL that explains how the allocations and reductions in existing pollutant loadings are achieved and specify the time-frame for which compliance with surface water quality standards is expected; and
7. Provide multiple opportunities for public notice and public comment on the following and provide response to comments before submittal to EPA:
   a. Initial and final draft listings,
   b. Draft pollutant loadings and allocations among the contributing sources, and
   c. Implementation plans.

303(d) Listing Process

Impaired waters that are not attaining their designated uses are identified during the biennial development of the 303(d) List. This rulemaking identifies the Department's approach for identifying and listing impaired surface waters and for prioritizing impaired waters for TMDL development.

R18-11-602. Credible Data

The intent of the 303(d) List is to identify impaired surface waters so that corrective actions can be taken, therefore, it is critical that the listing process accurately identify when impairment exists. This means that not only the data needs to be of high quality but it should accurately reflect the surface water conditions.

Both federal and state law requires the Department consider only reasonably current, credible, and scientifically defensible data to determine whether a surface water is impaired. The credible data requirements apply when the Department conducts water quality assessments and when monitoring entities (including the Department, municipalities, industry, volunteers, and federal and state land and resource management agencies) develop monitoring programs to collect data that ultimately may be used in the assessment, listing and TMDL development processes.

The Department begins the 303(d) listing process by collecting all existing and readily available surface water quality data and information from numerous sources, including federal and state agencies (including EPA's STORET database), other programs within the Department, tribes, local governments, watershed councils, private and public organizations, volunteer monitoring groups, and private individuals. The data may include chemical, physical, benthic, habitat, or toxicity testing data collected from a variety of sources such as fixed-stations, intensive surveys, or other types of field investigations.

Data is considered credible and relevant for assessment and listing purposes if the data submitted meets the minimum quality assurance/quality control requirements outlined in the rule. The monitoring entity must:

Develop and submit a Quality Assurance Plan (QAP) that includes certain required elements including: the methods used for sample collection, field and laboratory analysis, and data

management; and provide the assurance that field and laboratory personnel are adequately trained and supervised;
Develop and submit a site-specific or project-specific Sampling and Analysis Plan (SAP) containing required elements including: the data quality objectives of the project and sound rationale for the selection of sampling sites, water quality parameters, sampling frequency and methods that assure the samples are spatially and temporally representative of the surface water, representative of conditions within the targeted segment at the time of sampling, and are reproducible;
Ensure that data collection, preservation, and analytical procedures are those established in A.A.C. R9-14-610 which includes EPA methods, American Public Health Association *Standard Methods*, U.S.G.S. methods, and ASTM methods;
Ensure that laboratory analyses are performed by a state-licensed laboratory, a laboratory exempted by the Arizona Department of Health Services for specific analyses under A.R.S. § 36-495.02, or a federal or academic laboratory that can demonstrate proper quality assurance/quality control equal to the requirements for state licensure; and
Provide other information necessary to assist the Department in interpreting or validating the data.

The Department is responsible for reviewing all data to make sure it meets specified minimum quality assurance requirements, including reviewing the adequacy of the QAP and SAP for the type of sampling undertaken. The rule provides the Department discretion in approving a QAP or SAP that does not contain all the required elements of R18-11-602(A) if the Department determines that the omitted element is not relevant to the sampling and its omission will not impact the quality of the results based on factors including the type of pollutant being sampled, the type of surface water and the reason for the sampling. Similarly, the rule allows the Department to review data that was generated before the effective date of the rule without a QAP or SAP or was collected under a permit or enforcement action provided the Department determines the data yield results of comparable reliability based on the credible data requirements of the rule.

The data requirements of this Section constitute the minimum dataset needed to evaluate a surface water for impairment. All monitoring entities designing monitoring networks or monitoring projects are encouraged to consult with the Department to determine the sample design appropriate for their specific monitoring goals to ensure that the data will be deemed credible and relevant to impaired waters identification or TMDL decisions.

The rationale for the specificity of the credible data requirements is twofold. The water quality assessment and impaired waters identification processes are reliant on having sufficient data both in terms of quantity and quality. Listing decisions not supported by sufficient data are potentially flawed. An incorrect finding that a segment is not impaired allows a potential human health threat or environmental degradation to go unrecognized. Incorrectly placing a segment on the 303(d) List results in the unnecessary expenditure of public resources. It is important that data used for listing decisions is credible. The concept of credible data ensures that only those surface waters for which adequate documentation of water quality standards non-attainment is or will be occurring are included on the 303(d) List.

EPA's draft "Consolidated Assessment and Listing Methodology (CALM guidance)" dated April 20, 2001, identifies documenting data quality requirements and data evaluation procedures as a critical element that states should address:

> [N]ot all data are of equal value for assessing water quality standards attainment/impairment. Results or chemical data, or any other type of data, analysis are of limited value unless they are accompanied by documentation about sample collection, analytical methods and quality control protocols. Poorly documented monitoring results may provide an indication of potential problems, corroborate other data and information, or trigger additional monitoring, but they are unlikely to support an attainment or impairment decision if they fail to meet the data quality objectives ... (Section 3.2, pg 3-8)

With respect to data quality, the draft guidance not only allows but encourages states to develop methodologies establishing minimum requirements concerning data quality and quantity:

> EPA encourages states to use the data quality objectives process to define minimum quality data requirements. This includes information on appropriate sample size and monitoring design, sample collection and handling protocols, analytical methods and detection limits, quality control procedures and data management (Section 3.2.1, pg 3-9).

Secondly, clearly defined requirements "level the playing field" and serve to allay concerns by other monitoring entities as to the quality and adequacy of other monitoring programs. The Department collects much of the water quality data used in these processes but also relies on other monitoring entities such as the U.S. Geological Survey, Salt River Project, and municipalities to assist in data collection. Across the country, volunteers in watershed groups and other organizations are monitoring the condition of streams, rivers, and lakes. The number and variety of these projects are on the rise as is the complexity of the projects and the uses of the data collected. One of the most difficult issues facing volunteer environmental monitoring programs, in particular, is data credibility. Potential users are often skeptical of volunteer data – what were the goals of the project, how were the volunteers trained, how were the samples collected, handled, and stored, and how was the data analyzed and reported? A key tool in breaking down this barrier is through the proper preparation and execution of the quality assurance and sampling and analysis plans. The Department will provide clear direction in the form of EPA guidance documents and example QAPs and SAP, which will be available on the Department's Website at http://www.adeq.state.az.us/environ/water/assess/tmdl.html and from EPA documents such as:

1. *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations*, EPA QA/R-5, November 1999 (interim final);
2. *The Volunteer Monitor's Guide to Quality Assurance Project Plans*, USEPA, EPA 841-B-96-003, September 1996; and
3. *Sampling and Analysis Plan Guidance*, prepared by Quality Assurance Program, EPA Region IX, March 1997.

R18-11-603. General Data Interpretation Requirements

Once data is determined credible and scientifically defensible, the Department will interpret that data using the following conventions.

Method Detection Levels

Often individual sample results from monitoring efforts are reported as "less than the *method detection limit*." The method detection limit or MDL is the minimum concentration of an analyte that can be detected using that analytical procedure with 99% confidence that the analyte concentration is greater than zero. In cases where measurement data is described as "less than the MDL" or "nondetect," the actual concentration of the chemical is unknown although it lies somewhere between zero and the method detection limit. How to evaluate these unknown quantities and when they should be used in statistical analyses are questions that arise in both assessment and listing decisions. An important variation of this question is how to treat this data when the water quality standard is below the MDL. The fact that many of the values are reported as nondetects is noteworthy, in that, it indicates the results are generally below a level of concern. However, there is no standardized way to determine the true value for these individual nondetect values.

Surface water quality standards, especially those to protect the aquatic and wildlife or fish consumption designated uses, are often set at very low levels. When the MDL is at or below the standard, the actual measurement result reported as "less than the MDL" will either equal the standard or be less than the standard. In either case, there is no exceedance. (See example #1 below.)

When the MDL is above the standard and the measurement result is reported as "less than the MDL," there is a gray area in terms of knowing whether the sample is meeting or exceeding the standard. What is

known is that there is a 99% confidence that the pollutant concentration is greater than zero but the actual value may be anything from zero to the MDL. The area between the standard and the MDL is the gray zone. (See example #2 below.) The result may or may not be exceeding the standard. In the third example, the measurement result is clearly in exceedance of the standard and would be evaluated at the stated value.

Concentration Scale	MDL Example #1	MDL Example #2	MDL Example #3
7			
6			
5		Method Detection Limit	Resultant Value
4	Water Quality Standard		Method Detection Limit
3			Water Quality Standard
2	Method Detection Limit	Water Quality Standard	
1			
0			
Evaluation	Meeting standard	Inconclusive	Violation of standard

How the Department will address results reported as "less than the MDL" will vary depending on the situation (examples #1 - 3 above). To reduce the number of samples where the MDL is greater than the standard (example #2), the monitoring entity should specify that the laboratory use an approved analytical method with the method detection limit that is less than or equal to the applicable surface water quality standard. If an analytical method is not available, the laboratory must use the method with the lowest MDL. This is consistent with EPA Region IX guidance for NPDES permits issued in Arizona.

When the data is reported as "less than the method detection limit," there are two possible paths.

1. When the sample result is less than or equal to the MDL and the MDL is less than or equal to the surface water quality standard:
   a. The resultant value will be considered as meeting the surface water quality standard; and
   b. If there is sufficient data to support statistical analysis, the Department shall use the statistically derived values in trend analysis, descriptive statistics or modeling; or,
   c. If there is insufficient data to support statistical analysis, the Department shall use one-half of the value of the MDL in trend analysis, descriptive statistics or modeling;
2. When the sample value is less than or equal to the MDL and the MDL is greater than the water quality standard, the Department shall not use the result in impaired waters identification or TMDL decisions.

This information is only provided as guidance and must be exercised with good judgement. A good reference on assessing data quality criteria and performance specifications is EPA's *"Guidance for Data Quality Assessment: Practical Methods for Data Analysis,"* EPA QA/G-9, EPA/600/R-96/084, July 1996.

Field Equipment Specifications

Several water quality parameters have very short holding times for analysis or give a more accurate representation of conditions if measured in the field. These parameters include dissolved oxygen, pH, total residual chlorine, turbidity, and temperature. Studies document a wide range of errors associated in taking field measurements under natural conditions. Errors can be introduced depending on instrument selection, calibration method, placement of the instrument in the stream, or opacity of the instrument case such as clear versus opaque. Some of these errors are addressed through quality assurance/quality control procedures, others are

inherent in the variations in natural systems.

Most aquatic organisms can tolerate or adapt to small fluctuations, over short periods of time, for conventional water quality parameters without deleterious effects. When a field sample measurement is within the *manufacturer's specification for accuracy*, the result is considered to meet the surface water quality standard. For each listing cycle or for TMDL development, the Department will identify field equipment specifications. For the 2002 listing cycle, pH is ± 0.2 standard units, dissolved oxygen is ± 0.2 mg/l, and turbidity is ± 2 NTU.

Invalid Data

Invalid data is excluded when identifying impaired waters or for TMDL development. Invalid data includes: results outside the range of possible physical or chemical measurements for the parameter or equipment, data transcription or laboratory errors, or statistical outliers that have been verified through statistical analysis as not being representative of the target population.

Data Conflicts

To resolve *potential data conflicts*, the Department will consider a number of factors including: the age of the data, the accuracy and reliability of the monitoring methods and procedures, the amount of data, or the frequency of data collection, under what conditions the data was collected and whether these conditions were representative of the surface water. Generally, newer results are considered over older data unless the older data is more representative of critical flow conditions, more frequent data collection is favored over nominal datasets and results from more rigorous methods or procedures are weighted over less precise methods or procedures.

Statistical Tests and Modeling

State statute requires the Department to employ *fundamental statistical tests or modeling*, appropriate for the collected data and type of surface water, in an impaired waters identification or TMDL decision. The Department currently uses basic descriptive statistical tests, including the measure of central tendency such as arithmetic mean, geometric mean, median, or mode of a dataset when evaluating whether samples meet or exceed a surface water quality standard. However, as more data is collected as part of the statewide network of monitoring stations, the Department will begin evaluating trends in water quality at specific locations and so may use additional statistical tests such as regression analysis or correlation analyses.

A.R.S. 49-232 requires that the Department use methods of sampling and analysis, including statistical and modeling techniques, that are generally accepted and validated in the scientific community as appropriate for assessing the condition of the given surface water or in TMDL development. The rule identifies several of the modeling methodologies currently being used by ADEQ and its contractors in TMDL development. As science of modeling evolves, additional approaches will be available.

R18-11-604. Lists of Surface Water

This section of the rule provides the rationale and use of the two-part list for assessment and listing decisions, what surface waters will not be listed and how surface waters are segmented for listing.

The Department has identified Arizona's streams and rivers for assessment purposes based initially on EPA's Reach File System and then further segmented these reaches according to site specific water quality standards or where there is a change in the designated use. Surface waters, including lakes, placed on the Planning List may be further delineated, as a result of the targeted sampling efforts, prior to placement on the 303(d) List so that only that portion of the stream or lake (e.g., cove or beach) that is impaired is listed.

Not all water quality standards exceedances result in a surface water being identified as impaired. Certain situations are specified in the rule as non-applicable to determining impairment. Surface waters shall not be placed on either the Planning List or the 303(d) List for non-attainment of water quality standards, when:

1. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of water quality standards; or

2. Water quality results collected under a moderating provision of a NPDES permit, such as a mixing zone, provided the result doesn't exceed the alternate discharge limitation established the permit.

Surface waters may be placed on the Planning List for non-attainment of water quality standards when the exceedance is due to an activity exempted in the standards such as the physical or chemical maintenance of canals, drains or municipal park lakes, or the routine maintenance and operation of flood control structures or dams.

Planning List

The rule establishes that the Department shall develop a Planning List to prioritize surface waters for: (1) monitoring and evaluation as part of the overall watershed management approach and (2) evaluating each surface water or segment for impairment based on the criteria in R18-11-605(D) of the rule and to identify the source of the impairment. The Planning List shall be provided to EPA for informational purposes. A surface water will be placed on the Planning List if it meets the listing criteria in R18-11-605(C) or for a number of reasons outlined in the rule including:

A TMDL has been completed for the pollutant and approved by EPA. The surface water is placed on the Planning List for further monitoring to ensure the TMDL strategy results in water quality standards being attained;

Some monitoring data exists but there is insufficient data to determine whether the surface water is attaining or not attaining;

Exceedance of the water quality standard is due to pollution but not a pollutant;

The surface water is expected to attain its designated use by the next assessment as a result of existing or proposed technology-based effluent limitations or other pollution control program under local, state or federal authority, where the clean up is complete, or where proper documentation is provided to assure the remediation will occur;

The surface water was on the 1998 303(d) List but the data used in the original listing does not meet the credible data requirements of the new rule or there are insufficient samples for a determination; ~~or~~

Where the surface water is on the 1998 303(d) List, there is a proposed change in a water quality standard or designated use, but there is insufficient data to determine if the surface water will meet the new standard; or

Trend analysis using credible and scientifically defensible data indicates that surface water quality standards may be exceeded by the next assessment cycle. Current federal regulations do not requires states to list threatened waters on the 303(d) list. If federal regulations are changed and threatened water are required to be listed, such waters would be added to the 303(d) List.

The Planning List consolidates EPA's categories 2, 3 and 4(a, b, and c) from the guidance into one comprehensive list that will be managed by the Department to track the various subcategories. A preliminary review of the draft 2002 Assessment indicates a number of surface waters will be designated as category 2 or 3 because there is insufficient or inconclusive evidence to determine impairment.

303(d) List

Surface waters that the Department determines, based on the criteria in R18-11-605(D), are impaired due to a pollutant and require a TMDL, will be placed on the 303(d) List. Although EPA's monitoring and assessment guidance recommends placing threatened waters on the 303(d) List, current federal regulations do not require states to list waters that are "threatened" due to a pollutant.

R18-11-605. Evaluating a Surface Water or Segment for Listing and Delisting

This Section of the rule identifies the processes the Department uses to determine:

1. If a surface water or segment is not attaining or impaired, and if so, whether it is placed on the Planning List or the 303(d) List; and
2. Whether there is water quality evidence or factors to support the removal of a surface water,

segment or pollutant on the 303(d) List.

A.R.S. 49-232(B) requires that the Department consider only "reasonably current, credible, and scientifically defensible data" in identifying a surface water as impaired or in any TMDL decision which includes prioritizing an impaired water for TMDL development, developing the TMDL, or developing a TMDL implementation plan.

The process incorporates the ability to evaluate the data for exceedances of the numeric and/or narrative water quality standards in the context of the setting, time of year, and designated uses to determine if the exceedance has a true negative effect on water quality and is a violation of water quality standards. Water quality conditions vary from place to place (spatial) and from time to time (temporal). This occurs because changes in factors such as geology, vegetation, elevation, or climate can impact the natural or ambient water quality. In response to these changes, macroinvertebrates, fish, and algae evolve with different life histories, physiologies, and mobilities. These reasons coupled with knowledge of how water quality standards are developed, mean that not every standard exceedance automatically constitutes a violation of standards or is indicative of impairment.

The steps outlined in this process are not intended or designed for use in determining compliance with permits for enforcement purposes, as these activities often require additional information. Furthermore, portions of the surface water quality standards specifically dealing with compliance and enforcement actions or determining compliance with standards are not applicable to this process (e.g., provisions regarding Practical Quantitation Limits or enforcement provisions). The process ensures that designated use support determinations are made with a reasonable level of confidence. In the dynamic field of water quality assessment, methods and standards change as do factors affecting surface waters.

Weight of Evidence Approach

A surface water may be found to be impaired or not attaining based on an evaluation of multiple indicators of water quality, including biological, physical, and chemical data that demonstrate non-attainment of numeric or narrative standards, designated use impairment, or a declining trend in water quality or the health of the biotic community. When evaluating the data, the Department will consider:

1. Data collected during critical conditions separately from the complete dataset, if the data shows the surface water to be impaired during those conditions and attaining uses at other times;
2. The quality of the data with higher quality data given preference in a listing decision. Quality is established on the reliability, precision, accuracy and representativeness of the data including the age of the data, the frequency of the measurements, and whether the data provides a direct measure of impact or is a surrogate; and
3. Whether the data indicates the impairment is due to persistent, recurrent or seasonal conditions.

The Department uses a "weight-of-evidence" approach to assessments and listing, where the strengths and limitations of each dataset are weighed and considered. A surface water is not, by default, impaired because one dataset indicates possible impairment, while another dataset shows it attaining its uses. With a weight of evidence approach, the Department evaluates: (1) the numeric data for exceedances of numeric water quality standards, (2) data for exceedances of narrative water quality standards; and (3) other relevant information when making its determination whether the exceedance results in an impairment that is recurring, persistent, or seasonal in nature. The weight of evidence approach does not, however, preclude the Department from making a determination of impairment based on a single line of evidence, if the data provides clear and convincing evidence of impairment or non-attainment. Other relevant information that aids in determining whether the impairment is due to a pollutant, suspected pollutant, or naturally occurring conditions includes the role of soil, geology, hydrology, flow regime, natural processes, anthropogenic influences; the characteristics of the pollutant; effluent discharge data; and the direct evidence of impacts to aquatic life, wildlife, or human health where the impacts can be linked to water quality conditions in the surface water.

A.R.S. 49-232(E) requires that a surface water may not be listed, based on biological or narrative criteria

without the development and adoption, by the Department, of a narrative implementation guidance for the specific criterion. This section also states that the Department shall not list a surface water, based upon the evidence of a narrative standard exceedance in the absence of accompanying chemical data to support the finding, unless the evidence indicates that the numeric standard is insufficient to protect the surface water and the Department provides the scientific basis for the determination of use impairment. Concurrent with this rulemaking , the Department is adopting the *"Narrative Toxicity Standard 303(d) Program Implementation Procedures,"* which outline the procedures for developing and issuing fish consumption advisories in Arizona, in support of the narrative toxics standard. The Department will conduct separate stakeholder meetings in 2002 and initiate subsequent rulemakings to develop the remaining narrative standards implementation procedures after the formal adoption of this rule.

After looking at all the evidence and weighting the factors, if Department determines that a surface water or segment is impaired, the surface water or segment and the identified pollutant is placed on the 303(d) List. If it does not meet the criteria for impaired or is found to be not attaining, the surface water or segment and the identified pollutant are placed on the Planning List for additional monitoring.

Evaluation of the Numeric Dataset for Sufficiency and Representativeness

Before assessing whether a surface water is meeting numeric water quality standards, the Department must determine if there are a sufficient number of samples and whether those samples are spatially and temporally representative of the water quality in that surface water. If there is an insufficient number of samples or the number of samples are not representative, the water will be placed on the Planning List for further monitoring.

Sufficiency of spatial coverage takes into account the distribution of monitoring locations on the surface water, sources of pollution, and influences of tributaries or other significant hydrologic or hydrographic features. Samples are considered "spatially independent" if data is collected from stations or locations located more than 200 meters (0.1 miles) apart, or if the data is collected less than 200 meters apart to characterize the effect of an intervening tributary, outfall, pollution source, or significant hydrographic or hydrologic change. Unless there is sufficient data developed during initial data collection or through targeted monitoring to further delimit the extent of impairment, the data is used to characterize an entire reach or lake. The Department will consider the spatial extent of the evaluation as representative of an entire lake when the same factors mentioned above are considered. Arms or portions of a lake are treated separately if there is sufficient evidence of differing influence.

Available data is evaluated to ensure that there is an avoidance of temporal bias and to ensure that seasonality, where applicable, is represented in the sampling plan. Samples are considered "temporally independent" if they are collected at the same station or location more than seven days apart. For assessment and impairment evaluation, information and data should be no older than five years. Older data may be used on a case-by-case basis if conditions have not changed and the older data is still representative, or the older data is used with newer data to demonstrate water quality trends. If used for listing, the Department will include an explanation why this older data continues to reflect current water quality conditions. The occurrence of major mitigation or remediation efforts will be considered during evaluation and some waters may be assessed based only on data collected after the mitigation actions are implemented.

For data that is not spatially or temporally independent or when multiple depth samples are taken at a single location in a lake, the measurements must be aggregated and represented by a single resultant value. The proper statistical measure to represent the dataset is determined based on the type of water quality standard.

The measure of central tendency for the dataset used to evaluate an exceedance of the following water quality standards:

Human health and agricultural uses, except for nitrate and nitrate/nitrite (18 A.A.C. 11, Article 1, Appendix A, Table 1);

Four-day mean chronic standards (18 A.A.C. 11, Article 1, Appendix A, Table 2);

Any pollutant expressed as an annual or 30-day geometric mean (the specific number of samples necessary to evaluate either of these is expressly defined in A.A.C. R18-11-101);
Single sample maximum standards for temperature, turbidity, nitrogen, and phosphorus (A.A.C. R18-11-109 and R18-11-112);
Radiochemicals (A.A.C. R18-11-109(I)(2)); and
All single sample maximum standards for "unique waters," except chromium (A.A.C. R18-11-112).

The maximum value or "worst case" value of the dataset used to evaluate an exceedance of the following water quality standards:

Acute standards (18 A.A.C. 11, Article 1, Appendix A, Table 2);
Nitrate or nitrate/nitrite (18 A.A.C. 11, Article 1, Appendix A, Table 1);
Acute standards for "unique waters" (A.A.C. R18-11-112);
Single sample maximum standards for bacteria (A.A.C. R18-11-109(B));
90th percentile standards for nitrogen and phosphorus (A.A.C. R18-11-109(H) and R18-11-112) (The specific number of samples necessary to evaluate the standard are expressly defined in A.A.C. R18-11-101);
For dissolved oxygen measurements, the "worst case" value is the minimum value;
For pH measurements, the "worst case" value means both the minimum and maximum value of the dataset.

Evaluation of Numeric Standard Exceedances

In assessing water quality throughout the state, the Department must draw conclusions about specific surface waters based on a group of measurements for a particular pollutant of interest. The entire collection of measurements used a the basis for conclusion is referred to as the population. In general, it is impossible to obtain all of the measurements for a population, so it becomes necessary to attempt to describe the population as reliably as possible by collecting a set of samples from that population. There is always potential for error in this process. In assessment and listing decisions, there are two types of error:

Type I error: Inappropriately classifying a surface water as impaired, when it is actually attaining.
Type II error: Inappropriately classifying a surface water as attaining, when it is actually impaired.

Historically, EPA guidelines have suggested a surface water be listed as impaired when greater than 10% of the measurements of water quality conditions exceed standards for conventional pollutants (*"Guidelines for Deriving Numerical Natural Water Quality Criteria for the Protection of Aquatic Organisms and their Uses,"* USEPA, NTIS PB85-227049) . Using this "raw score approach," a surface water ~~was judged as~~ "fully supporting" its designated use if the calculated exceedance rate is 10 percent or less; "partially supporting" if the exceedance rate was greater than 10 percent but less than or equal to 25 percent; and "not supporting" if the exceedance rate was greater than 25 percent. According to Smith, et al, EPA's "raw score" approach does not include consideration of the likelihood and costs of making an erroneous listing decision ("Statistical Assessment of Violations of Water Quality Standards under Section 303(d) of the Clean Water Act," *Environmental Science and Technology*, Vol. 35, 2001, Smith, Ye, Hughes and Shabman).

In light of the concerns with EPA's traditional assessment methodology, various states, including Arizona, have begun looking into alternate methods of statistical decision making for water quality assessments. Given uncertainty in the measurement and sampling process, hypothesis testing is one statistical tool that has been explored where the null hypothesis is that the site *is not* impaired and the alternative hypothesis is that the site *is* impaired. The hypothesis is stated in terms of p, the true degree or probability of impairment and p_o, the "safe level". The decision is based on the test of H_0: $p \quad p_o$ versus H_1: $p > p_o$, where p_o is a constant between 0 and 1, allowing the two error rates to be evaluated. The error rates are bounded by 0 and 1, with 0 indicating no error. Given the generally small samples sizes available on any given surface water, neither error will be close to zero. Because both types of error will always be present, the analyst must choose the tolerable amount of error.

Several states have used the binomial testing approach which focuses on the probability of violation as alternative to the raw score method. The binomial method assigns results that exceed standards a value of 1 and those that meet standards a value of 0. When "n" independent samples are collected, the number of observations exceeding the standard can be expressed as a binomial random variable with parameters p and n. The hypothesis becomes: the probability of exceeding the standard is less than or equal to 0.10 (Ho: H_0: p 0.10 = not impaired) versus the alternative that the probability is greater than 0.1 (H_1: $p > 0.10$ = impaired). With this approach, error rates can be evaluated and a process developed to limit the error rates.

In typical statistical analysis, the Type I error rate is chosen by the assessor. If the rate chosen is 0.10, there is a 10% change of making a Type I error. With the binomial method, the choice of Type I error rate determines the trigger value. For a given sample size "n", the trigger is selected as the number of violations to make the probability of this many or fewer violations be as large as possible but less than the Type I error rate. Once the trigger and the alternative for frequency of violation is known, the Type II error rate can be calculated. The Type II error rate can be reduced by choosing a greater Type I error rate, by increasing sample size and/or by decreasing measurement uncertainty. It is common to select the Type I error rate at 0.05 or 0.10 and control Type II through the size of the sample. In the CALM guidance, EPA recommends balancing Type I and Type II error rates at the 15% level. In general, EPA supports setting a somewhat lower Type I confidence rate in order to balance Type II error but suggests states increase sample sizes to manage Type II error.

Tables 1 and 2 in the rule are based on work done by the Florida Department of Environmental Protection in support of Florida's June 2001, 303(d) listing rule (*"A Nonparametric Procedure for Listing and Delisting Impaired Water based on Criterion Exceedances,"* Lin, Meeter and Nui, October 2000). This listing methodology is based on the binomial distribution method and the premise that a surface water is listed if its true exceedance probability for a pollutant is greater than 10%. In an effort to balance the two types of error, the Arizona rule proposes use of two different confidence levels, two different minimum sampling sizes and cutoff values aimed at making the error rates as close as possible. For placement on the Planning List, there is a requirement for a minimum of 10 samples; a confidence level of 80% and cutoff beginning at 3 exceedances. For placement on the 303(d) List, there is a requirement for a minimum of 20 samples; a confidence level of 90% and cutoff beginning at 5 exceedances.

This proposed methodology is a departure from previous methods of assessment and requires a significant increase in the sample size. To address the need to acquire additional data, Arizona has committed to the creation of a new targeted monitoring team and a refocus of portions of the ambient surface water monitoring efforts to address this issue. The Department currently schedules its ambient monitoring based on a watershed rotation cycle. In the future, more emphasis will be given to verification and targeted monitoring in the chosen watersheds and targeted monitoring on waters when exceedances indicate potential problems or where there is insufficient data to make assessment decisions. This rule will also provide other monitoring entities with the necessary quality information necessary to use their data in assessment and listing activities. In addition, the rule provides the Department opportunities to list a surface water segment, without having the requisite 10 or 20 samples, for specific pollutants, such as toxics or bacteria, that pose a substantial threat to aquatic life, wildlife and human health.

Planning List

When evaluating a surface water for placement on the Planning List, the Department consider, at a minimum, ten spatially independent samples collected over three or more temporally independent sampling events. The surface water will be placed on the Planning List if the number of exceedances of an applicable surface water quality standard is greater than or equal to the number listed in Table 1, based on the sample size. Table 1 starts with three exceedances based on a minimum sample size of 10. Table 1 is based on a binomial distribution that determines at a 80% confidence level that the actual frequency of standards exceedance is greater than or equal to 10%.

Because of the higher probability of error in datasets of less than 10 points, the rule provides an exception to the binomial approach. A surface water may be placed on the Planning List when there are three or more

temporally independent samples exceeded in the following types of water quality standards:

> A surface water quality standard, based on lifetime or long-term exposures, including radiochemicals, agricultural criteria, field parameters, bacteria, and all human health criteria except nitrate and nitrate/nitrite.

303(d) List

When evaluating a surface water for impairment due to numeric water quality standards, the Department consider, at a minimum, twenty spatially independent samples collected over three or more temporally independent sampling events. The surface water shall be considered for placement on the 303(d) List if the number of exceedances of an applicable surface water quality standard is greater than or equal to the number listed in Table 2, based on the sample size. Table 2 starts with five exceedances based on a minimum sample size of 20. Table 2 is based on a binomial distribution that determines at a 90% confidence level that the actual frequency of standards exceedance is greater than or equal to 10%.

Based on guidance from EPA, in the following situations, the Department may consider listing a surface water or segment without the required number of samples or numeric standards exceedances:

> Where any of the following surface water quality standards with potentially acute or toxic impacts are exceeded more than once in any consecutive three-year period during the established monitoring period:
>
> - Acute surface water quality standards,
> - Nitrate or nitrate/nitrate standards, or
> - Single sample maximum standards for bacteria.
>
> Where there is more than one exceedance of an annual mean, 90th percentile, 30-day geometric mean, or four-day mean chronic criteria within the established monitoring period. To evaluate based on one of these standards requires a minimum number of samples taken within a specific time-frame. These criteria are defined for the specific type of standard in A.A.C. R18-11-101. For example, evaluation of an "annual mean" standard requires the Department to have sufficient credible data to develop an arithmetic mean of monthly values determined over a consecutive 12-month period, provided "monthly values" are available for at least three months. The "monthly value" is the arithmetic mean of all values determined in a calendar month. Calculation of an arithmetic mean for the calendar month requires at least two, and preferably three or more individual data points. Therefore, the minimum number of samples to calculate an annual mean is six; the minimum number of samples necessary to find impairment would be 12.

Any evidence of impairment based on an exceedance of numeric standards is used with other information, in the weight-of-evidence determination of actual impairment.

Evaluation of Impairment based on Narrative Water Quality Standards

In addition to numeric water quality criteria, designated uses are protected by narrative criteria which state that a surface water shall be "free from" pollutants, alone or in combination with other pollutants, that cause floating debris or suspended solids; settleable solids such as bottom deposits; odor, oil, or grease; off-taste; color present in the water beyond natural background levels; the growth of algae or aquatic plants that impairs an existing, or attainable designated use; or that are toxic to humans, aquatic life, or wildlife.

Information about support or nonsupport of narrative criteria may consist of water quality studies, biological data, existence of fish kills, fish tissue samples, photographic evidence, local knowledge, and best professional judgement. The analysis and determination of narrative criteria support is inherently less objective and consistent than that for numeric criteria and often use associated numeric data where it exists and is applicable, for example, excessive aquatic plant growth associated with instream nutrient concentrations.

A.R.S. 49-232(F) requires the development and adoption of narrative implementation guidance

documents for assessing and identifying impaired waters. Currently, the Department has developed a guidance document for the application of the toxics narrative standard through the use of fish consumption advisories. Additional guidance documents are being developed for this and other narrative standards, including the use of the narrative bottom deposits standard in wadeable, perennial streams and narrative nutrient standards. A separate stakeholder process and subsequent rulemaking will be conducted to develop and finalize these documents.

Planning List

The Department shall place a surface water or segment on the Planning List if there is evidence of a narrative water quality standards violation, but either there is insufficient evidence based on narrative implementation procedures that have been adopted by the agency; or there is no implementation procedures adopted for the particular standard.

303(d) List

The Department shall consider placing a surface water or segment on the 303(d) List, if there is evidence of an exceedance of the narrative toxic standard, under R18-11-108(A)(5), based on the *"Narrative Toxicity Standard 303(d) Implementation Procedures"*, January 2002, published by the Department. Evidence of impairment exists if a fish consumption advisory is issued by the Arizona Game and Fish Department or the U.S. Fish and Wildlife Service, in consultation with the Department.

The implementation procedures outlines the appropriate criteria for development of the fish consumption advisory and development of the screening levels, based on EPA guidance, for determining concentration of toxicants in fish tissue. The Department shall consider as evidence of possible impairment, exceedances of the narrative toxicity standard, based on the issuance of a fish consumption advisory using screening levels developed in accordance with the implementation procedures.

NONCARCINOGENS	CARCINOGENS
$RTC = \frac{RfD \times BW}{CR}$	$RTC = \frac{(ARL)(OSF) * BW}{CR}$

- RTC means reference tissue concentration (mg of toxicant/kg of fish tissue), which is the allowable concentration of the toxicant in edible fish tissue.
- RfD means reference dose (mg of toxicant/kg of human body weight/day), which is the allowable exposure of the toxicant (through ingestion of fish) on a daily basis. Reference doses are obtained from the EPA Integrated Risk Information System (IRIS), which is an updated computer database for assessing human health effects of toxicants, or are specifically developed using EPA methodology.
- BW means the average body weight for the most vulnerable portion of the potentially affected population, for example, children or pregnant women.
- CR means consumption ratio, which is the average amount of fish consumed per person (as kg of fish per day).
- ARL means the risk level for carcinogens (for example, 1/100,000; 1/1,000,000). This is the potential risk of cancer for each person exposed at the allowable dose over a 70-year period.
- OSF means the oral cancer potency slope factor, which is the relationship (slope) of the cancer risk to dose.

An EPA letter dated October 24, 2000, from Geoffrey H. Grubbs, Office of Science and Technology and Robert H. Waylands II, Office of Wetlands, Oceans, and Watersheds, states that fish and shellfish advisories should be used as sources of data to determine whether to list certain waters as impaired. A distinction is made between advisories issued based on real water quality or fish tissue data and those advisories issued merely as a precautionary tool. If the advisory is based on water quality data from a specific surface water, the surface water should be listed. If the advisory is based on regional water quality data and the advisory is precautionary, the data may be used as evidence but should not be used as a sole basis for listing.

EPA has faced opposition to this guidance in the past, where groups have maintained that numeric water quality criteria provide a scientifically defensible method for determining whether water quality standards are being met. In response, EPA held that a surface water can meet numeric ambient water quality criteria but not attain the designated uses because fish tissue concentrations exceed levels that are protective of human health. In these instances, where tissue concentrations indicate an impairment of the designated use, even though ambient water column concentrations of the pollutants do not indicate an exceedance, EPA recommends that states translate the applicable narrative criteria on a site-specific basis or adopt site-specific criteria to account for the expected exposures. The federal guidance and the Department's implementation procedures clearly articulate those situations where use of advisories should be considered as "readily available data and information" and used in the evaluation.

Removing a surface water, segment, or pollutant from the 303(d) List

In general, removing a surface water, segment or pollutant from the 303(d) List is subject to the same requirements used in the listing decision. A.R.S. 49-232(C)(4) requires that the criteria for delisting is no more stringent than the criteria for listing.

40 CFR 130.7(b)(6)(iv) requires states to demonstrate good cause for not including surface waters on the 303(d) List or for removing a stressor or a surface water from the 303(d) List. Considerations to support delisting include more recent and accurate data showing that the surface water is meeting the appropriate surface water quality standard and/or the designated uses are being attained, more sophisticated water quality modeling, identification of flaws in the original analysis that led to the surface water being listed, changes in conditions such as new control equipment or the elimination of a discharge, or changes in water quality standards, guidance, or policy. Each consideration is found in the rule under R18-11-605(E).

When collecting more recent data, the conditions such as sampling frequency, number of sampling events, and hydrologic or climatic conditions, should be similar to conditions occurring when the samples were taken, if those conditions still exist, indicating impairment and resulting in a listing decision. For example, if a listing was based on two successive years of an annual mean standard not being met, the Department will look for at least two successive years of data indicating that the standard is now being met.

Surface waters or stressors can be excluded or delisted from the 303(d) List in either of the following situations:

The Department has developed, and EPA has approved, a TMDL for the stressor or the surface water. A surface water that is delisted after development of a TMDL will be placed on the Planning List for followup monitoring to determine if the implementation strategies are effective and whether the TMDL allocations are satisfactory. The surface water may be added back to the 303(d) List if implementation strategies fail to eliminate the problem or if recommended strategies do not occur and the water quality remains impaired.

A surface water was placed on the 303(d) List based on standard violations caused solely by natural conditions with no human caused influences. The "natural background" provision of the state water quality standards (A.A.C. R18-11-119) specifies that where pollutant loading from naturally occurring conditions along are sufficient to cause a violation of surface water quality standards, the exceedance is not considered a violation. A.R.S. § 49-232(D) specifies that a surface water shall not be listed where the standard is exceeded solely due to naturally occurring conditions. The rationale for removal of a surface water or to exclude it from listing based on naturally occurring conditions must be sufficiently documented.

For example, waters that exceeded water quality standards but drained wilderness or similar areas, would meet the definition for natural background if it were well documented by the appropriate land management agency that there were no contributing human influences or activities. These waters could be removed or excluded from the list due to the natural background provision provided this judgment was documented by the land management agency that no past or present

human influences had or were occurring that might contribute to a water quality standard exceedance.

R18-11-606. TMDL Priority Criteria for 303(d) Listed Surface Waters

After states develop lists as required under Section 303(d), they are required to prioritize the list for development of TMDLs. Section 303(d) states that each "[S]tate shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters." As part of the ranking, each state is to identify which "high" priority waters will be targeted for TMDL development within two years following the listing process. A.R.S. Title 49, Chapter 2, Article 2.1also requires the Department to prioritize listed surface waters for development of a TMDL and identifies 17 factors that the Department must use (A.R.S. § 49-233). The Department added six additional factors to develop high, medium, and low categories of prioritization. These categories take into account factors such as the severity of the impairment, impacts to designated uses of the receiving water, the seriousness of the water quality problems, the value of the resource, the risk to human health, aquatic life, and wildlife; and the likelihood of success of TMDL implementation.

A priority ranking system is essential to establish a work plan for the state in developing TMDLs during the listing cycle. The Department considers all surface waters as important resources of the state. However, with dozens of segments listed, many for multiple pollutants and the arid environment of the state, it is clear that not all TMDLs can be completed in the same time frame. The amount of staff time and resources requires may vary greatly depending on the amount of existing information, complexity, type of pollutant, number of sources, resources available, staff turnover and other issues.

A high or low priority ranking does not necessarily mean that a river or lake is more or less important, but rather it is a surface water selected for TMDL development based on the reasons identified in the prioritization process. It is also important to understand that the priority ranking only addresses surface waters on the 303(d) list and is not a comprehensive prioritization of the value of surface waters statewide. Arizona will continue to perform activities such as water quality monitoring, permit issuance and enforcement of state environmental regulations statewide.

Generally, impaired surface waters are given high priority if: the pollutant poses a substantial threat to the health and safety of humans, aquatic life, or wildlife; the surface water has been classified by the state or federal government for special protection or is of important recreational or economic significance to the public; the surface water contains a listed threatened or endangered species under the Endangered Species Act; or there is a local priority such as a wastewater treatment plant seeks to increased discharge capacity on an impaired surface water. Surface waters were the pollutants posed a substantial threat to humans, aquatic life or wildlife, including endangered species; where the surface water is afforded special protections under state or federal rules or where a NPDES or AZPDES permit is needed, will be targeted for TMDL development during the next listing cycle.

Medium priority is given to surface waters that have ranking factors such as: failing to meet more than one of its designated uses or the pollutant exceeds more than one surface water quality standard; where impairment appears to be correlated with seasonal conditions that will require additional time to monitor; where the type of pollutant or other factors make the TMDL complex; or where the administrative needs of the Department, including commitments with EPA, permitting requirements, or basin priorities, require completion of the TMDL.

A surface water would be given a low priority ranking, if, among other factors:

The surface water is an ephemeral or intermittent water and the pollutant is not a threat to the health and safety of humans, aquatic life, or wildlife, nor does it contribute to the impairment of a downstream perennial surface water;

The pollutant poses a low ecological or human health risk or there is insufficient data to identify the pollutant source;

The surface water, segment or pollutant has been proposed for delisting;
The Department proposes modification to the applicable designated use or surface water quality standards but the change has not yet been approved by EPA;
There are international or interstate coordination issues; or
There are actions occurring or have occurred that are expected to bring the surface water back to attaining water quality standards including cessation of discharges, use of best management practices or recently instituted treatment levels. For actions that have yet to occur, assurance that the controls are in place or there is a firm schedule for implementation is required before the surface water could be re-prioritized as low.

Notwithstanding this ranking system, the Department may re-prioritize a surface water to take advantage of opportunities within a watershed such as restoration or remediation efforts, requests from other entities, or to capitalize on efficiencies and geographic practicalities by coordinating TMDL development with other activities or programs. The Department has posted the status of TMDL development on its website at http://www.adeq.state.az.us/environ/water/assess/tmdl.html and updates it regularly. Where a listed surface water has a mixture of high, medium and low prioritization factors, generally the presence of high priority factors will outweigh low and medium factors. An exception to this convention is where the low priority factors dealing with: a known proposal to delist a pollutant or surface water pending EPA approval; a known change in water quality standard or designated use is pending EPA approval; or known actions are occurring or have occurred that are expected to bring the surface water back to attaining in the near future. In these cases, the low priority factors (R18-11-606(B)(3)(a)-(c)) may override the high or medium priority factors. The Department would continue to monitor such waters under the Planning List until such time as it was determined that the surface water was attaining its designated uses.

Lastly, the Department may complete a TMDL, initiated before the effective date of this rule, for a surface water or segment that was listed as impaired on the 1998 303(d) list but does not qualify for listing under the criteria in R18-11-605(D), if:

1. The TMDL investigation has established that the standard is not being met and that the allocation of loads is expected to bring the surface water to attaining;
2. The Department estimate that more than 50% of the cost of completing the TMDL has been spent;
3. There is significant community involvement and interest in completing the TMDL; or
4. The TMDL is included in an EPA-approved state workplan initiated before the effective date of this rule.

The Department will make an effort to facilitate intergovernmental cooperation between the state and adjoining states, federally recognized tribes in Arizona, and Mexico regarding listing decisions and TMDL development. Whenever possible, the Department will make these listing and TMDL decisions by mutual agreement, through the sharing of information, clarification of issues, and discussion. Several of Arizona's recognized tribes have independent authority for setting water quality standards and implementing Clean Water Act regulations on reservation lands. The Department will cooperate on a government-to-government basis regarding natural resources during the development of the 303(d) List, especially during data assessment and in developing responses to comments on the listing. Cooperation during other listing tasks, including joint gathering of data and public involvement may be negotiated.

Developing Total Maximum Daily Loads

A.R.S. Title 49, Chapter 2, Article 2.1 requires that in developing TMDLs for listed surface waters, the Department must comply with certain provisions, including using credible data that is representative of the type of surface water, the conditions by which the water was listed, and broadly accepted statistical and modeling techniques. Any sampling or monitoring components of a required TMDL implementation plan must also comply the credible data requirements. In developing TMDLs, the Department will use only statistical and modeling techniques that have been validated and broadly accepted by the scientific community. The modeling techniques chosen may vary based on the type of surface water and the quantity and quality of available data provided it meets the credible data requirements. Examples of modeling methods that may be used by the

Department or its contractors are given in R18-11-603.

6. **A reference to any study that the agency relies on in its evaluation of or justification for the rule and where the public may obtain or review the study, all data underlying each study, any analysis of the study and other supporting material.**

R18-11-605, Tables 1 and 2, specifying the minimum number of samples exceeding the numeric standard, was derived from *"A Nonparametric Procedure for Listing and Delisting Impaired Waters Based on Criterion Exceedances,"* by Pi-Erh Lin, Duane Meeter and Xu-Feng Nui, October 2000. This study may be obtained from the Department, the Florida Department of Environmental Protection, 3900 Commonwealth Blvd. M.S. 49, Tallahassee, Florida 32399, Tallahassee, FL 32306-4330, or at http://www8.myflorida.com/environment/learn/waterprograms/tmdl/pdf/supdocument.pdf.

Use of statistical methods, including the binomial distribution, in the assessment and listing processes: "Statistical Assessment of Violations of Water Quality Standards under Section 303(d) of the Clean Water Act," *Environmental Science and Technology*, Vol. 35, 2001, by Eric P. Smith, Keying Ye, Chris Hughes and Leonard Shabman.

7. **A showing of good cause why the rule is necessary to promote a statewide interest if the rule will diminish a previous grant of authority of a political subdivision of this state:** Not applicable

8. **The preliminary summary of the economic, small business, and consumer impact:**

These rules establish procedures by which data will be collected and analyzed to determine whether a surface water is impaired and should be placed on the 303(d) List. The rule does not set TMDLs, nor does it address particular surface waters. The rules also do not establish new water quality standards or criteria but instead clarify interpretation of existing standards. The costs for this rulemaking will fall primarily to the Department and affect only those agencies or entities that monitor state surface waters and choose to submit the data to the Department for use in assessing and in identifying impaired surface waters. The rules do not directly regulate businesses, farms, or any other sectors of the economy.

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

These rules affect the Department's surface water quality monitoring and assessment programs. Based on stakeholder input, the Department reexamined how it collects, reviews, and analyzes data for 303(d) listing purposes. The rules require the Department to formalize its process to assure that data used in the listing process is credible and relevant to an impaired waters identification or a TMDL decision, and to develop a methodology for determining whether a surface water is impaired and should be placed on the 303(d) List.

The first step in developing a 303(d) List is compiling all readily available and existing data. The new rules require that the Department review data to ensure that it meets the credible data requirements (collected under an appropriately prepared QAP and SAP, for example). If questions arise concerning the data, the Department is responsible for reviewing the QAP and SAP and contacting the monitoring entity for additional data validation information, as necessary. This will require additional, but not significant staff resources to review the data submissions.

Department staff must determine whether there is sufficient data (at least ten temporally independent samples, for example) to evaluate the surface water and whether there is sufficient evidence of impairment for listing. Much of the data assessment protocols have already been developed as part of the state's 305(b) water quality assessment, and there are no additional costs to implement the assessment portion of these rules. If there is evidence of possible impairment in a surface water but documentation does not meet the minimum criteria for listing (insufficient number of samples, for example), the surface water will be assigned to the Planning List.

To develop a sufficient amount of monitoring information on the state's surface waters, the

Department is creating a separate Targeted Monitoring Team to perform follow up monitoring on both ambient sampling sites and post-TMDL monitoring sites. This team will start with four FTEs. Two FTEs are existing positions that will be reassigned and two FTEs are new positions. The Department anticipates that the first year cost of this new team is approximately $185,000 ($140,000 salaries and benefits, $25,000 vehicle, $20,000 equipment). While the Department cannot predict the amount of additional monitoring that will be needed, it is estimated that the annual monitoring budget will be $150,000 - 200,000. (The Department's current ambient monitoring team budget is $375,000.)

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

The credible data requirements of R18-11-602 may affect state and federal agencies and local governments who choose to monitor surface waters and submit the data for assessment, listing, and TMDL development. Resources expended to comply with this rulemaking will vary depending upon each entity's current procedures and resources. However, these entities are not required to submit data to the Department and any cost associated with this rulemaking is voluntary.

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

These rules do not regulate private businesses, residences, entities or activities. Some regulated parties, volunteer and watershed monitoring groups, private individuals, and environmental groups may voluntarily submit data to the Department for consideration under this rulemaking, and if so, are required to meet the credible data requirements.

This rulemaking has specific requirements concerning the choice of methods based on the applicable water quality standard. For example, the requirement to choose the analytical method with the method detection limit at or below the applicable surface water quality standard or the use of clean analytical technique for certain constituents. These requirements may result in samples being analyzed by alternate laboratories or being subcontracted to alternate laboratories and therefore, may impact the Department's and other monitoring entity's laboratory contracts.

R18-11-602(A)(6) requires that any laboratory submitting analytical results for listing or TMDL decisions be state-licensed, exempted by the state, or be a federal or academic laboratory that can demonstrate comparable quality assurance/quality control procedures. If a laboratory does not meet this criteria and wishes to submit analytical results, the laboratory must obtain licensing from the Arizona Department of Health Services and pay any associated fees.

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

Private and public employment are not directly affected by the implementation and enforcement of this rulemaking.

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

This rulemaking provides consumers and the public with a clearly defined listing process. The core of this process is based on sufficient credible and scientifically defensible data, which in turn, provides an increased confidence in the 303(d) listing process and TMDL decisions. The dual requirements of sufficient and credible data translates to higher confidence that a listed surface water is truly impaired.

This rulemaking ensures that impaired surface waters are recognized and that human health and environmental concerns are addressed. The prioritization criteria allows the Department to focus its efforts and resources on those surface waters in greatest need of restoration.

F. ***Estimated Costs and Benefits to State Revenues.***

This rulemaking will have no impact on state revenues.

9. **The name and address of agency personnel with whom persons may communicate regarding the accuracy of the economic, small business, and consumer impact statement:**

Name:	Linda Taunt
Address:	Arizona Department of Environmental Quality 3033 N. Central Avenue, MO301A-311 Phoenix, Arizona 85012-2809
Telephone Number:	(602) 207-4416
Fax Number:	(602) 207-4528
E-Mail:	taunt.linda@ev.state.az.us

10. **The time, place, and nature of the proceedings for the adoption, amendment, or repeal of the rule, or if no proceeding is scheduled, where, when, and how persons may request an oral proceeding on the proposed rule:**

Date:	Monday, March 11, 2002
Time:	2:00 p.m.
Location:	Arizona Department of Environmental Quality 3033 N. Central Avenue, Room 1710 Phoenix, Arizona 85012-2809
Nature:	Oral Proceeding

Written comments on the proposed rules or preliminary economic, small business, and consumer impact statement must be received by 5:00 p.m., Tuesday, March 12, 2002.

Persons with a disability may request a reasonable accommodation such as a sign language interpreter, by contacting the Department's coordinator, Katie Huebner, at (602) 207-4794 (voice) or 1-800-367-3839 (TDD Relay). Requests should be made as early as possible to allow time to arrange the accommodation.

11. **Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:** None

12. **Incorporations by reference and their location in the rules:** None

13. **Was this rule previously adopted as an emergency rule:** No

14. **The full text of the rules follows:**

NOTICE OF PROPOSED RULEMAKING
TITLE 18. ENVIRONMENTAL QUALITY
CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY STANDARDS

***ARTICLE 6. IMPAIRED* WATER IDENTIFICATION**

TITLE 18. ENVIRONMENTAL QUALITY
CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY STANDARDS

ARTICLE 6. IMPAIRED WATER IDENTIFICATION

R18-11-601. Definitions

In addition to the definitions established in A.R.S. §§ 49-201 and 49-231, and A.A.C. R18-11-101, the following terms apply to this Article:

1. "303(d) List" means the list of surface waters or segments required under section 303(d) of the Clean Water Act and A.R.S. Title 49, Chapter 2, Article 2.1, for which TMDLs are developed and submitted to EPA for approval.
2. "Attaining" means where there is sufficient, credible, and scientifically defensible data to assess a surface water or segment and the surface water or segment does not meet the definition of impaired or not attaining.
3. "Credible and scientifically defensible data" means data submitted, collected, or analyzed using:
   a Quality assurance and quality control procedures under A.A.C. R18-11-602;
   b. Samples or analyses representative of water quality conditions at the time the data was collected;
   c. Data consisting of an adequate number of samples based on the nature of the water in question and the parameters being analyzed; and
   d. Methods of sampling and analysis, including analytical, statistical, and modeling methods that are generally accepted and validated in the scientific community as appropriate for use in assessing the condition of the water.
4. "Designated use" means those uses specified in 18 A.A.C. 11, Article 1 for each surface water or segment whether or not they are being attained.
5. "EPA" means the U.S. Environmental Protection Agency.
6. *"Impaired water" means a Navigable water for which credible scientific data exists that satisfies the requirements of § 49-232 and that demonstrates that the water should be identified pursuant to 33 United States Code § 1313(d) and the regulations implementing that statute.* A.R.S. § 49-231(1).
7. "MDL" means method detection limit, which is the minimum concentration of an analyte that can be detected with 99% confidence that the analyte concentration is greater than zero, as defined by the specific laboratory method.
8. "Monitoring entity" means the Department or any person who collects physical, chemical, or biological data used for an impaired water identification or a TMDL decision.
9. "Naturally occurring condition" means the condition of a surface water or segment in the absence of human-induced alterations based on the best scientific information available.
10. "Not attaining" means a surface water is assessed as impaired, but:
    a. A TMDL is prepared and implemented,
    b. Another action, meeting the requirements of A.A.C. R18-11-604(D)(2)(h), is occurring and is expected to bring the surface water to attaining, or
    c. Where the impairment is due to pollution, but not a pollutant.
11. "Planning List" means a list of surface waters and segments that the Department will review and evaluate to determine if the surface water or segment is impaired and whether a TMDL is necessary.
12. "Pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. 33 U.S.C. 1362(6). Characteristics of water, such as dissolved oxygen, pH, temperature, turbidity, and suspended sediment are considered pollutants if they result or may result in the non-attainment of a water quality standard.
13. "Pollution" means "the man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water. 33 U.S.C. 1362(19).
14. "QAP" means a quality assurance plan detailing how environmental data operations are planned, implemented, and assessed for quality during the duration of a project.

15. "Sampling event" means one or more samples taken under consistent conditions on one or more days at a distinct station or location.
16. "SAP" means a site specific sampling and analysis plan that describes the specifics of sample collection to ensure that data quality objectives are met and that samples collected and analyzed are representative of surface water conditions at the time of sampling.
17. "Spatially independent samples" means samples that are distinct stations or locations based on whether the samples are collected more than 200 meters apart or are collected less than 200 meters apart to characterize the effect of an intervening tributary, outfall, or other pollution source, or significant hydrographic or hydrologic change.
18. "Temporally independent samples" means samples that are collected at the same station or location more than seven days apart;
19. "Threatened" means that a surface water or segment is currently attaining its designated use, however, trend analysis based on credible and scientifically defensible data indicates that the surface water or segment may be impaired before the next listing cycle.
20. "TMDL" means total maximum daily load.
21. "TMDL decision" means a decision by the Department to:
    a. Prioritize an impaired water for TMDL development,
    b. Develop a TMDL for an impaired water, or
    c. Develop a TMDL implementation plan.
22. *"Total maximum daily load" means an estimation of the total amount of a pollutant from all sources that may be added to a water while still allowing the water to achieve and maintain applicable surface water quality standards. Each total maximum daily load shall include allocations for sources that contribute the pollutant to the water, as required by section 303(d) of the clean water act (33 United States Code section 1313(d)) and regulations implementing that statute to achieve applicable surface water quality standards.* A.R.S. § 49-231(4).
23. "Water quality standards" means standards composed of designated uses (classification of waters), the numerical and narrative criteria applied to the specific water uses or classification, the antidegradation policy, and moderating provisions (e.g., mixing zones, site-specific alternative criteria, and exemptions) contained in A.A.C. Title 18, Chapter 11, Article 1.
24. "WQARF" means the water quality assurance revolving fund established under A.R.S. § 49-281.

R18-11-602. Credible Data

A. Data is credible and relevant to an impaired waters identification or a TMDL decision when:
    1. Quality Assurance Plan. A monitoring entity, contributing data for impaired waters identification or a TMDL decision, provides the Department with a QAP that contains, at a minimum, the elements listed in subsections (A)(1)(a) through (A)(1)(f). The Department may accept a QAP containing less than the required elements if the Department determines, that an element is not relevant to the sampling activity and that its omission will not impact the quality of the results, based upon the type of pollutants to be sampled, the type of surface water, the purpose of the sampling, such as compliance sampling, and any other related factor.
        a. An approval page that includes the date of approval and the signatures of the approving officials, including the project manager and project quality assurance manager;
        b. A project organization outline that identifies all key personnel, organizations, and laboratories involved in monitoring, including the specific roles and responsibilities of key personnel in carrying out the procedures identified in the QAP and SAP, if applicable;
        c. Sampling design and monitoring data quality objectives or a SAP that meets the requirements of subsection (A)(2) to ensure that:
            i. Samples are spatially and temporally representative of the surface water,
            ii. Samples are representative of water quality conditions at the time of sampling, and
            iii. The monitoring is reproducible.
        d. The following field sampling information to assure that samples meet data quality objectives:
            i. Sampling and field protocols that describe for each parameter or parametric group: the sampling methods, equipment and containers, sample preservation, holding times, and any

analysis proposed for completion in the field or outside of a laboratory. Identify field and laboratory methods approved under subsection(A)(5).

ii. Handling procedures to identify samples and custody protocols used when bringing samples from the field to the laboratory for analysis;

iii. Quality control protocols that describe the number and type of field quality control samples for the project that includes, if appropriate for the type of sampling being conducted, field blanks, travel blanks, equipment blanks, method blanks, split samples, and duplicate samples;

iv. Procedures for testing, inspecting, and maintaining field equipment;

v. Field instrument calibration procedures that describe how and when field sampling and analytical instruments will be calibrated;

vi. Field notes and records that describe the conditions that require documentation in the field, such as weather, stream flow, transect information, distance from water edge, water and sample depth, equipment calibration measurements, field observations of watershed activities, and bank conditions. Indicate the procedures implemented for maintaining field notes and records and the process used for attaching pertinent information to monitoring results to assist in data interpretation;

vii. Minimum training and any specialized training necessary to do the monitoring, including the proper use and calibration of field equipment used to collect data, sampling protocols, quality assurance/quality control procedures, and how the training will be achieved.

e. Laboratory analysis methods and quality assurance/quality control procedures that assure that samples meet data quality objectives, including:

i. Analytical methods and equipment necessary for analysis of each parameter, including identification of approved laboratory methods described in subsection (A)(5), method detection limits, and practical quantification methods for each parameter;

ii. The name of the designated laboratory, its license number, if licensed by the Arizona Department of Health Services, and the name of a laboratory contact person to assist the Department with quality assurance questions;

iii. Quality controls that describe the number and type of laboratory quality control samples for the project, including, if appropriate for the type of sampling being conducted, field blanks, travel blanks, equipment blanks, method blanks, split samples, and duplicate samples;

iv. Procedures for testing, inspecting, and maintaining laboratory equipment and facilities;

v. A schedule for calibrating laboratory instruments, a description of calibration methods and how calibration records are maintained; and

vi. Sample equipment decontamination procedures that outline specific methods for sample collection and preparation of equipment, identify the frequency of decontamination, and describe the procedures used to verify decontamination.

f. Data review, management, and use that includes the following:

i. A description of the data handling process from field, to laboratory, to data review and validation, to data storage and use. The description shall include the role and responsibility of each person for each step of the process, type of database or other storage used, and how laboratory and field data qualifiers are related to the laboratory result;

ii. Reports that describe the intended frequency, content, and distribution of final analysis reports and project status reports;

iii. Data review, validation, and verification that describes the procedure used to validate and verify data, the procedures used if errors are detected, and how is data accepted, rejected, or qualified; and

iv. Reconciliation with data quality objectives that describes the process used to determine whether the data collected meets the project objectives, which may include discarding data, setting limits on data use, or revising data quality objectives.

2. Sampling and analysis plan.

a. A monitoring entity shall develop a SAP that contains, at a minimum, the following elements:

i. The experimental design of the project, the project goals and objectives, and evaluation

criteria for data results;

ii. The background or historical perspective of the project;

iii. Identification of target conditions, including a discussion of whether any weather, seasonal variations, stream flow, lake level, or site access may affect the project and the consideration of these factors;

iv. The data quality objectives for measurement of data that describe in quantitative and qualitative terms how the data meets the project objectives of precision, accuracy, completeness, comparability, and representativeness;

v. The types of samples scheduled for collection;

vi. The sampling frequency;

vii. The sampling periods;

viii. The sampling locations and rationale for the site selection, how site locations are benchmarked, including, scaled maps indicating approximate location of sites; and

ix. A list of the field equipment, including tolerance range and any other manufacture specifications relating to accuracy and precision.

b. The Department may accept a SAP containing less than the required elements if the Department determines that an element is not relevant to the sampling activity and that its omission will not impact the quality of the results, based upon the type of proposed pollutant samples, the type of surface water, the purpose of the sampling, such as compliance sampling, and any other related factor.

3. The monitoring entity may include any of the following items in the QAP or SAP:

a. The name, title, and role of each person and organization involved in the project, identifying specific roles and responsibilities for carrying out the procedures identified in the QAP and SAP;

b. A distribution list of each individual and organization receiving a copy of the approved QAP and SAP and who are responsible for carrying out the procedures specified in these documents;

c. A table of contents;

d. A health and safety plan;

e. The inspection and acceptance requirements for supplies;

f. The data acquisition that describes types of data not obtained through this monitoring activity but used in the project;

g. The audits and response actions that describe how field, laboratory, and data management activities and sampling personnel are evaluated to ensure data quality, including a description of how the project will correct any problems identified during these assessments; and

h. The waste disposal methods that identify wastes generated in sampling and methods for disposal of those wastes.

4. Exceptions. The Department may determine that the following data is also credible and relevant to an impaired water identification or TMDL decision when data was collected provided the conditions in subsections (A)(5), (A)(6), and (B) are met, and where the data was collected in the surface water or segment being evaluated for impairment:

a. The data was collected before *[effective date of rule]* and the Department determines that the data yield results of comparable reliability to the data collected under subsections (A)(1) and (A)(2);

b. The data was collected after *[effective date of rule]* as part of an ongoing monitoring effort by a governmental agency and the Department determines that the data yield results of comparable reliability to the data collected under subsections (A)(1) and (A)(2); or

c. The data was or is collected under the terms of an NPDES or AZPDES permit or a compliance order issued by the Department or EPA, a consent decree signed by the Department or EPA, or a sampling program approved by the Department or EPA under WQARF or CERCLA, and the Department determines that the data yield results of comparable reliability to data collected under subsections (A)(1) and (A)(2).

5. Data collection, preservation, and analytical procedures. The monitoring entity shall collect, preserve, and analyze data using methods of sample collection, preservation, and analysis established under A.A.C. R9-14-610.

6. Laboratory. The monitoring entity shall ensure that chemical and toxicological samples are analyzed in

a state-licensed laboratory, a laboratory exempted by the Arizona Department of Health Services for specific analyses, or a federal laboratory or academic laboratory that can demonstrate proper quality assurance/quality control procedures substantially equal to those required by the Arizona Department of Health Services, and use of methods identified in subsection (A)(5).

B. Documentation for data submission. The monitoring entity shall provide the Department with the following information either before or with data submission:
   1. A copy of the QAP or SAP, or both, revisions to a previously submitted QAP or SAP, or any other information necessary for the Department to evaluate the data under subsection (A)(4);
   2. The applicable dates of the QAP and SAP, including any revisions;
   3. Written assurance that the methods and procedures specified in the QAP and SAP were followed;
   4. The name of the laboratory used for sample analyses and its certification number, if the laboratory is licensed by the Arizona Department of Health Services;
   5. The quality assurance/quality control documentation, including the analytical methods used by the laboratory, method number, detection limits, and any blank duplicate and spike sample information necessary to properly interpret the data, if different from that stated in the QAP or SAP;
   6. The data reporting unit of measure;
   7. Any field notes, laboratory comments, or laboratory notations concerning a deviation from standard procedures, quality control, or quality assurance that affects data reliability, data interpretation, or data validity; and
   8. Any other information, such as complete field notes, photographs, climatic or other information related to flow, field conditions, or documented sources of pollutants in the watershed, if requested by the Department for interpreting or validating data.

C. Recordkeeping. The monitoring entity shall maintain all records, including sample results for the duration of the listing cycle. If a surface water or segment is added to the Planning List or to the 303(d) List, the Department shall coordinate with the monitoring entity to ensure that records are kept for the duration of the listing.

R18-11-603. General Data Interpretation Requirements

The Department shall use the following data conventions to interpret data for impaired waters identification and TMDL decisions:

1. Data reported below Method Detection Limits (MDL).
   a. When the sample value is less than or equal to the MDL and the MDL is less than or equal to the surface water quality standard:
      i. The Department shall consider the result as meeting the water quality standard; and
      ii. If there is sufficient data to support statistically estimating values reported as less than the MDL, the Department shall use these statistically derived values in trend analysis, descriptive statistics or modeling; or
      iii. If there is insufficient data to support statistically estimating values reported as less than the MDL, the Department shall use one-half of the value of the MDL in trend analysis, descriptive statistics, or modeling.
   b. When the sample value is less than or equal to the MDL but the MDL is greater than the surface water quality standard, the Department shall not use the result for impaired waters identification or TMDL decisions.
2. The Department shall consider that a field sample measurement within the manufacturer's specification for accuracy meets surface water quality standards and identifies field equipment specifications used for each listing cycle or TMDL developed.
3. The Department shall resolve a data conflict by considering the factors identified under the weight-of-evidence determination in R18-11-605(B).
4. Invalid data. The Department shall not use the following data for making a listing or a TMDL decision:
   a. Any measurement outside the range of possible physical or chemical measurements for the pollutant or measurement equipment;
   b. Data transcription errors or laboratory errors; and
   c. Statistical outliers identified through statistical analysis appropriate to the dataset that do not represent valid measures of water quality for the dataset.

5. The Department shall employ fundamental statistical tests appropriate for the collected data and type of surface water when evaluating a surface water or segment for impairment or in making a TMDL decision. The statistical tests may include, descriptive statistics, frequency distribution, analysis of variance, correlation analysis, regression analysis, significance testing, and time series analysis.
6. The Department shall employ modeling, appropriate for the collected data and type of surface water when evaluating a surface water or segment for impairment or in making a TMDL decision. Modeling methods may include, Better Assessment Science Integrating Source and Nonpoint Sources (BASINS), regression analysis, Hydrologic Simulation Program-Fortran (HSPF), spreadsheet modeling, and Hydrologic Engineering Center (HEC) programs developed by the Army Corps of Engineers.
7. The Department shall use spatially independent samples, temporally independent samples, and multiple samples to evaluate surface water data for numeric surface water quality standards exceedances. The following resultant values shall represent the dataset when multiple samples from a surface water or segment are not spatially or temporally independent, or when multiple samples from a lake are not depth independent:
    a. The appropriate measure of central tendency for the dataset.
        i. The surface water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 1, except for nitrate or nitrate/nitrite;
        ii. The chronic water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 2;
        iii. A surface water quality standard for a pollutant that is expressed as an annual or geometric mean;
        iv. The surface water quality standard for temperature or the single sample maximum water quality standard for turbidity, nitrogen, and phosphorus in R18-11-109;
        v. The water quality standard for radiochemicals in R18-11-109(I); or
        vi. All single sample maximum water quality standards in R18-11-112, except chromium.
    b. The maximum value of the dataset.
        i. The acute water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 2 and acute water quality standard in R18-11-112;
        ii. The surface water quality standard for nitrate or nitrate/nitrite in 18 A.A.C. 11, Article 1, Appendix A, Table 1;
        iii. The single sample maximum water quality standard for bacteria in subsections R18-11-109(B) and (C); or
        iv. The 90th percentile water quality standard for nitrogen and phosphorus in R18-11-109(H) and R18-11-112.
    c. The worst case measurement of the dataset.
        i. Surface water quality standard for dissolved oxygen under R18-11-109(D). For purposes of this subsection, "worst case measurement" means the minimum value for dissolved oxygen;
        ii. Surface water quality standard for pH under R18-11-109(G). For purposes of this subsection, "worst case measurement" means both the minimum and maximum value for pH.

R18-11-604. Lists of Surface Waters and Segments

A. The Department shall evaluate, at least every five years, Arizona's surface waters by considering all readily available data according to R18-11-605.
    1. The Department shall place a surface water or segment meeting the criteria for listing under R18-11-605 on either the Planning List or the 303(d) List.
    2. The Department shall not place a surface water or segment on the Planning List or the 303(d) List that does not meet the criteria for listing under R18-11-605(C) or (D), or meets the exception criteria in subsection (C).
B. When placing a surface water or segment on the Planning List or the 303(d) List, the Department shall list the stream reach, derived from EPA's Reach File System, or the entire lake, unless the data indicates that only a segment of the stream reach or lake is impaired or not attaining its designated use, in which case, the

Department shall delineate only that segment for listing.

C. Exceptions.

1. The Department shall not place a surface water or segment on either the Planning List or the 303(d) List if the non-attainment of surface water quality standards is due to one of the following:
   a. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards; or
   b. The data was collected within a mixing zone or under a variance or nutrient waiver established in an NPDES or AZPDES permit for the specific parameter and the result does not exceed the alternate discharge limitation established in the permit. Data collected within these areas may be used for modeling or allocating loads in a TMDL decision.
2. The Department shall place a surface water or segment on the Planning List if the non-attainment of surface water quality standards is due to an activity exempted under R18-11-116, R18-11-117, R18-11-118, or R18-11-119.

D. Planning List.

1. The Department shall:
   a. Use the Planning List to prioritize surface waters for monitoring and evaluation as part of the Department's watershed management approach;
   b. Provide the Planning List to EPA; and
   c. Evaluate each surface water and segment on the Planning List for impairment based the criteria in R18-11-605(D) and determine the source of the impairment.
2. The Department shall place a surface water or segment on the Planning List based the criteria in R18-11-605(C). The Department may also include a surface water or segment on the Planning List when:
   a. A TMDL is completed for the pollutant and approved by EPA;
   b. The surface water or segment is on the 1998 303(d) List but the dataset used for the listing:
      i. Does not meet the credible data requirements of R18-11-602, or
      ii. Contains insufficient samples to meet the data requirements of R18-11-605(D);
   c. Some monitoring data exists but there is insufficient data to determine whether the surface water or segment is impaired or not attaining, including:
      i. A numeric surface water quality standard is exceeded, but there are not enough samples or sampling events to fulfill the requirements of R18-11-605(D);
      ii. Evidence exists of a narrative standard violation, but the amount of evidence is insufficient, based on narrative implementation procedures and the requirements of R18-11-605(D)(3);
      iii. Existing monitoring data does not meet credible data requirements in R18-11-602; or
      iv. A numeric surface water quality standard is exceeded, but there are not enough sample results above the MDL to support statistical analysis as established in R18-11-603(A).
   d. The surface water or segment no longer meets the criteria for impairment based on a change in the applicable surface water quality standard or a designated use approved by EPA under section 303(c)(1) of the Clean Water Act, but insufficient current or original monitoring data exists to determine whether the surface water or segment will meet current surface waterquality standards;
   e. Trend analysis using credible and scientifically defensible data indicates that surface water quality standards may be exceeded by the next assessment cycle;
   f. The exceedance of surface water quality standards is due to pollution but not a pollutant;
   g. Existing data was analyzed using methods with MDLs above the numeric surface water quality standard but analytical methods with lower MDLs are available; or
   h. The surface water or segment is expected to attain its designated use by the next assessment as a result of existing or proposed technology-based effluent limitations or other pollution control programs under local, state, or federal authority, or where the clean-up of a pollutant is complete and documented, or the following documentation is provided:
      i. Discharge controls are required and enforceable;
      ii. Controls are specific to the surface water or segment, and pollutant of concern;
      iii. Controls are in place or firmly scheduled for implementation; and
      iv. There are assurances that the controls are sufficient to bring about attainment of water quality standards by the next 303(d) List submission.

i. The surface water or segment is threatened due to a pollutant and, at the time the Department submits a final 303(d) List to EPA, there are no federal regulations implementing section 303(d) of the Clean Water Act in place that require threatened waters be included on the list.

E. 303(d) List. The Department shall:

1. Place a surface water or segment on the 303(d) List if the Department determines:
   a. Based on R18-11-605(D), that the surface water or segment is impaired due to a pollutant and that a TMDL decision is necessary; or
   b. That the surface water or segment is threatened due to a pollutant and, at the time the Department submits a final 303(d) List to EPA, there are federal regulations implementing section 303(d) of the Clean Water Act in place that require threatened waters be included on the list.
2. Public notice the 303(d) List according to the requirements of A.R.S. § 49-232 and submit the 303(d) List according to section 303(d) of the Clean Water Act.

R18-11-605. Evaluating A Surface Water or Segment For Listing and Delisting

A. The Department shall compile and evaluate all reasonably current, credible and scientifically defensible data to determine whether a surface water or segment is impaired or not attaining.

B. Weight-of-evidence approach.

1. The Department shall consider the following concepts when evaluating the data:
   a. Data or information collected during critical conditions may be considered separately from the complete dataset, when the data shows that the surface water or segment is impaired or not attaining its designated use during those critical conditions, but attaining its uses during other periods. Critical conditions may include stream flow, seasonal periods, weather conditions, or anthropogenic activities.
   b. Whether the data indicates that the impairment is due to persistent, seasonal, or recurrent conditions. If the data does not represent persistent, recurring, or seasonal conditions, the Department may place the surface water or segment on the Planning List;
   c. Higher quality data will be given higher priority when making a listing decision. Data quality is established by the reliability, precision, accuracy, and representativeness of the data, based on factors identified in A.A.C. R18-11-602(A) and (B), including monitoring methods, analytical methods, quality control procedures, analytical methods and the documented field and laboratory quality control information submitted with the data. The Department shall also consider the following factors when determining highest data quality:
      i. The age of the measurements with newer measurements weighted heavier than older measurements, unless the older measurements are more representative of critical flow conditions;
      ii. Whether the data provides a direct measure of an impact on a designated use, where direct measurements are weighted heavier than measurements of an indicator or surrogate parameter; or
      iii. The amount or frequency of the measurements, with more frequent data collection weighted heavier than nominal datasets.
2. The Department shall evaluate the following factors to determine if the water quality evidence supports a finding that the surface water or segment is impaired or not attaining:
   a. Exceedance of a numeric surface water quality standard specified in subsections (C)(1), (C)(2), (D)(1), and (D)(2);
   b. Exceedance of a narrative surface water quality standard specified in subsections (C)(3) and (D)(3);
   c. Additional information that determines whether a water quality standard is exceeded due to a pollutant, suspected pollutant, or naturally occurring conditions:
      i. Soil type, geology, hydrology, flow regime, biological communities, geomorphology, climate, natural processes, and anthropogenic influences in the watershed;
      ii. The characteristics of the pollutant, such as its solubility in water, bioaccumulation potential, sediment sorption potential, or degradation characteristics, to assist in determining which data more accurately indicates the pollutant's presence and potential for

causing impairment; and

iii. Available evidence of direct or toxic impacts on aquatic life, wildlife, or human health, such as fish kills and beach closures, where there is sufficient evidence that these impacts occurred due to water quality conditions in the surface water.

d. Other available water quality information, such as NPDES or AZPDES water quality discharge data, as applicable.

e. If the Department determines that a surface water or segment does not merit listing under numeric water quality criteria in subsections (C)(1), (C)(2), (D)(1), or (D)(2) for a pollutant, but there is evidence of a narrative standard exceedance in that surface water or segment under subsection (D)(3) as a result of the presence of the same pollutant, the Department shall list the surface water or segment as impaired only when the evidence indicates that the numeric water quality standard is insufficient to protect the designated uses of the surface water or segment and the Department justifies the listing based on any of the following:

i. The narrative standard data provides a more direct indication of impairment as supported by professionally prepared and peer-reviewed publications;

ii. Sufficient evidence of impairment exists due to synergistic effects of pollutant combinations or site-specific environmental factors; or

iii. The pollutant is bioaccumulative, relatively insoluble in water, or has other characteristics that indicate it is occurring in the specific surface water or segment at levels below the MDL, but are at levels sufficient to result in impairment.

3. The Department may consider a single line of water quality evidence when the evidence is sufficient to demonstrate that the surface water or segment is impaired or not attaining.

C. Planning List.

1. When evaluating a surface water or segment for placement on the Planning List, the Department shall:

a. Consider at least ten spatially independent samples collected over three or more temporally independent sampling events;

b. Evaluation of numeric water quality standards exceedances.

i. Place a surface water or segment on the Planning List if the number of exceedances of a surface water quality standard is greater than or equal to the number listed in Table 1, which provides the number of exceedances that indicate a minimum of a 10% exceedance frequency with a minimum of a 80% confidence level using a binomial distribution, for a given sample size.

ii. For sample datasets exceeding those shown in Table 1, calculate the number of exceedances using the following equation: (X x n , p) where n = number of samples; p = exceedance probability of 0.1; x = smallest number of exceedances required for listing with "n" samples; and confidence level 80%.

2. When there are less than ten samples, the Department shall place a surface water or segment on the Planning List when three or more temporally independent samples exceed the following surface water quality standards:

a. The surface water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 1, except for nitrate or nitrate/nitrite;

b. The surface water quality standard for temperature or the single sample maximum water quality standard for turbidity, nitrogen, and phosphorus in R18-11-109;

c. The surface water quality standard for radiochemicals in R18-11-109(I)(2);

d. The surface water quality standard for dissolved oxygen under R18-11-109(D);

e. The surface water quality standard for pH under R18-11-109(G); or

f. The following surface water quality standards in R18-11-112:

i. Single sample maximum standards for nitrogen and phosphorus;

ii. All metals except chromium; or

iii. Turbidity.

Table 1.

MINIMUM NUMBER OF SAMPLES EXCEEDING THE NUMERIC STANDARD								
Number of Samples		Number of Samples Exceeding Standard	Number of Samples		Number of Samples Exceeding Standard	Number of Samples		Number of Samples Exceeding Standard
From	To		From	To		From	To	
10	15	3	182	190	23	368	376	43
16	23	4	191	199	24	377	385	44
24	31	5	200	208	25	386	395	45
32	39	6	209	218	26	396	404	46
40	47	7	219	227	27	405	414	47
48	56	8	228	236	28	415	423	48
57	65	9	237	245	29	424	432	49
66	73	10	246	255	30	433	442	50
74	82	11	256	264	31	443	451	51
83	91	12	265	273	32	452	461	52
92	100	13	274	282	33	462	470	53
101	109	14	283	292	34	471	480	54
110	118	15	293	301	35	481	489	55
119	126	16	302	310	36	490	499	56
127	136	17	311	320	37	500		57
137	145	18	321	329	38			
146	154	19	330	338	39			
155	163	20	339	348	40			
164	172	21	349	357	41			
173	181	22	358	367	42			

3. Evaluation of narrative water quality standards exceedances. The Department shall place a surface water or segment on the Planning List if:
   a. Evidence of a narrative water quality standard violation exists, but there is insufficient evidence based on narrative implementation procedures under subsection (D)(3) to find that the surface water or segment is impaired or not attaining.
   b. Information under subsections (B)(2)(c), (B)(2)(d), and (B)(2)(e) indicates that a narrative water quality standards violation exists, but no narrative implementation procedure exists to support use of the information for listing.
4. Removing a surface water, segment, or pollutant from the Planning List.
   a. The Department shall remove a pollutant from the Planning List when monitoring activities

indicate that:

i. There is sufficient credible data to determine that the surface water or segment is impaired under subsection (D), in which case the Department shall place the surface water or segment on the 303(d) List. This includes waters with an EPA approved TMDL when the Department determines that the TMDL strategy is insufficient for the surface water or segment to attain water quality standards; or

ii. There is sufficient credible data to determine that the surface water or segment is attaining, in which case the Department shall not place the surface water or segment on the Planning List or 303(d) List.

b. The Department shall remove a surface water or segment from the Planning List if all pollutants for the surface water or segment are delisted.

D. 303(d) List.

1. When evaluating a surface water or segment for placement on the 303(d) List, the Department shall :

a. Consider at least twenty spatially independent samples collected over three or more temporally independent sampling events;

b. Evaluation of numeric water quality standards exceedances.

i. A surface water or segment shall be considered for the 303(d) List, under R18-11-605(B), if the number of exceedances of a surface water quality standard is greater than or equal to the number listed in Table 2, which provides the number of exceedances that indicate a minimum of a 10% exceedance frequency with a minimum of a 90% confidence level using a binomial distribution for a given sample size.

ii. For sample datasets exceeding those shown in Table 2, calculate the number of exceedances using the following equation: (X x n , p) where n = number of samples; p = exceedance probability of 0.1; x = smallest number of exceedances required for listing with "n" samples; and confidence level 90%.

2. The Department may consider listing a surface water or segment on the 303(d) List, under R18-11-605(B), without the required number of samples or numeric water quality standard exceedances under subsection (D)(1) if either the following conditions occur:

a. More than one temporally independent sample in any consecutive three-year period exceeds the surface water quality standard in:

i. The acute water quality standard for a pollutant listed in 18 A.A.C. 11, Article 1, Appendix A, Table 2 and the acute water quality standards in R18-11-112;

ii. The surface water quality standard for nitrate or nitrate/nitrite in 18 A.A.C. 11, Article 1, Appendix A, Table 1; or

iii. The single sample maximum water quality standard for bacteria in subsections R18-11-109(B) and (C).

b. More than one exceedance of an annual mean, 90th percentile, aquatic and wildlife chronic water quality standard, or a bacteria 30-day geometric mean water quality standard, specified in R18-11-109, R18-11-110, R18-11-112, or 18 A.A.C. 11, Article 1, Appendix A, Table 2 occurs.

Table 2.

MINIMUM NUMBER OF SAMPLES EXCEEDING THE NUMERIC STANDARD								
Number of Samples		Number of Samples Exceeding Standard	Number of Samples		Number of Samples Exceeding Standard	Number of Samples		Number of Samples Exceeding Standard
From	To		From	To		From	To	
20	25	5	183	191	25	362	370	45
26	32	6	192	199	26	371	379	46
33	40	7	200	208	27	380	388	47

41	47	8	209	217	28	389	397	48
48	55	9	218	226	29	398	406	49
56	63	10	227	235	30	407	415	50
64	71	11	236	244	31	416	424	51
72	79	12	245	253	32	425	434	52
80	88	13	254	262	33	435	443	53
89	96	14	263	270	34	444	452	54
97	104	15	271	279	35	453	461	55
105	113	16	280	288	36	462	470	56
114	121	17	289	297	37	471	479	57
122	130	18	298	306	38	480	489	58
131	138	19	307	315	39	490	498	59
139	147	20	316	324	40	499	500	60
148	156	21	325	333	41			
157	164	22	334	343	42			
165	173	23	344	352	43			
174	182	24	353	361	44			

3. Evaluation of narrative water quality standards exceedances. The Department shall consider placing a surface water or segment on the 303(d) List, under R18-11-605(B), if the surface water or segment exceeds the narrative toxicity water quality standard under R18-11-108(A)(5).
   a. Evidence of impairment exists, if a fish consumption advisory is issued by the Arizona Game and Fish Department or federal agency, in consultation with the Department.
   b. The appropriate criteria for issuance of a fish consumption advisory are specified in the "*Narrative Toxicity Standard 303(d) Implementation Procedures*," January 2002, published by the Arizona Department of Environmental Quality, 3033 North Central Avenue, Phoenix, Arizona.

E. Removing a surface water, segment, or pollutant from the 303(d) List.
   1. The Department shall remove a pollutant from an surface water or segment placed on the 303(d) List using one or more of the following criteria:
      a. The Department developed, and EPA approved, a TMDL for the pollutant;
      b. The data used for previously listing the surface water or segment under R18-11-604(C) is superseded by more recent credible and scientifically defensible data meeting the requirements of R18-11-602, showing that the surface water or segment meets the applicable numeric or narrative surface water quality standard. When evaluating data to remove a pollutant from the 303(d) List, the monitoring entity shall collect the more recent data under similar hydrologic or climatic conditions as occurred when the samples were taken that indicated impairment, if those conditions still exist;
      c. The surface water or segment no longer meets the criteria for impairment based on a change in the applicable surface water quality standard or a designated use approved by EPA under section 303(c)(1) of the Clean Water Act;

d. The surface water or segment no longer meets the criteria for impairment for the specific narrative water quality standard based on a change in narrative water quality standard implementation procedures;
e. A re-evaluation of the data indicates that the surface water or segment does not meet the criteria for impairment because of a deficiency in the original analysis;
f. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards; or
g. Monitoring data indicates that the impairment is due to pollution and not a pollutant.

2. When removing a pollutant from the 303(d) List, the Department shall not use criteria more stringent than the listing criteria under subsection (D).
3. The Department shall remove a surface water or segment from the 303(d) List if all pollutants for the surface water or segment are removed from the list.
4. The Department shall remove a surface water, segment or pollutant, from the 1998 303(d) List and place it on the Planning List, if the dataset used in the original listing:
   a. Does not meet the credible data requirements of R18-11-602, or
   b. Contains insufficient samples to meet the data requirements of R18-11-605(D).

R18-11-606. TMDL Priority Criteria for 303(d) Listed Surface Waters or Segments

A. In addition to the factors specified in A.R.S. § 49-233(C) the Department shall consider the following when prioritizing impaired waters for development of TMDLs:
   1. A change in a water quality standard;
   2. The date the surface water or segment was added to the 303(d) List;
   3. The presence in a surface water or segment of species listed as threatened or endangered under section 4 of the Endangered Species Act;
   4. The complexity of the TMDL;
   5. State, federal, and tribal policies and priorities; and
   6. The efficiencies of coordinating TMDL development with the Department's surface water monitoring program, the watershed monitoring rotation, or with remedial programs.

B. The Department shall prioritize an impaired surface water or segment for TMDL development based on the factors specified in A.R.S. 49-233(C) and subsection (A) as follows:
   1. Consider an impaired surface water or segment a high priority if:
      a. The listed pollutant poses a substantial threat to the health and safety of humans, aquatic life or wildlife based on:
         i. The number and type of designated uses impaired;
         ii. The type and extend of risk from the impairment to human health or aquatic life;
         iii. The pollutant causing the impairment, or
         iv. The severity, magnitude, and duration the surface water quality standard was exceeded;
      b. A new, or modified individual NPDES or AZPDES permit is sought for a new, or modified discharge to the impaired water;
      c. The listed surface water or segment is listed as a unique water in R18-11-112 or is part of an area classified as "wilderness area," wild and scenic rivers," or other federal special protection of the water resource;
      d. The listed surface water or segment contains a species listed as threatened or endangered under the federal Endangered Species Act and the presence of the pollutant in the surface water or segment is likely to jeopardize the listed species;
      e. A delay in conducting the TMDL could jeopardize the Department's ability to gather sufficient credible data necessary to develop the TMDL;
      f. There is significant public interest and support for the development of a TMDL;
      g. The surface water or segment has important recreational and economic significance to the public; or
      h. The pollutant is listed for eight years or more.
   2. Consider an impaired surface water or segment a medium priority if:
      a. The surface water or segment fails to meet more than one designated use;

b. The pollutant exceeds more than one surface water quality standard;
c. Surface water quality standard exceedances are correlated to seasonal conditions caused by natural events, such as storms, weather patterns, or lake turnover;
d. It will take more than two years for proposed actions in the watershed to result in the surface water attaining applicable water quality standards;
e. The type of pollutant and other factors relating to the surface water or segment make the TMDL very complex; or
f. The administrative needs of the Department, including TMDL schedule commitments with EPA, permitting requirements, or basin priorities that require completion of the TMDL.

3. Consider an impaired surface water or segment a low priority if:
a. The Department has formally submitted a proposal to delist the surface water, segment or pollutant to EPA based on R18-11-605. If the Department makes the submission outside the listing process cycle, the change in priority ranking will not be effective until EPA approves the submittal;
b. The Department has modified or formally proposed for modification the designated use or applicable surface water quality standard, which would result in an impaired water no longer being impaired, but the modification has not yet been approved by EPA;
c. The surface water or segment is expected to attain surface water quality standards due to any of the following:
i. Recently instituted treatment levels or best management practices in the drainage area;
ii. Discharges or activities related to the impairment have ceased; or
iii. Actions have been taken and the controls are in place or are firmly scheduled for implementation that are likely to bring the surface water back into compliance;
d. The surface water or segment is ephemeral or intermittent. The Department shall re-prioritize the surface water or segment if the presence of the pollutant in the listed water poses a threat to the health and safety of humans, aquatic life, or wildlife using the water, or the pollutant is contributing to the impairment of a downstream perennial surface water or segment;
e. The pollutant poses a low ecological and human health risk;
f. Insufficient data exists to determine the source of the pollutant load;
g. The uncertainty of timely coordination with national and international entities concerning international waters;
h. Naturally occurring conditions are a major contributor to the impairment; and
i. No documentation or effective analytical tools exist to develop a TMDL for the surface water or segment with reasonable accuracy.

C. The Department will target surface waters with high priority factors (B)(1)(a), (B)(1)(b), (B)(1)(c) and (B)(1)(d) for development of TMDLs within two years following EPA approval of the 303(d) List.

D. The Department may shift priority ranking of a surface water or segment for any of the following reasons:
1. A change in federal, state, or tribal policies or priorities that affect resources to complete a TMDL;
2. Resource efficiencies for coordinating TMDL development with other monitoring activities including the Department's ambient monitoring program that monitors watersheds on a 5-year rotational basis;
3. Resource efficiencies for coordinating TMDL development with Department remedial or compliance programs;
4. New information is obtained that will revise whether the surface water or segment is a high priority based on factors in subsection (B); and
5. Reduction or increase in staff or budget involved in the TMDL development.

E. The Department may complete a TMDL, initiated before [*effective date of rule*] for a surface water or segment that was listed as impaired on the 1998 303(d) list but does not qualify for listing under the criteria in R18-11-605, if:
1. The TMDL investigation has established that the water quality standard is not being met and the allocation of loads is expected to bring the surface water into compliance with standards;
2. The Department estimates that more than 50% of the cost of completing the TMDL has been spent;
3. There is community involvement and interest in completing the TMDL, or
4. The TMDL is included within an EPA-approved state workplan initiated before [*effective date of rule*].