

NOTICES OF PROPOSED RULEMAKING

Unless exempted by A.R.S. § 41-1005, each agency shall begin the rulemaking process by first submitting to the Secretary of State's Office a Notice of Rulemaking Docket Opening followed by a Notice of Proposed Rulemaking that contains the preamble and the full text of the rules. The Secretary of State's Office publishes each Notice in the next available issue of the *Register* according to the schedule of deadlines for *Register* publication. Due to time restraints, the Secretary of State's Office will no longer edit the text of proposed rules. We will continue to make numbering and labeling changes as necessary.

Under the Administrative Procedure Act (A.R.S. § 41-1001 et seq.), an agency must allow at least 30 days to elapse after the publication of the Notice of Proposed Rulemaking in the *Register* before beginning any proceedings for adoption, amendment, or repeal of any rule. A.R.S. §§ 41-1013 and 41-1022.

NOTICE OF PROPOSED RULEMAKING

TITLE 4. PROFESSIONS AND OCCUPATIONS

CHAPTER 23. BOARD OF PHARMACY

PREAMBLE

- 1. Sections Affected**

| | |
|-----------|-------|
| R4-23-402 | Amend |
| R4-23-601 | Amend |
| R4-23-606 | Amend |
- 2. The specific authority for the rulemaking, including both the authorizing statute (general) and the statutes the rules are implementing (specific):**

Authorizing statute: A.R.S. § 32-1904(A)(1)

Implementing statutes: A.R.S. §§ 32-1904(B)(5), 32-1929, 32-1930, 32-1931, 32-1934, and 32-1963
- 3. A list of all previous notices appearing in the Register addressing the proposed rule:**

Notice of Rulemaking Docket Opening: 5 A.A.R. 1319, May 7, 1999
- 4. The name and address of agency personnel with whom persons may communicate regarding the rule:**

| | |
|------------|--|
| Name: | Dean Wright, Compliance Officer |
| Address: | Board of Pharmacy 5060 N. 19th Ave., Suite 101 Phoenix, AZ 85015 |
| Telephone: | (602) 255-5125, ext. 131 |
| Fax: | (602) 255-5740 |
| E-mail: | rxcop@uswest.net |
- 5. An explanation of the rule, including the agency's reasons for initiating the rule:**

During the 5-year rule review in 1997, the Board staff noted that Sections R4-23-601 and R4-23-606 should be revised to bring the terminology into conformity with state statute. The Precursor Chemical bill, H.B. 2448, passed in the 1999 legislative session makes additional changes to these two Sections necessary. The Board staff identified a small change to Section R4-23-402 that would allow a pharmacist to use professional judgement in determining whether or not to dispense a prescription. The proposed rule includes necessary style, format, and grammar changes to provide a clear, concise, and understandable document.

The proposed rule amends Section R4-23-402 by adding language allowing use of a pharmacist's professional judgement in interpreting a prescription order.

Arizona Administrative Register
Notices of Proposed Rulemaking

Section R4-23-601 is amended to remove the statement in subsection (B) that out-of-state firms shipping drugs into Arizona do not need a permit issued by the Arizona Board. The 1999 Legislature passed H.B. 2448 (Precursor Chemical bill) requiring the Board to issue permits to anyone (resident or nonresident) who distributes precursor chemicals such as ephedrine, pseudoephedrine, and phenylpropanolamine. These chemicals are active ingredients in common over-the-counter products sold for treatment of flu, colds, and weight loss. The proposed rule further amends Section R4-23-601 by expanding and clarifying the recordkeeping requirements of persons manufacturing, receiving, selling, or delivering any drug in Arizona. The proposed rule deletes the term “proprietary or patent medicine” and replaces it with the current statutory term, “nonprescription drug”.

The language in Section R4-23-606 receives numerous changes in style, format, punctuation, and grammar to comply with the statutory requirements of the Administrative Procedure Act and rules of the Secretary of State and Governor’s Regulatory Review Council. Subsection (F) is amended by replacing the term “patent or proprietary medicine” with the term “nonprescription drug”. Subsection (I) is amended to better clarify and update the requirements when there is a change of officers in a corporation. The requirements for closing a pharmacy in subsection (L) are amended to better clarify retention times for records, types of records, and proper disposition of records and drugs.

The Board believes that making these rules will benefit the public health and safety by establishing clear standards for pharmacists, pharmacy interns, permits, and the distribution of drugs in Arizona.

6. A reference to any study that the agency proposes to rely 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:

Not applicable

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:

The rule will have a direct economic impact on nonresident firms that ship drugs into Arizona because the rule no longer exempts these firms from registration. These firms will now fall under existing statutes and rules requiring a permit for drug distribution. The permit fees for wholesale drug distribution in Arizona are \$1,000 biennially for a full-service drug wholesale permit and \$500 biennially for a nonprescription drug wholesale permit. House Bill 2448 requires that the Board issue a permit to any person who ships a precursor chemical (nonprescription drug) into the state. If taken literally, this bill could include nonresident pharmacies as well as nonresident drug manufacturers and wholesalers. At this time, the Board is interpreting the bill to include nonresident drug manufacturers and wholesalers who ship a precursor chemical into Arizona. However, the amending of this rule eliminates the exemption from registration for nonresident firms shipping prescription-only or nonprescription drugs into Arizona. This means the Board must issue a permit to any firm shipping any drug into Arizona. The cost to the Board to permit these nonresident firms will be substantial. Fortunately, House Bill 2448 included an appropriation to cover some of the Board costs. These costs include identifying, contacting, and educating nonresident firms regarding the new requirements, issuing and renewing permits for affected nonresident firms, investigation of complaints against nonresident firms, and enforcement of statutes and rules. Initially, the Board will target nonresident firms that ship precursor chemicals into Arizona and later expand to include all drugs and nonresident pharmacies. The cost to the Board of Pharmacy and the Secretary of State for writing and publishing the rule will be minimal. The rule does not impose any additional costs on Arizona small business or consumers.

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: Dean Wright, Compliance Officer
Address: Board of Pharmacy
5060 N. 19th Ave., Suite 101
Phoenix, AZ 85015
Telephone: (602) 255-5125, ext. 131
Fax: (602) 255-5740
E-mail: rxcop@uswest.net

Arizona Administrative Register
Notices of Proposed Rulemaking

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:

Comments may be written or presented orally. Written comments must be received by 5:00 p.m., Monday, June 5, 2000. An oral proceeding is scheduled for:

Date: June 5, 2000
Time: 10:00 a.m.
Location: 5060 N. 19th Ave., Suite 101
Phoenix, AZ 85015

A person may request information about the oral proceeding by contacting the person listed above.

11. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:

Not applicable

12. Incorporations by reference and their location in the rules:

None

13. The full text of the rules follows:

TITLE 4. PROFESSIONS AND OCCUPATIONS

CHAPTER 23. BOARD OF PHARMACY

ARTICLE 4. PROFESSIONAL PRACTICES

Section

R4-23-402. Pharmacist, Graduate Intern, and Pharmacy Intern

ARTICLE 6. PERMITS AND DISTRIBUTION OF DRUGS

Section

R4-23-601. General provisions

R4-23-606. Pharmacy Permit, Community, Hospital, and Limited Service

ARTICLE 4. PROFESSIONAL PRACTICES

R4-23-402. Pharmacist, Graduate Intern, and Pharmacy Intern

- A.** A pharmacist or a graduate intern or pharmacy intern under the supervision of a pharmacist shall perform the following professional practices in dispensing a prescription medication from a prescription order:
1. Receive, reduce to written form, and manually initial oral prescription orders;
 2. Obtain and record the name of an individual who communicates an oral prescription order;
 3. Obtain, or assume responsibility to obtain, from the patient, patient's agent, or medical practitioner and record, or assume responsibility to record, in the patient's profile, the following information:
 - a. Name, address, telephone number, date of birth (or age), and gender;
 - b. Individual history including known diseases and medical conditions, known drug allergies or drug reactions, and if available a comprehensive list of medications currently taken and medical devices currently used;
 4. Record, or assume responsibility to record, in the patient's profile, a pharmacist's, graduate intern's, or pharmacy intern's comments relevant to the individual's drug therapy, including other information specific to the patient or drug;
 5. Verify the legality and pharmaceutical feasibility of dispensing a drug based upon:
 - a. A patient's allergies,
 - b. Incompatibilities with a patient's currently taken medications,
 - c. A patient's use of unusual quantities of dangerous drugs or narcotics,
 - d. A medical practitioner's signature, and
 - e. The frequency of refills;
 6. Verify that a dosage is within proper limits;
 7. Interpret the prescription order, which includes exercising professional judgement in determining whether or not to dispense a particular prescription;
 8. Compound, mix, combine, or otherwise prepare and package prescription medication needed to dispense individual prescription orders;

Arizona Administrative Register
Notices of Proposed Rulemaking

9. Prepackage or supervise the prepackaging of drugs by supportive personnel under R4-23-403. For drugs prepackaged by supportive personnel, a pharmacist shall verify the drug to be prepackaged, decide the wording and requirements placed on the label, and check the completed prepackaging procedure and product;
 10. Check a prescription label to ensure that it communicates the prescriber's directions precisely;
 11. Make a final check on the completed prescription medication and manually initial the finished label;
 12. Record, or assume responsibility to record a prescription serial number and date dispensed on the original prescription order.
 13. Obtain or assume responsibility to obtain permission to refill prescription orders and record or assume responsibility to record, on the prescription order, the date dispensed, quantity dispensed, and name of medical practitioner or medical practitioner's agent who communicates permission to refill the prescription order;
 14. Reduce to written or printed form or assume responsibility to reduce to written or printed form a new prescription order received by facsimile, computer modem, or other means of communication;
 15. Verify and manually initial a new prescription order received by facsimile, computer modem, or other means of communication;
 16. Record on the original prescription order the name or initials of the pharmacist, graduate intern, or pharmacy intern who originally dispenses the order; and
 17. Record on the original prescription order the name or initials of the pharmacist, graduate intern, or pharmacy intern who dispenses each refill.
- B.** Only a pharmacist, graduate intern, or pharmacy intern shall provide oral consultation about a prescription medication to a patient or patient's agent in all outpatient settings, including a patient discharged from a hospital, whenever the following occurs:
1. The prescription medication has not been previously dispensed to the patient;
 2. A new prescription number is assigned to a previously dispensed prescription medication;
 3. The prescription medication has not been previously dispensed to the patient in the same strength or dosage form or with the same directions;
 4. The pharmacist, through the exercise of professional judgment, determines that oral consultation is warranted; or
 5. The patient or patient's agent requests oral consultation.
- C.** Oral consultation shall include:
1. The name, strength, and dosage form of a prescription medication or prescription-only device;
 2. The directions for use;
 3. The route of administration; and
 4. Special instructions, precautions, or storage requirements.
- D.** The pharmacist, through the exercise of professional judgment, may provide oral consultation that includes:
1. Common severe adverse effects, interactions, or therapeutic contraindications, and the action required if they occur;
 2. Techniques of self-monitoring drug therapy;
 3. The duration of the drug therapy;
 4. Prescription refill information; and
 5. Action to be taken if a dose is missed.
- E.** Nothing in subsection (B) shall be construed as requiring a pharmacist, graduate intern, or pharmacy intern to provide oral consultation if a patient or patient's agent refuses the consultation. Only a pharmacist, graduate intern, or pharmacy intern shall accept a refusal for consultation. A pharmacist, graduate intern, or pharmacy intern shall document, or assume responsibility to document, a refusal for consultation on the original prescription order or document by alternative methods approved by the Board or its designee.
- F.** When a prescription is delivered to the patient or patient's agent outside the immediate area of a pharmacy and a pharmacist is not present, the prescription shall be accompanied by written or printed patient medication information that, in addition to the requirements in subsection (C), includes:
1. Approved use for the prescription medication;
 2. Possible adverse reactions;
 3. Drug-drug, food-drug, or disease-drug interactions;
 4. Missed dose information; and
 5. Telephone number of the dispensing pharmacy.
- G.** A prescription medication or prescription-only device, delivered to a patient at a location where a licensed health care professional is responsible for administering a prescription medication to a patient, is exempt from the requirement of subsection (C).
- H.** A pharmacist, graduate intern, or pharmacy intern shall wear a badge indicating name and title while on duty.
- I.** Nothing in this Section shall prevent hospital pharmacists from accepting prescription orders in accordance with rules pertaining specifically to hospital pharmacies.

Arizona Administrative Register
Notices of Proposed Rulemaking

ARTICLE 6. PERMITS AND DISTRIBUTION OF DRUGS

R4-23-601. General provisions

- A.** Permit required to sell drugs: ~~No drugs may be sold~~ To sell a drug in Arizona or to sell a drug from outside Arizona and ship the drug into Arizona, except by a person having shall have a current permit from issued by the Board; except medical practitioners may administer drugs for the emergency needs of their patients.
- B.** ~~Out of state firms: Out of state firms shall not be required to have a permit if licensed in the state from which the drugs are shipped, if drugs are not warehoused in Arizona, and if there is no district office in Arizona.~~
- BC.** Permit fee: Permits are issued biennially on an odd- and even-year expiration based on the permit number assigned. The fee, specified in R4-23-205, is not refunded under any circumstances except for the Board's failure to comply with its permit timeframes established in R4-23-602.
- C.** Record of receipt and disposal of drugs:
1. Every person manufacturing any drug, including repackaging or relabeling, shall prepare and retain the manufacturing, repackaging, or relabeling date for each drug.
 2. Every person selling, delivering, or disposing of any drug shall record and retain for not less than 3 years the following information:
 - a. The name, strength, dosage form, and quantity of each drug received, sold, delivered, or disposed;
 - b. The name, address, and license or permit number, if applicable, of the person from whom each drug is received;
 - c. The name, address, and license or permit number, if applicable, of the person to whom each drug is sold or delivered or who disposes of each drug; and
 - d. The date of each transaction.
 3. The record required in this subsection shall be available for inspection by the Board or its compliance officers during regular business hours.
 4. In instances where the record required in the subsection is stored in a centralized-recordkeeping system and not immediately available for inspection, a permittee, manager, or pharmacist-in-charge shall provide such record within 4 working days of receiving a request from the Board or its compliance officers.
- D.** Fire- or water-damaged drugs or devices: No person shall expose, sell or offer to sell any drug or device ~~which has been that is~~ damaged by water, fire, or from human or animal consumption or use.
- E.** Sale of drugs, including nonprescription drugs proprietary or patent medicines by mechanical devices or vending machines prohibited: The use of any mechanical device or vending machine in connection with the sale of any drug, including a nonprescription drug proprietary or patent medicine, is unlawful.

R4-23-606. Pharmacy Permit, Community, Hospital, and Limited Service

- A.** Pharmacy permit in general: No person may operate a pharmacy before the Board has approved the application, inspected the premises, and issued a permit.
- B.** Qualifications for applicants for pharmacy permit: Any person, including firm or corporation, applying for a pharmacy permit shall submit to the Board satisfactory proof that the owner, officers, and manager ~~has have~~ not been convicted or are not then under any charges of a felony, an offense involving moral turpitude, or ~~of the violating federal or state laws~~ pertaining to drugs, devices, or and poisons. A non-pharmacist owner or manager shall be requested to appear before the Board with the his pharmacist-in-charge before approval of the permit. Fingerprints shall be furnished at request of Board.
- C.** Pharmacy permit not issued under certain conditions: ~~A pharmacy permit~~ The Board shall not be issued whereby issue a pharmacy permit to an applicant if a medical practitioner may receive compensation for the medical practitioner's his prescription orders whether directly or indirectly. This shall not include instances where sporadic prescription orders of a medical practitioner may be filled.
- D.** Lease ~~may be~~ required: A pharmacy permittee or an applicant for a pharmacy permit ~~may be required to shall~~ reveal their lease to the Board upon request to prove that a medical practitioner is not receiving more than the prevailing rent which ~~might be is~~ considered a rebate.
- E.** Approval of plans: ~~The pharmacy area, waiting area, storerooms, restrooms and all partitions, doors, windows, and fixtures pertaining thereto shall be indicated on floor plans showing appropriate elevations and shall be submitted to the Board at the time the application for a new pharmacy is filed or prior to remodeling. At the time an application for a new pharmacy or the remodeling or relocating of an existing pharmacy is filed, a pharmacy permit applicant or pharmacy permittee shall submit to the Board construction plans that indicate the pharmacy area, waiting area, storerooms, restrooms and all related partitions, doors, windows, and fixtures, including appropriate elevations and dimensions. Such plans shall be submitted A pharmacy permit applicant or pharmacy permittee shall submit a completed application and construction plans before prior to proceeding with new construction. Before a new pharmacy permit is shall be issued or a remodel or relocation occurs, the submitted plans submitted must shall meet the approval of the Board or its designee.~~
- F.** Nonprescription drug Patent or proprietary permit required outside pharmacy area: If any nonprescription drugs are sold outside the pharmacy area when the pharmacist is not in attendance, a patent or proprietary medicine permit or a general dealer's current nonprescription drug permit shall be issued by the Board is required.

Arizona Administrative Register
Notices of Proposed Rulemaking

- G.** New pharmacies: ~~Whenever it is desired~~ To open a new pharmacy, a person shall ~~it shall be necessary for the ownership to~~ apply in advance to the Board on a form ~~prescribed and~~ furnished by the Board under the procedures in R4-23-602. The application shall be accompanied by construction plans and a biennial fee which shall be collected under in accordance ~~with~~ the provisions of A.R.S. § 32-1931. Renewals shall ~~will~~ not be granted for a period less than 24 months. Fees are not refunded under any circumstances except for the Board's failure to comply with its permit timeframes established in R4-23-602.
- H.** Change of ownership: ~~Whenever there are~~ For any changes in ownership in a pharmacy, except for changes due to death of an individual owner or of a partner, as specified in subsection (J) ~~below, it shall be necessary for the new ownership owner shall to apply before in advance of the change using the same form and biennial fee as described in subsection (G) for new pharmacies and under the procedures in R4-23-602. on a form prescribed and furnished by the Board, the same as for a new pharmacy, accompanied by a biennial fee as required by subsection (G) of this Section for a new pharmacy. It is shall be considered a change of ownership if there is a change of stock ownership involving 30% or more of the voting stock of a corporation, except in an existing and continuing corporation which is actively traded on any securities market or in any over-the-counter market. Fees are not refunded under any circumstance except for the Board's failure to comply with its permit timeframes established in R4-23-602.~~
- I.** Change of officers in a corporation: When a corporation, holding a pharmacy permit, changes officers, the corporation shall notify the Board of the change. The notice shall list the new officers by name and title and include their qualifications as required in subsection (B). The Board shall be notified whenever there is a change of officers in a corporation owning a pharmacy permit, listing the new officers, and their home addresses, and additional information if required.
- J.** Change due to death of owner or partner: If there is a death of an individual owner or ~~of a partner~~ and it is desired to continue the operation of the pharmacy, the estate or heirs or a partnership consisting of the estate or heirs of the deceased partner and the remaining partners shall ~~must~~ file an application upon a form ~~prescribed and~~ furnished by the Board, for which there shall be no fee, indicating the changes which that have taken place and supplying ~~any other requested information~~ their qualifications as required in subsection (B).
- K.** Change of location or remodel of an existing location: ~~Whenever a pharmacy is to be moved~~ permittee plans to move a pharmacy to a new location or remodel an existing pharmacy, the pharmacy permittee shall ~~it shall be necessary to apply on a form prescribed and furnished by the Board, indicating the new location or remodeling and submitting plans for approval similarly to application for a new pharmacy, except there shall be no fee. The new premises shall be inspected pass a final inspection by a Board compliance officer before beginning operations.~~
- L.** Procedure for closing a pharmacy:
1. A pharmacy permittee or pharmacist-in-charge shall provide written notice to the Board office and the Drug Enforcement Administration (D.E.A.) at least 10 days before prior to closing a pharmacy. ~~a written notice shall be sent to the Board office and to the Drug Enforcement Administration (D.E.A.):~~ The notice shall contain, as a minimum, the following information:
 - a. Name, address, pharmacy permit number, and D.E.A. registration number of the pharmacy discontinuing business.
 - b. Name, address, pharmacy permit number (if applicable), and D.E.A. registration number of the licensee, permittee, or registrant to whom the prescription-only drugs and controlled substances will be transferred.
 - c. The name and address of the location at which the records of the purchase and disbursement of controlled substances and prescription-only drugs will be kept. These records ~~must~~ shall be ~~retained~~ kept for a minimum of 3 ~~three~~ years from the date of the last entry.
 - d. The name and address of the location at which the prescription files and ; patient profiles and/or family records will be kept. These records shall be kept for a minimum of 3 years from the date of last refill.
 - e. The proposed date of discontinuing business.
 2. The pharmacy permittee shall ensure that all drug signs and symbols ~~must be~~ are removed from both the inside and outside of the premises.
 3. The pharmacy permittee or pharmacist-in-charge shall ensure that all state permits and certificates of registration ~~shall be~~ are returned to the Board office; and D.E.A. registration certificates and unused D.E.A. Schedule II order forms ~~should be~~ are returned to the D.E.A. Regional Office in Phoenix.
 4. ~~No one except~~ The pharmacist-in-charge of the pharmacy discontinuing business shall ensure that:
 - a. Only a pharmacist has ~~have~~ access to the prescription-only drugs and controlled substances until they are transferred to the new owner; ;
 - b. When the pharmacy has been closed and the pharmacy permit has been surrendered, the All prescription-only drugs and controlled substances ~~must be~~ are removed from the premises on or before the date the pharmacy is closed; and
 - 5c. Drugs All controlled substances ~~shall be~~ are transferred in accordance with the following procedures:
 - a. Take an inventory of all controlled drugs substances being that are transferred using the procedures in R4-23-1003 shall be taken as of the close of business.

Arizona Administrative Register
Notices of Proposed Rulemaking

- ii. Include a copy shall be used to adjust the purchaser's inventory. of the inventory with the controlled substances that are transferred.
 - iii. Keep the original copy of the inventory with the closed pharmacy's records of drug purchase and disbursement. The original inventory and copy shall be kept for a minimum of 3 years from the date the business is closed.
 - biv. The inventory of all Schedule II drugs controlled substances shall be an accurate count. All other controlled drugs substances may be estimated unless container quantities exceed 1,000 each, in which case an accurate count shall be made. Use a D.E.A. form 222 to transfer any Schedule II controlled substances must be provided by the purchaser for Schedule II drugs.
 - e. The inventory shall list the name, strength, dosage form and quantity of all controlled drugs transferred.
 - dy. Drugs Transfer controlled substances that need destruction to be destroyed shall be transferred in the same manner as all other drugs controlled substances. The new owner shall contact a D.E.A. registered reverse distributor for proper destruction of outdated or damaged controlled substances. If there are controlled substances the reverse distributor cannot take, the new owner shall then contact the Board office requesting an inspection for the purpose of drug destruction.
 - e. A copy of the inventory shall be included by the Board in the records of both the pharmacy discontinuing business and the new owner.
65. Statistical information pertaining to prescriptions, drug records, and other information pertaining to the pharmacy discontinuing business shall be furnished to the Board upon request by the individuals referred to in R4-23-606(L)(1)(e) and (d). A person described in R4-23-606(L)(1)(c) and (d) shall furnish to the Board upon request a closed pharmacy's records of the purchase and disbursement of controlled substances and prescription-only drugs, prescription files, and patient profiles.

NOTICE OF PROPOSED RULEMAKING

TITLE 9. HEALTH SERVICES

CHAPTER 5. DEPARTMENT OF HEALTH SERVICES

CHILD CARE FACILITIES

PREAMBLE

- 1. Sections Affected** **Rulemaking Action**
R9-5-516 Amend
- 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. §§ 36,136(F), 36-883, and 36-883.04
Implementing statute: A.R.S. § 36-883(A)
- 3. A list of all previous notices appearing in the Register addressing the proposed rule**
Notice of Rulemaking Docket Opening: 6 A.A.R. 1087, March 24, 2000
- 4. The name and address of agency personnel with whom persons may communicate regarding the rulemaking:**
Name: Kathleen Phillips, Rules Administrator
Address: Department of Health Services
1740 W. Adams, Suite 102
Phoenix, Arizona 85007
Telephone: (602) 542-1264
Fax: (602) 542-1290
or
Name: Lourdes Ochoa, Program Manager
Assurance and Licensure Services
Office of Child Care Licensure
Address: 1647 E. Morten, Suite 230

Arizona Administrative Register
Notices of Proposed Rulemaking

Phoenix, Arizona 85020

Telephone: (602) 674-4220

Fax: (602) 861-0674

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

More and more children are being diagnosed with life-threatening allergies or have a history of severe allergic reactions. If a child with a severe allergy to peanuts is exposed to peanuts, the child may go in to anaphylactic shock which, if not immediately treated, can close the child's airways. A child in anaphylactic shock needs an immediate injection of epinephrine or a similar medication to prevent loss of consciousness, coma, and death. Although R9-5-516 allows a health care provider who is a state board licensed individual to give an injection to an enrolled child at a child care facility, A.R.S. §§ 32-1421(A)(1) and 32-1631(2) allow an unlicensed individual to provide medical assistance in an emergency. The Department plans to amend R9-5-516 to clarify that in an emergency, an unlicensed individual may give an injection to an enrolled child at a child care facility.

6. 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

7. Reference to any study that the agency proposes to rely on and its evaluation of or justification for proposed 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:

Not applicable

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

The Department will incur minimal costs promulgating the rule amendment. The rule amendment will not have an economic impact on the public or the regulated community but will clarify that in an emergency A.R.S. §§ 32-1421(A)(1) and 32-1631(2) allow an unlicensed individual to give an injection to an enrolled child in a child care facility.

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: Kathleen Phillips, Rules Administrator

Address: Department of Health Services
1740 W. Adams, Suite 410
Phoenix, Arizona 85007

Telephone: (602) 542-1264

Fax: (602) 542-1289

or

Name: Lourdes Ochoa, Program Manager
Assurance and Licensure Services
Office of Child Care Licensure

Address: 1647 E. Morten, Suite 230
Phoenix, Arizona 85020

Telephone: (602) 674-4220

Fax: (602) 861-0674

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:

The Department has not scheduled any oral proceedings on this rulemaking action. The Department will schedule oral proceedings if a person submits a written request for oral proceedings to an individual listed in paragraph 4 before 5:00 p.m., June 2, 2000 the date scheduled for the close of record.

11. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:

Not applicable

12. Incorporations by reference and their locations in the rules:

Not applicable

13. The full text of the rules follows:

TITLE 9. HEALTH SERVICES

**CHAPTER 5. DEPARTMENT OF HEALTH SERVICES
CHILD CARE FACILITIES**

ARTICLE 5. FACILITY PROGRAM AND EQUIPMENT

Section
R9-5-516. Medications

ARTICLE 5. FACILITY PROGRAM AND EQUIPMENT

R9-5-516. Medications

- A.** No change.
- B.** A licensee shall allow a child to receive an injection only after obtaining written authorization from a physician. ~~Only those health care providers authorized by state law to give injections are permitted to give injections to an enrolled child.~~ A licensee shall maintain the physician's written injection authorization on facility premises for 12 months from the date of the authorization.
- C.** A health care provider authorized by state law to give injections is permitted to give an injection to an enrolled child. In an emergency and according to A.R.S. §§ 32-1421(A)(1) and 32-1631(2), an individual may give an injection to an enrolled child.
- ~~**D.**~~ No change.
- ~~**E.**~~ No change.
- ~~**F.**~~ No change.
- ~~**G.**~~ No change.

NOTICE OF PROPOSED RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

**CHAPTER 5. DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL REVIEWS AND CERTIFICATION**

PREAMBLE

- | | |
|------------------------------------|---------------------------------|
| 1. <u>Sections Affected</u> | <u>Rulemaking Action</u> |
| Article 3 | New Article |
| R18-5-301 | New Section |
| R18-5-302 | New Section |
| R18-5-303 | 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. §§ 41-1003 and 49-104
Implementing statute: A.R.S. § 49-203
- 3. List all previous notices appearing in Register addressing the rules:**
Notice of Rulemaking Docket Opening: 6 A.A.R. 966, March 10, 2000
- 4. The name and address of agency personnel with whom persons may communicate regarding the rule:**
Primary Contact:
Name: Deborah K. Blacik, Rules Specialist, or Martha Seaman, Rule Development Manager
Address: Arizona Department of Environmental Quality

Arizona Administrative Register
Notices of Proposed Rulemaking

Rule Development Section, M0836A-829
3033 North Central Avenue
Phoenix, AZ 85012-2809

Telephone: (602) 207-2223 or (602) 207-2248, or (800) 234-5677, ext. 2223 (Arizona only)

TTD Number: (602) 207-4829

Fax Number: (602) 207-2251

Secondary Contact:

Name: Charles Graf, Water Quality Division Deputy Director

Address: Arizona Department of Environmental Quality
Water Quality Division, M0341B
3033 North Central Avenue
Phoenix, AZ 85012-2809

Telephone: (602) 207-4661 or (800) 234-5677, ext. 4661 (Arizona only)

Fax Number: (602) 207-4528

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

The Department is proposing this water quality management planning rule in a new Article as a component of its comprehensive unified water quality permitting effort. The goal of this effort is to eliminate duplicate permitting processes, streamline remaining processes and provide improved water quality protection. The Department intends this rule to become effective on January 1, 2001, the same day that applicable provisions of Laws 1999, Chapter 26 take effect. This Chapter provides the basis for the Department to undertake this unified water quality permitting approach.

This proposed rulemaking is consistent with the requirements of Section 208 of the Federal Water Pollution Control Act (P.L. 92-500), as amended by the Clean Water Act of 1987 (P.L. 100-4). Any change affecting the licensing timeframes for these plans will be addressed in the next amendment to the Licensing Timeframes rules.

6. A reference to any study that the agency proposes to rely 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:

Not applicable

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:

A. Identification of Proposed Rule:

Title 18, Chapter 5, Article 3, Water Quality Management Planning

B. Background

Section 208 of the Federal Water Pollution Control Act (33 U.S.C.A. § 1288) mandates that regional water quality plans be developed, known as Certified Water Quality Management Plans (often referred to as 208 plans). The purpose for this type of planning is to encourage and facilitate area-wide wastewater treatment plans. These water quality management plans include a variety of vital information, including anticipated municipal and industrial waste treatment needs, financial resource needs, land use requirements, construction priorities, regulatory program requirements, nonpoint sources of pollution, and groundwater and surface water protection plans.

The Department is statutorily mandated to incorporate the 208 planning process into its water quality permitting procedures. Essentially, several Councils of Governments (COGs), each representing a state planning region, serve as the planning agencies in the state designated to coordinate regional water quality planning. The important point is that the Department only issues, or modifies, a permit for a sewage treatment facility after making a determination that the operation of the facility will be consistent with the regional 208 Plan.

The Department funds positions in its Water Quality Division to ensure that these regional plans are implemented and that all facilities being permitted will operate in a manner consistent with these plans. Compliance with 208 planning requirements is important because it ensures the Department continued federal funding through the Clean Water

Arizona Administrative Register
Notices of Proposed Rulemaking

Act and therefore continued benefits from comprehensive state and regional environmental planning and management. In addition, compliance with 208 planning requirements ensures continuation of grants and loans in Arizona through the U.S.D.A. Rural Development program and the Water Infrastructure Finance Authority.

C. Preliminary Analysis

This rule is expected to primarily impact owners and operators of wastewater treatment facilities, both public and private. Owners and operators could include such entities as: counties, municipalities, sanitary improvement districts, the federal government and private businesses. Others persons involved with wastewater treatment facilities could also be affected, including engineering consultants, developers, construction contractors, ADEQ, and the general public.

ADEQ anticipates this rule will provide cost-saving benefits to facility owners and operators because: (1) The 208 planning requirements will be clearly stated in a single rule established for that purpose, (2) Submittal of duplicative information to the Department by applicants will be minimized, and (3) The requirements of this rule will be tightly integrated with the requirements of the Aquifer Protection Permit rules recently proposed as part of the Department's unified water quality permitting initiative, including early notification to applicants of the 208 plan conformance requirements. Additionally, this rule is not expected to impose additional costs on the rest of the regulated community, small businesses, political subdivisions, or members of the public in Arizona. For some businesses, such as developers, ADEQ expects that this rule will provide cost savings due to more timely permit issuance. Other businesses, such as engineering consultants, might experience a slight reduction in revenues due to a more efficient permitting process, which in turn, translates to a cost-savings for facility owners and operators. ADEQ administrative costs should decrease slightly due to tighter integration of the 208 planning and the aquifer protection permitting processes. ADEQ expects that this rule will not negatively impact employment, revenues, payroll expenditures, or state revenues. Importantly, the general public will continue to experience benefits from the regional water quality planning process in Arizona.

D. Rule Impact Reduction on Small Businesses

ADEQ is sensitive to the concerns of small businesses and the impact this rulemaking could have upon them. State law requires agencies to reduce the impact of a rule on small businesses by using certain methods when they are legal and feasible in meeting the statutory objectives for the rulemaking. ADEQ considered each of the methods prescribed in A.R.S. §§ 41-1035 and 41-1055(B)(5)(c) for reducing the impact on small businesses.

Methods that may be used include the following: (1) Exempt them from any or all rule requirements, (2) Establish performance standards which would replace any design or operational standards, or (3) Institute reduced compliance or reporting requirements. An agency may accomplish the third method by establishing less stringent requirements, consolidating or simplifying them, or setting less stringent schedules or deadlines.

Other than simplifying the process and eliminating some of the associated problems, ADEQ has not incorporated other specific methods to reduce the impact on small businesses in this rule. However, the other rules being proposed by the Department as part of this four rule unified water quality permit initiative significantly reduce impacts to small businesses.

F. Less Intrusive or Costly Methods

ADEQ could not find any alternative methods that would be less intrusive or less costly to implementing rule objectives.

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: David Lillie
Address: Arizona Department of Environmental Quality
3033 N. Central M0836A, 844
Phoenix, AZ 85012-2809
Telephone: (602) 207-4436 or (800) 234-5677, ext. 4436 (Arizona only)
TTD Number: (602) 207-4829
Fax Number: (602) 207-2251

Arizona Administrative Register
Notices of Proposed Rulemaking

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: Wednesday, June 7, 2000
Time: 4:00 p.m.
Location: Arizona Department of Environmental Quality
Room 1706,
3033 N. Central, Phoenix, AZ 85012

(Please call 602-207-4795 for special accommodations pursuant to the Americans with Disabilities Act.)

Nature: Public hearings on the proposed rules, with opportunity for formal comments on the record.

The close of the written comment period is at 5:00 p.m., June 9, 2000.

Submit comments to:

Arizona Department of Environmental Quality
Rule Development Section, Deborah K. Blacik, M0836A-829
3033 North Central Avenue
Phoenix, AZ 85012-2809

11. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules.

Not applicable

12. Incorporations by reference and their location in the rules:

Not applicable

13. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY

**CHAPTER 5. DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL REVIEWS AND CERTIFICATION**

ARTICLE 3. ~~RESERVED~~ WATER QUALITY MANAGEMENT PLANNING

Section

R18-5-301. Definitions
R18-5-302. Plan Approval
R18-5-303. Determination of Conformance

ARTICLE 3. ~~RESERVED~~ WATER QUALITY MANAGEMENT PLANNING

R18-5-301. Definitions

In this Article, unless otherwise specified, the following terms mean:

“Certified areawide water quality management plan” means a plan prepared by the designated Water Quality Planning Agency under Section 208 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1987 (P.L. 100-4), certified by the Governor or the Governor’s designee and approved by the United States Environmental Protection Agency.

“Designated management agency” means those entities designated in a certified areawide water quality management plan to manage sewage treatment facilities and sewage collection systems in their respective area.

“Designated water quality planning agency” means the single representative organization designated by the Governor under Section 208 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1987 (P.L. 100-4) as capable of developing effective areawide sewage treatment management plans for the respective area. The State acts as the planning agency for those non-tribal portions of the State for which there is no designated water quality planning agency.

“Facility plan” means the plans, specifications and estimates for a proposed sewage treatment facility prepared under Sections 201 and 203 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1987 (P.L. 100-4), and submitted to the Department by and for a designated management agency.

Arizona Administrative Register
Notices of Proposed Rulemaking

“General plan” means a municipal statement of land development policies, which may include maps, charts, graphs, and text which list objectives, principles, and standards for local growth and development enacted under State law.

“Service area” means the geographic region specified for a designated management agency by the applicable certified areawide water quality management plan, facility plan, or general plan.

“Sewage” means untreated wastes from toilets, baths, sinks, lavatories, laundries, and other plumbing fixtures in places of human habitation, employment, or recreation.

“Sewage treatment facility” means a plant or system for sewage treatment and disposal, except an onsite wastewater treatment facility, that consists of treatment works, disposal works, and appurtenant pipelines, conduits, pumping stations, and related subsystems and devices.

“Sewer collection system” means the system of pipelines, conduits, manholes, pumping stations, force mains, and all other structures, devices and appurtenances that collect, contain, and conduct sewage from its sources to the point of entry into a sewage treatment facility.

“State water quality management plan” means the body of certified areawide water quality management plans and amendments thereto, water quality rules, final Total Maximum Daily Loads and plans for water quality priorities determined by the Department, intergovernmental agreements between the Department and designated water quality planning agencies and designated management agencies, and active management area plans adopted by the Department of Water Resources.

R18-5-302. Plan Approval

A designated water quality planning agency shall submit a proposed certified areawide water quality management plan or plan amendment to the Director for review and approval. Upon approval, the Governor or the Governor’s designee shall certify that the plan or plan amendment has been incorporated into and is consistent with the state water quality management plan and shall submit the plan or plan amendment to the United States Environmental Protection Agency for approval.

R18-5-303. Determination of Conformance

- A.** All sewage treatment facilities including expansions of an existing sewage treatment facility shall conform with the certified areawide water quality management plan or other alternative allowed in this Section before construction. The Department shall make the determination of conformance based on the requirements specified in subsection (B) or (C), as applicable.
- B.** A sewage treatment facility including an expansion of an existing sewage treatment facility shall conform with the certified areawide water quality management plan and facility plan that prescribe a configuration for sewage treatment and sewer collection system management by a designated management agency within the service area. If no facility plan is applicable, the Department shall rely on the certified areawide water quality management plan for the determination of conformance.
- C.** If there is no certified areawide water quality management plan that prescribes a configuration for sewage treatment and sewer collection system management by a designated management agency within the service area, the Department shall make the determination of conformance on the basis of conformance with the general plans and after conferring with the designated water quality planning agency for the area and any responsible and affected governmental units.

NOTICE OF PROPOSED RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 9. DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER POLLUTION CONTROL

PREAMBLE

1. Sections Affected

Article 6
R18-9-601
R18-9-602
R18-9-603
R18-9-604
Article 7
R18-9-701
R18-9-702

Rulemaking Action

New Article
New Section
New Section
New Section
New Section
Amend
Amend
Repeal

Arizona Administrative Register
Notices of Proposed Rulemaking

| | |
|------------|--------------|
| R18-9-702 | New Section |
| R18-9-703 | Repeal |
| R18-9-703 | New Section |
| R18-9-704 | Repeal |
| R18-9-704 | New Section |
| R18-9-705 | Repeal |
| R18-9-705 | New Section |
| R18-9-706 | Repeal |
| R18-9-706 | New Section |
| R18-9-707 | Repeal |
| R18-9-707 | New Section |
| R18-9-708 | New Section |
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| R18-9-711 | New Section |
| R18-9-712 | New Section |
| R18-9-713 | New Section |
| R18-9-714 | New Section |
| R18-9-715 | New Section |
| R18-9-716 | New Section |
| R18-9-717 | New Section |
| R18-9-718 | New Section |
| R18-9-719 | New Section |
| R18-9-720 | New Section |
| R18-9-721 | New Section |
| R18-9-722 | New Section |
| R18-9-723 | New Section |
| Appendix A | New Appendix |

2. The specific authority for the rulemaking, including both the authorizing statute (general) and the statutes the rules are implementing (specific):

Authorizing statute: A.R.S. § 49-203(A)(6)

3. A list of all previous notices appearing in the Register addressing the proposed rule:

Notice of Rulemaking Docket Opening: 3 A.A.R. 2178, August 15, 1997

Notice of Rulemaking Docket Opening: 5 A.A.R. 2112, July 2, 1999

Notice of Rulemaking Docket Opening: 6 A.A.R. 1674, May 5, 2000

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

Name: Michele Robertson
Address: Arizona Department of Environmental Quality
3033 North Central Avenue
Phoenix, Arizona 85012
Telephone: (602) 207-4827

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

In July, 1997 the Department formed a Unified Water Quality Permit Rewrite Steering Committee composed of 22 members representing several stakeholder organizations that included private businesses, large and small municipalities, county governments, and other agencies. ADEQ requested that the committee review existing water permitting processes and develop recommendations for process improvements through the consolidation and streamlining of current requirements.

The Steering Committee first met in August, 1997 and members agreed on a consensus model of decision-making with an option for "grudging consent" and submittal of minority opinions. Because of the complexity of technical issues, the necessity for a detailed evaluation of existing requirements and processes, as well as the plan to develop strategies for improvement, the Steering Committee established subcommittees of stakeholders with expertise in specific areas (industrial discharge, wetlands, reclaimed water, mines, wastewater treatment plants).

Arizona Administrative Register
Notices of Proposed Rulemaking

All Steering Committee meetings were open to the public and attendees were allowed to participate in the discussions. Participation in the subcommittees was open to anyone expressing an interest in becoming involved. The Steering Committee and subcommittees spent approximately a year evaluating existing ADEQ Water Quality Division permitting procedures. Volunteer subcommittee members spent a tremendous amount of time developing recommendations that would streamline and enhance the effectiveness of the permitting process for both ADEQ and regulated entities. Subcommittees submitted their recommendations to the Steering Committee for discussion, revision and approval. The Steering Committee wrote its Final Report (Unified Water Quality Permit Rewrite Project, Final Report of the Steering Committee) and transmitted it to ADEQ in August 1998. The Final Report provided a basis for Senate Bill 1379, which became law in August 1999.

Senate Bill 1379 provided statutory changes to pave the way for rule revisions. After passage of the bill, ADEQ reconvened the Steering Committee and the various subcommittees. A particular focus of the subcommittees has been development of numerous general permits to be issued by rule. The work products of the Reuse Subcommittee provide the basis for today's rulemaking.

The Department expects these rules to simplify the permitting process for reuse of reclaimed water thereby encouraging its use and conserving potable resources for human consumption and domestic purposes. The current reuse permitting program is unwieldy and costly to the permittee. The end users are required to monitor and report to the Department and assure the quality of the reclaimed water. The proposed rule places the burden of assuring reclaimed water quality where it belongs - at the place of origin. Monitoring and reporting requirements will be conditions of the individual Aquifer Protection Permit for the sewage treatment facility or alternative source. During the Aquifer Protection Permit engineering review, the sewage treatment facility may be classified regarding the quality of reclaimed water produced. End users will be able to apply for a general permit that relies on site controls in the application and use of reclaimed water to ensure protection of human health and the environment. General permits match site requirements with the particular classes of reclaimed water identified in the rule. Although individual permits will be available under this rule, it is believed that most end users of reclaimed water will opt for the general permit approach.

A companion rule to adopt Reclaimed Water Quality Standards is being proposed with this rule. The standards rule establishes 5 classes of reclaimed water expressed as a combination of minimum treatment requirements and a limited set of numeric reclaimed water quality criteria. Class A reclaimed water is required for reuse applications where there is a relatively high risk of human exposure to potential pathogens in the reclaimed water. For uses where the potential for human exposure is lower, Classes B and C are acceptable.

The proposed Reclaimed Water Quality Standards rule also includes two "+" categories of reclaimed water, Class A+ and Class B+. Both "+" categories require treatment to produce reclaimed water with a total nitrogen concentration of less than 10 mg/l. The Department's purpose in establishing these categories of reclaimed water is to minimize concerns over nitrate contamination of groundwater beneath sites where reclaimed water is applied. As a result, the general permits for the direct reuse of Class A+ and Class B+ reclaimed water do not include nitrogen management that is a condition of the reuse of the other classes of reclaimed water.

The Department recognizes that reclaimed water may change hands more than once between the place of generation and the final end user. Therefore, this rule provides permitting options for reclaimed water blending facilities and reclaimed water agents. A reclaimed water blending facility receives reclaimed water of a certain class and improves the quality by blending the reclaimed water with water from another source or sources. The improved quality of the resultant reclaimed water allows more or different reuse applications than the original quality would have allowed. The rule also provides an option for a person or entity to act as a reclaimed water agent for multiple end users. The reclaimed water agent operates under a general or individual reclaimed water permit and allows the end users to receive reclaimed water for appropriate reuse applications without having to notify the Department directly to obtain permit coverage.

The rule also includes an individual permit for the reuse of industrial wastewater that contains a component of sanitary wastewater or is used in processing any crop or substance that may be used as human or animal food. The Department does not intend this permit to apply to industrial wastewater that is recycled or used in industrial processes. Rather, this permit would apply where the industrial wastewater is provided for a reuse application beyond the normal industrial process. Furthermore, the rule makes clear that use of reclaimed water in an industrial workplace is not governed by these rules if Occupational Safety and Health Administration or Mine Safety and Health Administration requirements apply.

The current reuse rules provide an individual permit approach for the use of gray water. However, the Department has never issued a permit for gray water use under the rule. A yearlong study was undertaken in Tucson to assess the risks involved in the residential reuse of gray water. The results of the study indicate that risk can be minimized by prohib-

Arizona Administrative Register
Notices of Proposed Rulemaking

iting the use of gray water from kitchen sinks as well as washing machines where diapers are likely to be washed. The study also determined that gray water reuse is a common practice in the Tucson area with approximately 13% of households using collection and irrigation systems that range from fairly primitive to sophisticated engineered systems. In recognition of the widespread use of gray water for residential irrigation, the proposed rule includes a general permit with limitations on the sources of the gray water, amount reused, and application methods that will minimize the risk to humans while encouraging educated use of the gray water.

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

None

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 to a political subdivision of this state:

Not applicable

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

ADEQ anticipates the rule will provide cost-saving benefits to businesses in Arizona. The proposed rule includes general permits for end users of reclaimed water replacing the current rule structure that required an individual permit for any reuse. Additionally, the rule places the responsibility for ensuring the quality of the reclaimed water on the generator that is permitted under the Aquifer Protection Permit program, eliminating the burden and cost of monitoring and reporting on the end user. As a result, these rules impose no additional costs on the regulated community, small businesses, political subdivisions, or members of the public in Arizona. For some businesses, ADEQ expects these rule changes to reduce costs associated with the reuse of reclaimed water. Furthermore, these changes should decrease ADEQ staff time and resultant costs to permit reuse applications. Additional information and analysis will be provided in the final EIS, including examples of the impact to the various categories of permittee: sewage treatment facility, reclaimed water blending facility, reclaimed water agent, and end user.

The Department is sensitive to the concerns of small businesses and the impact this rulemaking could have upon them. State law requires agencies to reduce the impact of a rule on small businesses by using identified methods when they are determined to be legal and feasible in meeting the statutory objectives for the rulemaking. The Department considered each of the methods prescribed in A.R.S. §§ 41-1035 and 41-1055(B)(5)(c) for reducing the impact on small businesses. These methods include: (1) Exempt small businesses from any or all rule requirements, (2) Establish performance standards which would replace any design or operational standards, or (3) Institute reduced compliance or reporting requirements for small businesses. An agency may accomplish the third method by establishing less stringent requirements, consolidating or simplifying them, or setting less stringent schedules or deadlines.

The Department believes that the simplified permitting process in the proposed rule and the emphasis on general permits for end users accomplishes the intent of reducing the impact to all end users of reclaimed water, including small businesses. Other than simplifying the permitting process and providing a general permit approach in place of individual permits, the Department was unable to incorporate other specific methods to reduce the impact on small businesses. The Department expects that all end users of reclaimed water will benefit from the proposed, new permit process.

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

Name: David H. Lillie, Economist
Address: Arizona Department of Environmental Quality
3033 N. Central M0836A
Phoenix, AZ 85012-2809
Telephone: (602) 207-4436 (Any extension may be reached in-state by dialing 1-800-234-5677, and asking for that extension.)
Fax: (602) 207-2251
E-mail: lillie.david@ev.state.az.us

Arizona Administrative Register
Notices of Proposed Rulemaking

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:

Public Hearing Tuesday, June 6, 2000, 6:00 p.m.

State of Arizona
400 West Congress
Arizona Corporation Commission Hearing Room
Room 222, 2nd Floor
Tucson, AZ 85701

Public Hearing Wednesday, June 7, 2000, 6:00 p.m.

Arizona Department of Environmental Quality
3033 North Central Avenue
Room 1706
Phoenix, AZ 85012

Public Hearing Tuesday, June 13, 2000, 6:00 p.m.

Coconino County - Admin Offices
219 East Cherry Avenue
1st Floor, Board Room
Flagstaff, AZ 86001

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. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY

**CHAPTER 9. DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER POLLUTION CONTROL**

ARTICLE 6. ~~RESERVED~~ TECHNICAL STANDARDS FOR CONVEYANCES OF RECLAIMED WATER

Section

| | |
|-------------------|--|
| <u>R18-9-601.</u> | <u>Definitions</u> |
| <u>R18-9-602.</u> | <u>Applicability</u> |
| <u>R18-9-603.</u> | <u>Technical Standards for Pipeline Conveyances of Reclaimed Water</u> |
| <u>R18-9-604.</u> | <u>Technical Standards for Open Water Conveyances of Reclaimed Water</u> |

**ARTICLE 7. REGULATIONS FOR THE REUSE OF WASTEWATER
DIRECT REUSE OF RECLAIMED WATER**

Section

| | |
|-------------------|--|
| <u>R18-9-701.</u> | <u>Definitions</u> |
| <u>R18-9-702.</u> | <u>General Requirements for reuse of wastewater</u> <u>Applicability</u> |
| <u>R18-9-703.</u> | <u>Specific standards and permit monitoring requirements for the reuse of wastewater</u> <u>Transition of Permits for the Reuse of Reclaimed Wastewater</u> |
| <u>R18-9-704.</u> | <u>Irrigation as part of the wastewater treatment process</u> <u>Classification of Sewage Treatment Facilities that Generate Reclaimed Water and APP Monitoring Provisions</u> |
| <u>R18-9-705.</u> | <u>Permit for reuse of reclaimed wastewater</u> <u>General Requirements</u> |
| <u>R18-9-706.</u> | <u>Enforcement and Penalties</u> <u>Operational Requirements</u> |
| <u>R18-9-707.</u> | <u>Severability</u> <u>Reclaimed Water Individual Permit Application Process</u> |
| <u>R18-9-708.</u> | <u>Individual Permit Application Requirements</u> |
| <u>R18-9-709.</u> | <u>Reclaimed Water Individual Permit: General Provisions</u> |
| <u>R18-9-710.</u> | <u>Direct Reuse of Industrial Wastewater</u> |
| <u>R18-9-711.</u> | <u>Notice Requirements for Reclaimed Water General Permits</u> |

Arizona Administrative Register
Notices of Proposed Rulemaking

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| <u>R18-9-712.</u> | <u>Reclaimed Water General Permits: Duration, Renewal and Transfers</u> |
| <u>R18-9-713.</u> | <u>Reclaimed Water General Permits: Revocation</u> |
| <u>R18-9-714.</u> | <u>Type 1 Reclaimed Water General Permit: Gray Water</u> |
| <u>R18-9-715.</u> | <u>Type 2 Reclaimed Water General Permit: Direct Reuse of Class A+ Reclaimed Water</u> |
| <u>R18-9-716.</u> | <u>Type 2 Reclaimed Water General Permit: Direct Reuse of Class A Reclaimed Water</u> |
| <u>R18-9-717.</u> | <u>Type 2 Reclaimed Water General Permit: Direct Reuse of Class B+ Reclaimed Water</u> |
| <u>R18-9-718.</u> | <u>Type 2 Reclaimed Water General Permit: Direct Reuse of Class B Reclaimed Water</u> |
| <u>R18-9-719.</u> | <u>Type 2 Reclaimed Water General Permit: Direct Reuse of Class C Reclaimed Water</u> |
| <u>R18-9-720.</u> | <u>Type 3 Reclaimed Water General Permit: Reclaimed Water Blending Facility</u> |
| <u>R18-9-721.</u> | <u>Type 3 Reclaimed Water General Permit: Reclaimed Water Agent</u> |
| <u>R18-9-722.</u> | <u>Type 3 Reclaimed Water General Permit: Gray Water</u> |
| <u>R18-9-723.</u> | <u>Enforcement and Penalties</u> |
| <u>Appendix A.</u> | |

ARTICLE 6. ~~RESERVED~~ TECHNICAL STANDARDS FOR CONVEYANCES OF RECLAIMED WATER

R18-9-601. Definitions

In addition to the definitions provided in R18-9-701, the following definitions apply:

“Conveyance” means both “open water conveyance” and “pipeline conveyance” as defined in this Section.

“Open water conveyance” means any constructed open waterway, including canals and laterals, that transports reclaimed water from a sewage treatment facility to a reclaimed water blending facility or from a sewage treatment facility or reclaimed water blending facility to the point of delivery to an end user.

“Pipeline conveyance” means any system of pipelines that transports reclaimed water from a sewage treatment facility to a reclaimed water blending facility or from a sewage treatment facility or reclaimed water blending facility to the point of delivery to an end user.

R18-9-602. Applicability

This Article applies to conveyances of reclaimed water as follows:

1. Pipeline conveyances of reclaimed water constructed on or after the effective date of this Article. A pipeline conveyance constructed before the effective date of this Article is considered to comply with this Article. A new pipeline or the replacement of an existing pipeline shall be constructed following R18-9-603.
2. Open water conveyances, regardless of the date of construction.

R18-9-603. Technical Standards for Pipeline Conveyances of Reclaimed Water

A pipeline conveyance shall comply with the following standards:

1. The conveyance shall be constructed so that:
 - a. Reclaimed water shall not find its way into, or otherwise contaminate, a potable water system;
 - b. System structural integrity shall be maintained; and
 - c. Capability for adequate inspection, maintenance and testing shall be maintained.
2. A pipeline, 8 inches in diameter or less, that is designed for or used to transport reclaimed water, shall be purple in color or wrapped with durable purple tape, and marked on opposite sides in English: “CAUTION: RECLAIMED WATER, DO NOT DRINK” in intervals of 3 feet or less.
3. A mechanical appurtenance to a pipeline conveyance shall be purple in color or legibly marked to identify it as part of the reclaimed water distribution system and distinguish it from systems for potable water distribution and sewage collection.
4. The following requirements for minimum separation distance shall apply:
 - a. A reclaimed water pipeline shall be located no closer than 50 feet from a drinking water well unless the pipeline is constructed following subsection (4)(c).
 - b. A reclaimed water pipeline shall be located no closer than 2 feet vertically nor 6 feet horizontally from a potable water pipeline unless the reclaimed water pipeline is constructed following subsection (4)(c).
 - c. A reclaimed water pipeline that does not meet the minimum separation distances specified in subsections (4)(a) and (4)(b) shall be constructed by encasing the pipeline in at least 6 inches of concrete or using mechanical joint ductile iron pipe for a distance of at least 10 feet beyond any point on the reclaimed water pipeline that is within the specified minimum separation distance.
5. The pipeline conveyance and all appurtenances conducting reclaimed water shall withstand a static pressure of at least 50 pounds per square inch above the design working pressure without excessive leakage.
6. The pipeline conveyance shall be provided with thrust blocks or restrained joints where needed to prevent excessive movement of the pipeline.
7. The pipeline conveyance system shall be designed and constructed using good engineering judgement following engineering standards of practice.

Arizona Administrative Register
Notices of Proposed Rulemaking

R18-9-604. Technical Standards for Open Water Conveyances of Reclaimed Water

An open water conveyance shall comply with the following standards:

1. The conveyance shall be maintained to prevent the unpermitted release of reclaimed water. The maintenance program shall include periodic inspections and follow up corrective measures to ensure the integrity of conveyance banks and capacity of the conveyance to carry operational flows with an appropriate factor of safety.
2. A conveyance that transports Classes B+, B, or C Reclaimed Water shall be posted in the following manner to inform the public:
 - a. Signs shall state: "CAUTION: RECLAIMED WATER, DO NOT DRINK," and display the international "do not drink" symbol.
 - b. Signs shall be placed at all points of ingress and, if the conveyance is operated under open access status, at least every 1/4-mile along the length of the conveyance.
 - c. Signs shall be visible and legible from both sides of the conveyance.

**ARTICLE 7. REGULATIONS FOR THE ~~REUSE OF WASTEWATER~~
DIRECT REUSE OF RECLAIMED WATER**

R18-9-701. Definitions

~~Definitions given in R18-9-802, R9-20-203, and applicable state statutes will apply to those words and phrases when used in this Article. In addition, the following apply:~~ In addition to the definitions in R18-9-601 and R18-11-301, the following definitions apply in this Article, unless the context otherwise requires:

1. ~~"Reuse of reclaimed wastewater" means the use of reclaimed wastewater transported from the point of treatment to the point of use without an intervening discharge to the surface waters of the state for which water quality standards have been established.~~

"APP" means Aquifer Protection Permit and has the meaning ascribed to it in R18-9-101.

"Class A+ reclaimed water" means reclaimed water that meets the standards established in R18-11-303.

"Class A reclaimed water" means reclaimed water that meets the standards established in R18-11-304.

"Class B+ reclaimed water" means reclaimed water that meets the standards established in R18-11-305.

"Class B reclaimed water" means reclaimed water that meets the standards established in R18-11-306.

"Class C reclaimed water" means reclaimed water that meets the standards established in R18-11-307.

"Department" means the Department of Environmental Quality.

"Direct reuse" means the beneficial use of reclaimed water for a purpose allowed by this Article including industrial wastewater used for the production or processing of any crops used as a human or animal food. The following do not constitute direct reuse of reclaimed water:

Use of water subsequent to its release under the conditions of a National Pollution Discharge Elimination System permit,

Use of water subsequent to discharge under the conditions of an APP, or

Use of industrial wastewater or reclaimed water, or both in a workplace that is subject to a federal program that protects worker from workplace exposures.

"Direct reuse site" means an area that is permitted for the application or impoundment of reclaimed water according to the terms of this Article. An impoundment operated for disposal under an APP does not constitute a direct reuse site.

"Director" means the director of the Department of Environmental Quality or the director's designee.

2. ~~"Effluent" means a wastewater that has completed its passage through a wastewater treatment plant.~~

"End user" means a person who directly reuses reclaimed water.

"Food crops" means crops which are produced for consumption by humans.

3. ~~"Gray water" means wastewater, separately collected from sewage flows, that originates from clothes washers, dishwashers, bathtubs, showers, and sinks, except but does not include wastewater from kitchen sinks, dishwashers, and/or toilets.~~

4. ~~"Industrial wastewater" means all wastes that enter a collection, treatment or disposal system wastewater generated from an industrial process.~~

5. ~~"Irrigation" means the application of water or wastewater-reclaimed water, or both, for growing agricultural crops, turf or silviculture, or for landscaping purposes.~~

Arizona Administrative Register
Notices of Proposed Rulemaking

6. ~~“NPDES permit” means a permit issued by the United States Environmental protection Agency for discharge to the waters of the United States as required by the Clean Water Act, as amended.~~
7. ~~“On-site wastewater treatment plant” encompasses all of the processes, devices, structures, and earthworks used for treating wastewater for disposal and reuse other than septic tanks with a hydraulic capacity less than two thousand (2,000) gallons per day that possess a N.S.F. Class I rating.~~
8. ~~“Open access” means that access to the reuse site reclaimed water by the general public is uncontrolled.~~
9. ~~“Partially treated wastewater” means wastewater which has received a minimum of primary treatment but does not meet the allowable limits contained in R18-9-703 for release to a reuse, or for discharge into the waters of the United States.~~
- “Permittee” means a person who has obtained a reclaimed water individual permit or who is operating under a reclaimed water general permit authorized by the Department according to the terms of this Article.
- “Person” has the meaning prescribed in A.R.S. § 49-201(26), and includes an agent or employee of an agency or organization. A person may include any of the following: an owner of a sewage treatment facility, an owner of a reclaimed water blending facility, a reclaimed water agent, an end user, a permittee, and a person who was issued a permit for the reuse of reclaimed wastewater before the effective date of this Article.
10. ~~“Primary treatment” is a treatment process which accomplishes removal of sewage solids by physical means so that the effluent contains no more than 1.0 milligram of settleable solids per liter of wastewater.~~
11. ~~“Reclaimed wastewater” is effluent which meets the standards for the specific reuses contained in R18-9-703.~~
- “Reclaimed water” has the meaning prescribed in A.R.S. § 49-201(31) and includes gray water and industrial wastewater with a component of sanitary wastewater.
- “Reclaimed water agent” means a person who distributes reclaimed water to 1 or more end users and assumes responsibility for the direct reuse of reclaimed water by the end user.
- “Reclaimed water blending facility” means an installation or method of operation that receives reclaimed water from a sewage treatment facility or other reclaimed water blending facility that is classified to produce Class C or better reclaimed water and blends it with other water so that the produced water can be used for a higher class purpose listed in Appendix A.
12. ~~“Restricted access” means that the access to the reuse site reclaimed water by the general public is controlled.~~
13. ~~“Reuse” means the use of reclaimed wastewaters.~~
14. ~~“Reuse site” means that area where reclaimed wastewater is applied to and/or impounded upon.~~
- “Sanitary wastewater” means wastewater originating from toilets, baths, sinks, lavatories, laundries, and other plumbing fixtures in places of human habitation, employment, or recreation.
- “Sewage treatment facility” means a plant or system for sewage treatment and disposal that is permitted under R18-9-101 et seq.
15. ~~“Secondary treatment” is a treatment process that produces treated wastewater containing no more than 30 milligrams per liter of five day biochemical oxygen demand, 30 milligrams per liter of suspended solids, a pH between the limits of 6.0 to 9.0 and a fecal coliform standard based on the uses of the wastewater. Aerobic stabilization ponds shall be considered as providing secondary treatment if the effluent contains no more than 30 milligrams per liter of five day biochemical oxygen demand, 90 milligrams per liter of suspended solids for pond systems treating less than or equal to two million gallons per day, plus the same pH and fecal coliform standards given above. Pond systems with a design capacity of greater than two million gallons per day must meet the 30 milligram per liter standard for suspended solids.~~
16. ~~“Wastewater” means sanitary wastes of human origin, sewage, gray water, and industrial wastes that contain sanitary wastes or are used in the production or processing of any crop or substance which may be used as human or animal food.~~
17. ~~“Wastewater reclamation system” means the wastewater treatment plant and the entire reuse and distribution system for the reclaimed wastewater.~~
18. ~~“Wastewater treatment plant” encompasses all of the processes, devices, structures, and earth works which are used for treating wastewater for disposal and reuse, but does not include septic tanks, wastewater treatment plants serving singly family residences, industrial unit processes, or industrial impoundments for process waters within the industrial property.~~

Arizona Administrative Register
Notices of Proposed Rulemaking

R18-9-702. General Requirements for Reuse of Wastewater Applicability

- ~~A. The application of reclaimed wastewater shall be consistent with the goals and policies of the Council.~~
 - ~~B. Irrigation with untreated wastewater is prohibited.~~
 - ~~C. No wastewater treatment plant owner shall release reclaimed wastewater for reuse without a permit issued by the Department.~~
 - ~~D. Food crops which may be consumed raw by humans that are irrigated with reclaimed wastewater shall be considered adulterated foods in accordance with A.R.S. § 36-904(A)(5), unless the reclaimed wastewater conforms with the limits and conditions of R18-9-703. The production, sale or delivery of such adulterated food crops is prohibited and the Director may detain, remove, or destroy such adulterated food crops pursuant to A.R.S. § 36-910.~~
 - ~~E. A reuser may accept reclaimed wastewater and provide additional treatment for a more restrictive reuse. Under such conditions, the plant providing the additional treatment is subject to the same requirements as other wastewater treatment plants and will be permitted separately.~~
 - ~~F. When no means of reuse, discharge, or disposal of reclaimed wastewater are available other than surface irrigation, a minimum of five days storage shall be provided to prevent the necessity of irrigation when the soil is saturated or during a period when the reclaimed wastewater does not meet the minimum water quality standards for the specific reuse. The irrigation site shall be designed to contain the runoff from a 10-year, 24-hour precipitation event unless the reclaimed wastewater meets the standards and conditions of a valid NPDES permit for discharge into waters of the United States. These provisions shall not apply to agricultural irrigation return flows, and runoff from highway landscaping or golf courses when the Department determines that such a flow does not present a danger to the health of the public.~~
 - ~~G. Discharges of effluent into waters of the United States require a NPDES permit and are not regulated by this Article.~~
 - ~~H. In determining allowable uses of reclaimed wastewater, the Department will consider the effects of blending secondary effluent with waters of higher quality or the effects of additional treatment prior to reuse if requested by the applicant. In cases where blending or additional treatment of secondary effluent is provided, the user shall submit to the Department, as a minimum, a plan of operation, a description of any additional treatment process, blending volumes, and an estimation of final quality at the point of reuse.~~
 - ~~I. The wastewater treatment plant owner or the reclaimed wastewater owner shall be responsible and liable for meeting the conditions of the wastewater reuse permit. The treatment plant owner will not be liable for misapplication of reclaimed wastewater by reusers. To identify the responsibilities of the wastewater treatment plant owner and the reclaimed wastewater owner there shall be a legally enforceable contract which sets forth as a minimum:
 - ~~1. The quality and maximum quantity of wastewater to be released for reuse by the wastewater treatment plant.~~
 - ~~2. The specific reuse(s) for which the reclaimed wastewater will be used by the reuser.~~
 - ~~3. The method of disposal of any reclaimed wastewater left over from the reuse activity by the reuser.~~
 - ~~4. The responsibility for compliance with additional requirements for specific reuses as contained in R18-9-703(C) by the reuser.~~~~
 - ~~J. In those cases where the reclaimed wastewater is owned by someone other than the wastewater treatment plant owner, the reclaimed wastewater owner may apply for the reuse permit pursuant to R18-9-705(A) and perform any of the other functions required by this Article so long as the reclaimed wastewater owner, in a form acceptable to the Director, commits to perform any or all of the duties required in this Article and/or produces a legally enforceable contract with the wastewater treatment plant owner which commits performance to any or all of the duties required in this Article. The intent of this policy is that the wastewater treatment plant owner and the reclaimed wastewater owner, either together or separately, agree to commit to all of the requirements of this Article, as shown in a legally enforceable contract.~~
 - ~~K. In cases where someone other than the wastewater treatment plant owner makes an actual reuse of the reclaimed wastewater, each succession of ownership shall be governed by a legally enforceable contract, filed with the Department, which notifies the succeeding reclaimed wastewater owner of the requirements of this Article and which requires the succeeding owner to so contract with any additional succeeding reclaimed wastewater owners.~~
 - ~~L. Nothing in this Article is intended to exempt disposal of reclaimed wastewater from the requirements of A.A.C. Title 9, Chapter 20, Article 2.~~
 - ~~M. The use of reclaimed wastewater for direct human consumption is prohibited.~~
- A. This Article applies to an owner of a sewage treatment facility that generates reclaimed water for direct reuse, an owner of a reclaimed water blending facility, a reclaimed water agent, an end user, and a person who uses gray water. This Article also applies to a person directly reusing industrial wastewater that contains sanitary wastewater and to a person directly reusing industrial wastewater in the processing of any crop or substance that may be used as human or animal food.
- B. Nothing in this Article is intended to exempt disposal of reclaimed water from the requirements of A.R.S. Title 49, Chapter 2, Articles 2 and 3.

R18-9-703. ~~Specific Standards and Permit Monitoring Requirements for the Reuse of Wastewater~~ Transition of

Arizona Administrative Register
Notices of Proposed Rulemaking

Permits for the Reuse of Reclaimed Wastewater

- A.** Numerical parameter limits pertaining to specific reuse categories are contained in Table I of this Article and A.A.C. Title 18, Chapter 11, Article 2. Concentrations of trace substances, organic chemicals, toxic substances, and radiochemicals in waters used for agricultural irrigation, livestock watering, and recreation must meet the allowable limits contained in the state surface water quality standards, A.A.C. Title 18, Chapter 11, Article 2. Permit monitoring requirements for specific reuses are given in Table II of this Article. The regulations in this part apply to effluent flow at a point in the wastewater reclamation system just prior to release for reuse.
- B.** Permittees are not required to monitor routinely for enteric viruses, entamoeba histolytica, giardia lamblia, ascaris lumbricoides, common large tapeworm, trace substances, organic chemicals, toxic substances, or radiochemicals for which no sampling frequency is specified. However, should the Department find or have reason to believe such contaminants are present in excess of the allowable limits given in Table I of this Article and A.A.C. Title 18, Chapter 11, Article 2, corrective action including monitoring will be required to eliminate or reduce the contaminants to meet these limits.

| TABLE I—ALLOWABLE PERMIT LIMITS FOR SPECIFIC REUSES | | | | | | | | | | |
|---|----------|----------------------------|--------------------|-----------------------|-------------------|---|----------------------|-------------------------|--------------------------------|-------------------------|
| PARAMETER | A | B | C | D | E | F | G | H | I | J |
| | ORCHARDS | FIBER- SEED & FORAGE | PASTURES | LIVESTOCK WATERING | PROCESSED FOOD | LANDSCAPED AREAS RESTRICTED ACCESS | OPEN ACCESS | FOOD CONSUMED RAW | INCIDENTAL HUMAN CONTACT | FULL BODY CONTACT |
| pH | 4.5-9 | 4.5-9 | 4.5-9 | 6.5-9 | 4.5-9 | 4.5-9 | 4.5-9 | 4.5-9 | 6.5-9 | 6.5-9 |
| FECAL COLIFORM (CFU/100 ml) ^a | | | | | | | | | | |
| geometric mean (5-sample minimum) | 1000 | 1000 | 1000 | 1000 | 1000 | 200 | 25 | 2.2 | 1000 | 200 |
| single sample not-to-exceed | 4000 | 4000 | 4000 | 4000 | 2500 | 1000 | 75 | 25 | 4000 | 800 |
| TURBIDITY (NTU) ^b | — | — | — | — | — | — | 5 | 1 | 5 | 1 |
| ENTERIC VIRUSE ^c | — | — | — | — | — | — | 125-per 40 liters | 1-per 40 liters | 125-per 40 liters | 1-per 40 liters |
| ENTAMOEBAS HISTOLYTICAS | — | — | — | — | — | — | — | none detectable | — | none detectable |
| GIARDIAS | — | — | — | — | — | — | — | none detectable | — | none detectable |
| ASCARIS | — | — | — | — | — | — | — | none detectable | none detectable | none detectable |
| COMMON-LARGE TAPEWORM | — | — | none detectable | none detectable | — | — | — | — | — | — |

Notes: a. CFU = colony forming units
b. NTU = nephelometric turbidity units
c. expressed as PFU, plaque-forming units; MPN, most probable numbers; or immunofluorescent foci-per-liter
d. "None detectable" means no pathogenic microorganisms observed during examination

| TABLE II—MINIMUM PERMIT MONITORING REQUIREMENTS FOR SPECIFIC REUSES | | | | | | | | | | |
|---|-----------|----------------------------|----------|-----------------------|-------------------|---|----------------|-------------------------|--------------------------------|-------------------------|
| PARAMETER | FREQUENCY | | | | | | | | | |
| | A | B | C | D | E | F | G | H | I | J |
| | ORCHARDS | FIBER- SEED & FORAGE | PASTURES | LIVESTOCK WATERING | PROCESSED FOOD | LANDSCAPED AREAS RESTRICTED ACCESS | OPEN ACCESS | FOOD CONSUMED RAW | INCIDENTAL HUMAN CONTACT | FULL BODY CONTACT |
| pH | 1/month | 1/month | 1/month | 1/month | 1/month | 1/month | 1/month | 1/month | 1/month | 1/month |
| FECAL COLIFORM | 1/month | 1/month | 1/month | 1/month | 1/month | 1/week | 1/day | 1/day | 1/week | 1/day |
| TURBIDITY | — | — | — | — | — | — | continuous | continuous | continuous | continuous |

C. Additional requirements for specific uses—

1. Irrigation of orchard crops and crops not subject to rotation (Table I, Column A). Irrigation shall be by a method which minimizes contact of the reclaimed wastewater with the fruit or foliage—
2. Irrigation of pastures (Table I, Column C). Pastures must be maintained to prevent incidental ponding or standing water except where local farming conditions and the use of accepted irrigation delivery systems and cropping patterns are such that, as an unavoidable consequence of such conditions, systems, and patterns, there will be standing water—

Arizona Administrative Register
Notices of Proposed Rulemaking

3. Irrigation of landscaped areas, cemeteries, highway medians, golf courses, and other areas where public access is restricted (Table I, Column F). Golf courses in residential areas which are separated by a fence or barrier of at least four feet in height will be included in this category. Golf courses contiguous with a residential area primarily restricted to adults or which strictly enforce nonaccess for anyone other than players will be included in this category.
 - a. Spray irrigation of fairways shall be limited to such times of the day as to reasonably preclude direct contact of the spray with golfers.
 - b. Irrigation spray shall not reach any privately owned premises or public drinking fountains.
 - c. Hose bibbs discharging reclaimed wastewater shall be posted with signs reading "Reclaimed Water, Do Not Drink", or similar warnings, or be secured to prevent access by the public.
 - d. Signs reading "Irrigation with reclaimed wastewater" or similar warning shall be prominently displayed on the premises. Score cards shall include the same warning.
 - e. Irrigation pipe shall be color coded, buried with colored tape, or otherwise suitably marked to indicate nonpotable water.
4. Irrigation of landscaped areas including playgrounds, lawns, parks, golf courses not covered by paragraph (3) above, and other areas where public access is not restricted (Table I, Column G).
 - a. Hose bibbs discharging reclaimed wastewater shall be secured to prevent any use by the public.
 - b. Irrigation pipe shall be color coded, buried with colored tape, or otherwise suitably marked to indicate nonpotable water.
 - c. These areas shall be irrigated only at such time as to minimize contact with the public and be reasonably dry and free from standing water during normal usage periods.
 - d. Signs reading "Irrigated with reclaimed wastewater" or similar warnings shall be prominently displayed on the premises.
5. On-site wastewater treatment plants.
 - a. For surface irrigation, on-site wastewater treatment plant effluent must meet the allowable limits listed in Table III of this Article. Surface irrigation sites shall be designed to contain a 10 year, 24 hour rainfall event. On-site wastewater treatment plants which use reclaimed wastewater within common areas or discharge to areas off the reuse site are subject to quality, monitoring, management, and operation requirements which pertain to all other wastewater treatment plants.
 - b. This Section does not apply to on-site wastewater treatment plants that dispose effluent through the following means:
 - i. Conventional leach trenches designed in accordance with Department engineering bulletins.
 - ii. Mound disposal systems.
 - iii. Evapotranspiration beds designed in accordance with Department engineering bulletins.
6. Gray water from single and multi-family residences may be used for surface irrigation under the following conditions:
 - a. The design and construction of the system are approved by the Department in accordance with A.A.C. Title 18, Chapter 9, Article 8. Design guidelines and information on suitable plantings and irrigation methods are available from the Department.
 - b. Such irrigation sites shall be designed to contain a 10-year, 24-hour rainfall event.
 - c. The gray water must meet the allowable limits for surface irrigation in Table III.

TABLE III
ALLOWABLE LIMITS AND MONITORING REQUIREMENTS FOR SURFACE IRRIGATION WITH ON-SITE WASTEWATER-TREATMENT PLANT EFFLUENT AND GRAY WATER

| Parameters | Allowable Limits | Samples Required |
|---|------------------|--|
| Fecal Coliform (CFU/100 ml) geometric mean | 25 | Series of 5 in one calendar month; 1 series per year minimum |
| single sample not to exceed | 75 | |
| Chlorine Residual, mg/l | 2.0 | 1/month minimum |

7. Wetlands marsh.
 - a. Formation of a wetlands marsh is an allowable reuse of reclaimed wastewater under conditions and design criteria outlined in Engineering Bulletin No. 11, available from the Department.
 - b. Table IV of this Article contains minimum effluent standards and monitoring requirements for formation of a wetlands marsh or addition of reclaimed wastewater to an existing man-made wetlands marsh.

Arizona Administrative Register
Notices of Proposed Rulemaking

TABLE IV
ALLOWABLE LIMITS AND MONITORING REQUIREMENTS FOR RECLAIMED WASTEWATER RELEASED TO
WETLANDS MARSHES

| Parameters | Allowable Limits | Samples Required |
|---|---|------------------|
| FECAL COLIFORM | | |
| (CFU/100 ml, 30-day period) | | |
| FLOWS LESS THAN 1 MILLION GALLONS PER DAY | | |
| geometric mean | 1000 | 5/month |
| single sample not to exceed | 4000 | |
| FLOWS 1 MILLION GALLONS PER DAY OR ABOVE | | |
| geometric mean | 1000 | 10/month |
| single sample not to exceed | 4000 | |
| pH, units | 6.5-8.6 | 1/week |
| pH CHANGE, units/day, maximum change per day in receiving waters | 0.5 | |
| DISSOLVED OXYGEN, receiving waters shall not be lowered beyond this limit (mg/l) | | |
| | 6 | 2/week |
| TEMPERATURE- | | |
| | shall not interfere with aquatic life and wildlife | 2/week |
| TRACE SUBSTANCES- | | |
| | per A.A.C. Title 18, Chapter 11, Article 2 "aquatic and wildlife" | |

8. ~~Industrial reuse-~~

- a. ~~All wastewater reclamation systems that contain industrial wastewater will be subject to these rules, if they either-~~
 - i. ~~Totally or partially consist of or originated as a sanitary waste of human origin; or,~~
 - ii. ~~Are used for the production and processing of any crops or substance which may be used as human or animal food-~~
- b. ~~Reuse of reclaimed wastewater for industrial purposes is exempt from these rules under the following circumstances-~~
 - i. ~~The industrial wastewater did not originally contain sanitary wastes of human origin; or,~~
 - ii. ~~The wastewater is not used for the production or processing of any crop or substance which may be used as human or animal food-~~
- c. ~~If not exempt, each industrial reuse will be considered on an individual basis to determine applicable quality criteria. The variety of industrial reuses is so extensive that establishing specific criteria governing all industrial reuses is not practicable. In fixing such treatment requirements and quality criteria the Department shall give consideration to-~~
 - i. ~~The degree of potential contact with the reclaimed wastewater by the general public-~~
 - ii. ~~The degree of potential contamination of the products or byproducts being produced or handled in the industrial process-~~
- d. ~~The use of secondary treated reclaimed wastewater for use in industrial cooling processes shall be allowed-~~

A. Any direct reuse activity covered by an individual APP or a Permit for the Reuse of Reclaimed Wastewater issued by the Department before the effective date of this Article is continued according to the terms of the permit until its expiration date.

B. A person who meets the requirements of subsection (A) may apply for a Reclaimed Water Permit under this Article by following R18-9-708 or R18-9-711 as applicable. The application or notice shall be submitted to the Department at least 120 days before the permit expiration date. The terms of the individual APP or Permit for the Reuse of Reclaimed Wastewater shall be continued beyond the stated date of expiration provided:

1. The permitted direct reuse activity is of a continuing nature;
2. The permittee has submitted a timely and sufficient application for a new permit; and
3. The Department is unable, through no fault of the permittee, to issue a new permit before the expiration date of the previous permit.

Arizona Administrative Register
Notices of Proposed Rulemaking

R18-9-704. Irrigation as Part of the Wastewater Treatment Process Classification of Sewage Treatment Facilities that Generate Reclaimed Water and APP Monitoring Provisions

Irrigation with partially treated wastewater is considered a part of the treatment process and is subject to the same Department controls as other wastewater treatment processes. Such irrigation is allowable only under all of the following conditions:-

1. The person having administrative control over the wastewater treatment plant or the reclaimed wastewater owner has direct physical and administrative control over the irrigation site and process.-
2. The entire treatment process, including irrigation and harvesting, is under the direct supervision of a wastewater treatment plant operator certified by the Department under A.A.C. Title 18, Chapter 4, Article 1.-
3. The irrigation site, cropping, application rates, irrigation practices, harvesting, and a plan of operation shall have been approved by the Department.-
4. Land to which partially treated wastewater is applied shall not be used for crops requiring higher quality irrigation water until such land use is approved in writing by the Department.-
5. Any discharge of partially treated wastewater from the irrigation site shall be from a designated discharge point or points and shall meet the limits and conditions of NPDES permit or a groundwater permit issued under A.A.C. Title 9, Chapter 20, Article 2.-

A. For purposes of this Article, the Department shall determine the classification of reclaimed water generated by a new sewage treatment facility by reviewing information submitted in the application for an individual APP following A.A.C. R18-9-101 et seq.

B. For individual APPs issued before the effective date of this Article and at the request of the permittee, the Department may amend the individual APP to incorporate conditions to assure the quality of reclaimed water produced for direct reuse. The Department shall review water quality test results from the previous 2 years to determine the classification of reclaimed water generated by the sewage treatment facility. If the facility has operated for less than 2 years, the Department will review the available water quality data.

C. The Department shall include in the individual APP the following requirements:

1. A statement of the class of reclaimed water the plant generates;
2. Provisions for monitoring reclaimed water quality and flow on a regular basis; and
3. Provisions for reporting the following data to the Department and end users on a regular basis:
 - a. Water quality test results demonstrating that all the reclaimed water meets the applicable standards for the class of water identified in subsection (C)(1).
 - b. The total volume of reclaimed water generated for direct reuse.
4. Provisions for storage or disposal when reclaimed water cannot be delivered for direct reuse. If storage is necessary, a minimum of 5-days storage capacity is required.

D. The Department shall include the requirements in subsection (C) as an amendment to the individual APP following R18-9-220(D).

R18-9-705. Permit for Reuse of Reclaimed Wastewater General Requirements

A. To effectuate R18-9-702(C), above, the following shall apply:-

1. Application for a permit and signatories:-
 - a. The owner or operator of any wastewater treatment plant or reclaimed wastewater owner who proposes to allow the reclaimed wastewater to be reused for any of the purposes authorized by these rules shall complete, sign and submit to the Director information requested in an application form provided by the Department.-
 - b. All permit applications shall be signed by either a principal executive officer or ranking elected official.-
2. Time allowed for application submittal. A person proposing a reuse facility shall submit an application not less than 120 days before the date on which the reuse is to commence, unless permission for a lesser period has been granted by the Director.-
3. Reissuance of permit: time allowed for application submittal. A person who expects to continue to release reclaimed wastewater for reuse after expiration of the permit shall apply for reissuance not less than 120 days before the expiration date of the present permit.-
4. Duration of permits and continuation of expiring permits:-
 - a. All permits shall be issued for fixed terms not to exceed five years. Permits may be modified, transferred, reissued, or revoked by the Director.-
 - b. The term and conditions of an expired permit are automatically continued under the provisions of A.R.S. § 41-1012(B) pending issuance of a new permit if:-
 - i. The permitted activity is of a continuing nature.-
 - ii. The permittee has submitted a timely and sufficient application for a new permit.-
 - iii. The Department is unable, through no fault of the permittee, to issue a new permit before the expiration date of the previous permit.-
5. Public comment and hearings, public notice regarding permits and permit hearings.-

Arizona Administrative Register
Notices of Proposed Rulemaking

- a. ~~Notices shall be circulated in a manner designed to inform interested persons of a hearing or determination dealing with permit denial or issuance. Notice of draft permit shall allow at least 30 days for public comments and notice of hearing shall be given 30 days before the hearing.~~
- b. ~~Notice of the formulation of any draft permit and notice of all hearings shall be given by the Department:~~
 - i. ~~By mailing a copy to the applicant, to interested state and county agencies, and to any person on request.~~
 - ii. ~~By any of the following methods:~~
 - (1) ~~By publication of a notice in a daily or weekly newspaper within the area affected by the wastewater reuse activity or discharge; or,~~
 - (2) ~~By posting a copy of the information required at the principal office of the municipality or political subdivision affected by the wastewater reuse activity or discharge, and by posting a copy at the United States Post Office serving those premises.~~
 - (3) ~~In any other manner constituting legal notice under state law.~~
- B.** ~~Public notices issued under this Section will contain the following information:~~
 - 1. ~~Name and address of the office processing the application or conducting the hearing.~~
 - 2. ~~Name and address of the applicant and the wastewater treatment plant owner (if different from the applicant) and a general description of the location of each existing or proposed reuse facility.~~
 - 3. ~~Name of person, and an address and telephone number where interested persons may obtain further information, including copies of the draft permit.~~
- C.** ~~Transfer of permits. A permit may be transferred to another person by a permittee if:~~
 - 1. ~~The permittee notifies the Director of the proposed transfer.~~
 - 2. ~~A written agreement containing a specific date for transfer of permit responsibility and coverage between the current and new permittees (including acknowledgment that the existing permittee is liable for violations up to that date, and that the new permittee is liable for violations from that date on) is submitted to the Director.~~
 - 3. ~~The Director, within 30 days of receiving a transfer notice, does not notify the current permittee and the new permittee of the intent to modify revoke and reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.~~
- D.** ~~Permit compliance. To assure compliance with permit terms and conditions, the permittee shall monitor:~~
 - 1. ~~The amount, concentration, or other measurement for each contaminant from Table II of this Article and A.A.C. Title 18, Chapter 11, Article 2 specified in the permit.~~
 - 2. ~~The volume of reclaimed wastewater released for reuse.~~
 - 3. ~~Other parameters specifically required in the permit.~~
 - 4. ~~The Director will specify the following monitoring requirements in the permit:~~
 - a. ~~Requirements concerning proper installation, use and maintenance of monitoring equipment or methods (including biological monitoring methods where appropriate).~~
 - b. ~~Monitoring frequency, type and intervals sufficient to yield continuing data representative of the volume of reclaimed wastewater flow and the quantity of contaminant discharged.~~
 - e. ~~Test procedures for the analysis of contaminant meeting the requirements of this Section.~~
 - 5. ~~Test procedures identified in 40 CFR Part 136 shall be utilized for contaminants or parameters listed in the permit unless an alternative test procedure has been approved by the Director.~~
- E.** ~~Recording of monitoring results.~~
 - 1. ~~Any permittee required to monitor shall maintain records of all monitoring information and monitoring activities, including:~~
 - a. ~~The date, exact place and time of sampling or measurements;~~
 - b. ~~The person who performed the sampling or measurements;~~
 - e. ~~The date analyses were performed;~~
 - d. ~~The person who performed the analyses;~~
 - e. ~~The analytical techniques or methods used;~~
 - f. ~~The results of such analyses.~~
 - 2. ~~All records of monitoring activities and results (including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records shall be retained by the permittee for three years. The three year period shall be extended:~~
 - a. ~~Automatically during the course of any unresolved litigation regarding the discharge of contaminants by the permittee;~~
 - b. ~~As requested in writing by the Director.~~
- F.** ~~Access to records. The manager of the wastewater treatment plant shall allow any and all of the reusers to have access to the records of physical, chemical and biological quality of the reclaimed wastewater.~~
- G.** ~~Availability of records. Water quality records of the wastewater facility will be available for public inspection at the Department.~~

Arizona Administrative Register
Notices of Proposed Rulemaking

- H.** Reuses requiring lower quality reclaimed wastewater than that allowed by permit. It is expressly allowed that a reuser of reclaimed wastewater may use the water for any purpose included in these rules which requires a lower quality than that set forth in the permit.
- A.** An owner of a sewage treatment facility shall provide reclaimed water for direct reuse only under an individual APP that includes the requirements of R18-9-704.
- B.** If an owner of a facility accepts reclaimed water and provides additional treatment for a higher quality direct reuse, that facility is considered to be a sewage treatment facility and shall be operated under an individual APP and the requirements of R18-9-704.
- C.** An owner of a reclaimed water blending facility shall not conduct blending operations without obtaining a reclaimed water individual permit or reclaimed water general permit for the blending of reclaimed water.
- D.** A person who directly reuses reclaimed water shall do so only under 1 or more of the permits in this Article.
- E.** All of the following activities are prohibited:
1. Irrigating with untreated wastewater.
 2. Providing or using reclaimed water for any of the following activities:
 - a. Direct reuse for human consumption.
 - b. Direct reuse for swimming, wind surfing, water skiing, or other full-immersion water activity with a potential of ingestion, or
 - c. Direct reuse for evaporative cooling or misting.
 3. Misapplying reclaimed water for any of the following reasons:
 - a. Application of a stated class of reclaimed water that is of lesser quality than allowed by this Article for the type of direct reuse application.
 - b. Application of reclaimed water to any area other than a direct reuse site, or
 - c. Allowing runoff of reclaimed water or reclaimed water mixed with stormwater from a direct reuse site.
- F.** A permittee shall follow the signage requirements identified in Table 1.

Table 1. Signage Requirements for Sites of Direct Reuse of Reclaimed Water

| <u>Reclaimed Water Class</u> | <u>Hose Bibbs</u> | <u>Residential Irrigation</u> | <u>School-ground Irrigation</u> | <u>Other Open Access Irrigation</u> | <u>Restricted Access Irrigation</u> | <u>Mobile Reclaimed Water Dispersal</u> |
|------------------------------|-------------------|---------------------------------|--|-------------------------------------|---|---|
| <u>A+</u> | <u>Each bibb</u> | <u>Front yard</u> | <u>On premises visible to staff and students</u> | <u>None</u> | <u>None</u> | <u>Back of truck or on tank</u> |
| <u>A</u> | <u>Each bibb</u> | <u>Front yard</u> | <u>On premises visible to staff and students</u> | <u>None</u> | <u>None</u> | <u>Back of truck or on tank</u> |
| <u>B+</u> | <u>Each bibb</u> | <u>Direct Reuse Not Allowed</u> | <u>Direct Reuse Not Allowed</u> | <u>Direct Reuse Not Allowed</u> | <u>1. Ingress points</u> <u>2. On premises or at reasonably spaced intervals not more than 1/4 mile, as applicable to the use</u> <u>3. Notice on golf score cards, if applicable</u> | <u>Back of truck or on tank</u> |
| <u>B</u> | <u>Each bibb</u> | <u>Direct Reuse Not Allowed</u> | <u>Direct Reuse Not Allowed</u> | <u>Direct Reuse Not Allowed</u> | <u>1. Ingress points</u> <u>2. On premises or at reasonably spaced intervals not more than 1/4 mile, as applicable to the use</u> <u>3. Notice on golf score cards, if applicable</u> | <u>Back of truck or on tank</u> |

Arizona Administrative Register
Notices of Proposed Rulemaking

| | | | | | | |
|----------|----------------------|-------------------------------------|---|-------------------------------------|--|-------------------------------------|
| <u>C</u> | <u>Each bibb</u> | <u>Direct Reuse Not Allowed</u> | <u>Direct Reuse Not Allowed</u> | <u>Direct Reuse Not Allowed</u> | <u>1. Ingress points 2. On premises or at reasonably spaced intervals not more than 1/4 mile, as applicable to the use</u> | <u>Back of truck or on tank</u> |
|----------|----------------------|-------------------------------------|---|-------------------------------------|--|-------------------------------------|

NOTE: All impoundments with open access including lakes, ponds, ornamental fountains, waterfalls, and other water features must be posted with signs regardless of the class of reclaimed water.

R18-9-706. ~~Enforcement and Penalties~~ Operational Requirements for Irrigation with Reclaimed Water

~~Any person who releases reclaimed wastewater for reuse without a permit or contrary to provisions of a permit or this Article, falsifies data or information submitted to the Department as a result of the requirements of this Article, or otherwise violates the provisions of this Article, shall be subject to enforcement and penalties pursuant to A.R.S. §§ 49-262 and 49-263 and any other applicable and appropriate provisions of the Arizona Revised Statutes.~~

Irrigation with reclaimed water shall:

1. Reasonably preclude human contact with reclaimed water by such methods as limiting the time of application to avoid normal periods of use,
2. Prevent reclaimed water from standing on open access areas during normal periods of use,
3. Prevent reclaimed water from coming into contact with drinking fountains, water coolers, or eating areas, and
4. Secure hose bibs discharging reclaimed water to prevent any use by the public.

R18-9-707. ~~Severability~~ Reclaimed Water Individual Permit Application Process

~~If any provision of this Article is finally adjudicated invalid, the remaining provisions of this Article shall not be affected thereby.~~

- A. Preapplication conference. Upon request by the applicant, the Department shall schedule and hold a preapplication conference with an applicant to discuss any of the requirements of this Article.
- B. Permit application. A person who is required to or desires to obtain a Reclaimed Water Individual Permit shall submit a permit application on a form provided by the Department.
- C. Administrative completeness review. Upon receipt of a Reclaimed Water Individual Permit application, the Department shall review the application to determine its administrative completeness following the requirements of A.R.S. § 41-1074 and A.A.C. R18-1-503.
- D. Substantive review. Upon receipt of a Reclaimed Water Individual Permit application the Department shall review the application to determine its substantive adequacy following the requirements of A.R.S. § 41-1075 and A.A.C. R18-1-504.
- E. Draft permit. At its earliest opportunity, the Department shall provide the applicant a copy of the draft of the Reclaimed Water Individual Permit.
- F. Public participation.
 1. The Department shall publish a notice of the preliminary decision to issue or deny a Reclaimed Water Individual Permit within a period of time that allows the Department to meet the licensing timeframe requirements of A.A.C. R18-1-501 et seq. The Department shall publish the notice of the preliminary decision as a legal notice at least once, in 1 or more newspapers of general circulation in the county concerned.
 2. After the publication of the public notice, the Department shall conduct a public hearing if the Department determines either of the following:
 - a. That significant public interest in a public hearing exists.
 - b. That significant issues or information have been brought to the attention of the Department that have not been considered previously in the permitting process.
 3. The Department shall provide notice of any public hearing following A.A.C. R18-1-401(B) and (C) and conduct the public hearing as a general public hearing following A.A.C. R18-1-402.
- G. Final permit issuance or denial. Except as otherwise provided in this Section, the Department shall give the applicant written notification of its final decision to issue or deny the permit application within the overall licensing timeframe requirements of A.A.C. R18-1-501 et seq.
- H. If the Department denies a Reclaimed Water Individual Permit application the Department shall provide the applicant with a written notification that explains the following:
 1. The reasons for the denial with references to the statutes or rules on which the denial is based.
 2. The applicant's right to appeal the denial including the number of days the applicant has to file a protest challenging the denial and the name and telephone number of the Department contact person who can answer questions regarding the appeals process.
 3. The applicant's right to request an informal settlement conference under A.R.S. §§ 41-1092.03(A) and 41-1092.06.

Arizona Administrative Register
Notices of Proposed Rulemaking

R18-9-708. Individual Permit Application Requirements

- A.** A person applying for a Reclaimed Water Individual Permit shall provide the Department with all of the following information on a form provided by the Department:
1. The name and mailing address of the owner of the facility or the reclaimed water agent.
 2. The legal description of the direct reuse site or location of the facility including city or town, county, Township, Range, Section, 1/4, 1/4, 1/4, and latitude and longitude coordinates, as applicable to the type of direct reuse activity.
 3. Any other federal or state environmental permits issued to the applicant.
 4. Source of reclaimed water to be directly reused.
 5. Volume of reclaimed water to be directly reused on an annual basis.
 6. Class of reclaimed water to be directly reused.
 7. Description of the direct reuse activity.
- B.** A person applying for a Reclaimed Water Individual Permit shall provide the Department with a copy of the certificate of disclosure of violations required by A.R.S. § 49-109.
- C.** A person applying for a Reclaimed Water Individual Permit shall certify in writing that the information submitted in the application is true and accurate to the best of the applicant's knowledge.
- D.** The applicable permit fee following A.A.C. R18-14-101 et seq. and this rule.

R18-9-709. Reclaimed Water Individual Permit: General Provisions

- A.** A person who does not desire to operate under a reclaimed water general permit may apply for a reclaimed water individual permit by completing and submitting an individual permit application. The reclaimed water individual permit:
1. Shall be issued by the Department for a fixed term of 5 years;
 2. May be amended, transferred, reissued, or revoked by the Director; and
 3. Will automatically continue, pending the issuance of a new permit, with the same terms following its expiration if all of the following are met:
 - a. The permittee submits an application for a new permit, in good faith, at least 120 days before the expiration of an existing permit;
 - b. The permitted activity is of a continuing nature; and
 - c. The Department is unable, through no fault of the permittee, to issue a new permit before the expiration date of the permit.
- B.** The Department shall include in the reclaimed water individual permit the following requirements:
1. A statement of the class of reclaimed water to be produced and specific reuse applications or limitations on reuse;
 2. Provisions for monitoring reclaimed water quality and flow on a regular basis; and
 3. Provisions for reporting the following data on a regular basis:
 - a. Water quality test results demonstrating that the reclaimed water meets the applicable standards for the class of water identified in subsection (B)(1).
 - b. The total volume of reclaimed water generated for direct reuse.
 4. Provisions for maintaining records of all monitoring information and monitoring activities which include the following:
 - a. Date, exact place, and time of sampling or measurements.
 - b. Person who performed the sampling or measurements.
 - c. Date analyses were performed.
 - d. Person who performed the analyses.
 - e. Analytical techniques or methods used.
 - f. Results of the analyses, and
 - g. Documentation of sampling technique, sample preservation, and transportation, including chain-of-custody forms.
 5. Provisions to retain for 5 years from the date of sampling or analysis all records of monitoring activities and results, including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records. The 5-year retention period shall be extended under either of these circumstances:
 - a. Automatically during the course of any unresolved litigation regarding compliance with the permit conditions, or
 - b. As requested in writing by the Director.
 6. A requirement to allow access by all end users to the records of physical, chemical, and biological quality of the reclaimed water.
- C.** A reclaimed water individual permit may be transferred to another person if all of the following conditions are met:
1. The permittee notifies the Director of the proposed transfer.
 2. The permittee submits a written agreement containing a specific date for transfer of permit responsibility and coverage between the current permittee and the proposed new permittee, including an acknowledgment that the existing permittee is liable for violations up to the date of transfer and that the proposed new permittee will be liable for violations from that date forward.

Arizona Administrative Register
Notices of Proposed Rulemaking

3. The Director, within 30 days of receiving a transfer notice from the permittee, does not notify the current permittee and the proposed new permittee of the intent to amend, revoke and reissue, or terminate the permit and require the proposed new permittee to file an application for a new permit rather than agreeing to transfer the current permit.

R18-9-710. Direct Reuse of Industrial Wastewater

- A. Direct reuse of industrial wastewater with a component of sanitary wastewater for any use and direct reuse of industrial wastewater in the processing of any crop or substance that may be used as human or animal food shall be conducted under a reclaimed water individual permit.**
- B. In addition to the application requirements of R18-9-708, an application for a reclaimed water individual permit for direct reuse of industrial wastewater shall include the following information:**
 1. Each source of the industrial wastewater with Standard Industrial Code and the projected rates and volumes from each source.
 2. Chemical, biological and physical characteristics of the industrial wastewater, and
 3. If industrial wastewater is to be used in the processing of any crop or substance that may be used as human or animal food, the applicant shall submit information regarding food safety and any potential adverse health effects of this direct reuse.

R18-9-711. Notice Requirements for Reclaimed Water General Permits

- A. Reclaimed Water General Permit: Type 1. A person may directly reuse reclaimed water without notice of such use to the Department provided:**
 1. The direct reuse is specifically authorized in this Article by a Type 1 Reclaimed Water General Permit, and
 2. The direct reuse complies with the applicable requirements of this Article, including specific terms of the applicable Type 1 Reclaimed Water General Permit.
- B. Reclaimed Water General Permit: Type 2. A person may directly reuse reclaimed water under a Type 2 Reclaimed Water General Permit after filing with the Department a Notice of Intent for Direct Reuse of Reclaimed Water provided all of the following requirements are met:**
 1. The applicant shall submit, either by certified mail, in person at the Department, or by other method approved by the Department, the notice of intent on a form provided by the Department including the following information:
 - a. Name, address, and telephone number of the permittee;
 - b. Name, address, and telephone number of the contact person;
 - c. Source, volume and class of reclaimed water to be directly reused;
 - d. Location of the direct reuse site, including city or town, county, Township, Range, Section, 1/4, 1/4, 1/4, and latitude and longitude coordinates;
 - e. Description of the direct reuse activity, including a description of acreage and the type of vegetation to be irrigated, if applicable to the type of direct reuse activity;
 - f. A signature on the notice of intent certifying that the permittee agrees to comply with all requirements of this Article, including specific terms of the applicable Reclaimed Water General Permit; and
 - g. The applicable permit fee following A.A.C. R18-14-101 et seq. and this rule.
 2. The direct reuse meets all of the conditions of a Type 2 Reclaimed Water General Permit established in this Article.
- C. Reclaimed Water General Permit: Type 3.**
 1. A person may operate under a Type 3 Reclaimed Water General Permit after filing with the Department the applicable Notice of Intent to Operate and receiving from the Department a written Verification of General Permit Conformance for the subject operation.
 2. The applicant shall submit, either by certified mail, in person at the Department, or by other method approved by the Department, the notice of intent on a form provided by the Department and provide the information specified in the applicable Type 3 Reclaimed Water General Permit with the applicable fee following A.A.C. R18-14-101 et seq.
 3. After reviewing all required information, if the Department determines that the direct reuse conforms with the conditions of a Type 3 Reclaimed Water General Permit and all other applicable requirements of this Article, the Department shall issue the Verification of General Permit Conformance within 45 business days of receiving a complete notice of intent.
 4. If the Department determines on the basis of its review or an inspection that the direct reuse will not conform to the conditions of the applicable Type 3 Reclaimed Water General Permit or other applicable requirements of this Article, the Department shall notify the applicant of its decision not to issue the Verification of General Permit Conformance. If the Department makes such a determination, the applicant is not authorized to operate under the Type 3 Reclaimed Water General Permit. A decision not to issue a Verification of General Permit Conformance is an appealable agency action under A.R.S. §§ 41-1092 through 41-1092.12.
 5. If the Department does not issue the Verification of General Permit Conformance within 45 business days and does not notify the applicant that it will not issue the verification, the verification automatically becomes effective 45 business days following receipt of the complete notice of intent.

Arizona Administrative Register
Notices of Proposed Rulemaking

R18-9-712. Reclaimed Water General Permits: Duration, Renewal and Transfers

- A.** A Type 1 Reclaimed Water General Permit shall be valid as long as the conditions of the general permit and the requirements of this Article are met. A Type 2 Reclaimed Water General Permit shall be valid for 5 years from the date the Department receives the Notice of Intent for Direct Reuse of Reclaimed Water. A Type 3 Reclaimed Water General Permit shall be valid for 5 years from the date the Verification of General Permit Conformance becomes effective.
- B.** No less than 90 days before the date on which a reclaimed water general permit will expire, a permittee shall apply for a general permit renewal by following the process described in R18-9-711(B) or (C) as applicable with any applicable fee following A.A.C. R18-14-101 et seq.
- C.** The permittee shall provide notice to the Department of the transfer of a Type 2 or Type 3 Reclaimed Water General Permit by certified mail within 15 days following the transfer. The notice of transfer shall be submitted with any applicable fee following A.A.C. R18-14-101 et seq. and shall note any changed information on the Notice of Intent originally submitted to the Department.

R18-9-713. Reclaimed Water General Permits: Revocation

- A.** The Department may revoke a reclaimed water general permit if the permittee has failed to comply with any requirement of this Article, including specific conditions of the applicable Reclaimed Water General Permit.
- B.** Before revoking the general permit, the Department shall provide notice to the permittee by certified mail of the Department's intent to revoke the reclaimed water general permit and provide the permittee a reasonable opportunity to correct any noncompliance. The notice of intent to revoke the general permit shall specify a timeframe within which the permittee shall achieve compliance.
- C.** If the permittee fails to correct the noncompliance within the specified timeframe, the Director shall notify the permittee, by certified mail, of the Department's decision to revoke the reclaimed water general permit.
- D.** The Director may revoke reclaimed water general permits for facilities located within a specific geographic area if the Director determines that the cumulative effect of the facilities subject to the reclaimed water general permit are such that any water quality standard established under A.R.S. §§ 49-221 and 49-223 may be violated due to geologic or hydrologic conditions. The Director shall notify each permittee, by certified mail, of the Department's decision to revoke each reclaimed water general permit.

R18-9-714. Type 1 Reclaimed Water General Permit: Gray Water

- A.** A Type 1 Reclaimed Water General Permit is established for private residential direct reuse of gray water for a flow of less than 400 gallons per day provided all of the following conditions are met:
 - 1.** Human contact with gray water and soil irrigated by gray water should be avoided.
 - 2.** The gray water originates from the residence and is used and contained within the property boundary for household gardening, composting, lawn watering, or landscape irrigation.
 - 3.** Surface application of gray water shall not be used for irrigation of food plants except for citrus and nut trees.
 - 4.** The gray water shall not contain hazardous chemicals derived from activities such as cleaning of car parts, washing of greasy or oily rags, or disposal of waste solutions from home photo labs or similar hobbyist or home occupational activities.
 - 5.** Gray water systems which are used for disposal rather than irrigation are prohibited.
 - 6.** Application of gray water shall be managed to minimize standing water on the surface.
 - 7.** The gray water system is constructed so that in the case of blockage, plugging or backup of the system, gray water can be directed into the sewage collection system or on-site wastewater treatment and disposal system, as applicable. The gray water system may include a means of filtration to reduce the opportunity for plugging and to extend the system lifetime.
 - 8.** Any gray water storage tank shall be covered to restrict access and to eliminate habitat for mosquitoes or other vectors.
 - 9.** The gray water system is sited outside of any floodway.
 - 10.** The gray water system is operated so as to maintain a minimum vertical separation distance of at least 5 feet from the point of gray water application to the top of the seasonally high groundwater table.
 - 11.** For residences using an on-site wastewater treatment facility for black water treatment and disposal, the use of a gray water system shall not change the design, capacity, or reserve area requirements for the on-site wastewater treatment facility at the residence, thus ensuring that the facility can handle the combined black water and gray water flow if the gray water system fails or is not fully used.
 - 12.** Any pressure piping used in a gray water system that might be susceptible to cross connection with a potable water system shall be clearly marked.
 - 13.** Gray water applied by surface irrigation shall not contain water from a washing machine that is used to wash diapers or similarly soiled or infectious garments unless the gray water is disinfected before irrigation.
 - 14.** Surface irrigation by gray water shall be by flood or drip irrigation only. No spray irrigation is allowed.

Arizona Administrative Register
Notices of Proposed Rulemaking

- B.** Towns, cities, or counties may further limit the use of gray water described in this Section through passage of a rule or ordinance.

R18-9-715. Type 2 Reclaimed Water General Permit: Direct Reuse of Class A+ Reclaimed Water

- A.** A Type 2 Reclaimed Water General Permit is established for the direct reuse of Class A+ reclaimed water provided that all of the conditions of this Section and this Article are met.
- B.** Class A+ reclaimed water may be used for any direct reuse application specified in Appendix A.
- C.** The permittee shall maintain records for 5 years that identify the direct reuse site or sites and the total amount of reclaimed water used annually for each category of direct reuse activity listed in Appendix A. The permittee shall make these records available to the Department upon request.
- D.** Signs shall be posted according to R18-9-705(F).
- E.** No lining is required for an impoundment storing Class A+ reclaimed water.

R18-9-716. Type 2 Reclaimed Water General Permit: Direct Reuse of Class A Reclaimed Water

- A.** A Type 2 Reclaimed Water General Permit is established for Class A reclaimed water for any direct reuse specified in Appendix A provided that all of the conditions of this Section and this Article are met.
- B.** Records and Reporting. The permittee shall do all of the following:
1. Maintain records for 5 years that identify the direct reuse site or sites including volume of reclaimed water applied monthly for each category of direct reuse activity listed in Appendix A, the total nitrogen concentration of the reclaimed water applied, and the acreage and type of vegetation to which the reclaimed water is applied. These records shall be available to the Department upon request.
 2. Report annually to the Department the volume of reclaimed water received, the type of reclaimed water application, and, if used for irrigation, the vegetation and acreage that is irrigated.
- C.** Nitrogen management of Class A reclaimed water shall consist of:
1. Impoundments storing Class A reclaimed water shall be lined using a low-hydraulic conductivity artificial or site-specific liner material achieving a calculated discharge rate less than 550 gallons per acre per day; and
 2. The application rates of the reclaimed water shall be based on 1 of the following:
 - a. The water allotment assigned by the Arizona Department of Water Resources;
 - b. A water balance that considers consumptive use of water by the crop, turf, or landscape vegetation; or
 - c. An alternative method approved by the Department.
- D.** In addition to the notification requirements of R18-9-711, the applicant shall provide a list of impoundments and the liner characteristics and the method chosen from the list in subsection (B)(2).
- E.** Signs shall be posted according to R18-9-705(F).

R18-9-717. Type 2 Reclaimed Water General Permit: Direct Reuse of Class B+ Reclaimed Water

- A.** A Type 2 Reclaimed Water General Permit is established for the direct reuse of Class B+ reclaimed water provided that all of the conditions of this Section and this Article are met.
- B.** Class B+ reclaimed water may be used for the direct reuse applications specified for Class B and Class C reclaimed water in Appendix A.
- C.** The permittee shall maintain records for 5 years that describe the direct reuse site and the total amount of reclaimed water used annually for the permitted direct reuse activities. The permittee shall make these records available to the Department upon request.
- D.** Signs shall be posted according to R18-9-705(F).
- E.** No lining is required for an impoundment storing Class B+ reclaimed water.

R18-9-718. Type 2 Reclaimed Water General Permit: Direct Reuse of Class B Reclaimed Water

- A.** A Type 2 Reclaimed Water General Permit is established for Class B reclaimed water for any direct reuse application specified for Class B and Class C reclaimed water in Appendix A provided that all of the conditions of this Section and this Article are met.
- B.** Records and Reporting. The permittee shall do all of the following:
1. Maintain records for 5 years that identify the direct reuse site or sites including volume of reclaimed water applied monthly for each category of direct reuse activity listed in Appendix A, the total nitrogen concentration of the reclaimed water applied, and the acreage and type of vegetation to which the reclaimed water is applied. These records shall be available to the Department upon request.
 2. Report annually to the Department the volume of reclaimed water received, the type of reclaimed water application, and, if used for irrigation, the vegetation and acreage that is irrigated.
- C.** Nitrogen management of Class B reclaimed water shall consist of:
1. Impoundments storing Class B reclaimed water shall be lined using a low-hydraulic conductivity artificial or site-specific liner material achieving a calculated discharge rate less than 550 gallons per acre per day; and
 2. The application rates of the reclaimed water shall be based on 1 of the following:

Arizona Administrative Register
Notices of Proposed Rulemaking

- a. The water allotment assigned by the Arizona Department of Water Resources;
 - b. A water balance that considers consumptive use of water by the crop, turf, or landscape vegetation; or
 - c. An alternative method approved by the Department.
- D.** In addition to the notification requirements of R18-9-711, the applicant shall provide a list of impoundments and the liner characteristics and the method chosen from the list in subsection (B)(2).
- E.** Signs shall be posted according to R18-9-705(F).

R18-9-719. Type 2 Reclaimed Water General Permit: Direct Reuse of Class C Reclaimed Water

- A.** A Type 2 Reclaimed Water General Permit is established for Class C reclaimed water for any direct reuse application for Class C reclaimed water specified in Appendix A provided that all of the conditions of this Section and this Article are met.
- B.** Records and Reporting. The permittee shall do all of the following:
- 1. Maintain records for 5 years that identify the direct reuse site or sites including volume of reclaimed water applied monthly for each category of direct reuse activity listed in Appendix A, the total nitrogen concentration of the reclaimed water applied, and the acreage and type of vegetation to which the reclaimed water is applied. These records shall be available to the Department upon request.
 - 2. Report annually to the Department the volume of reclaimed water received, the type of reclaimed water application, and, if used for irrigation, the vegetation and acreage that is irrigated.
- C.** Nitrogen management of Class C reclaimed water shall consist of:
- 1. Impoundments storing Class C reclaimed water shall be lined using a low-hydraulic conductivity artificial or site-specific liner material achieving a calculated discharge rate less than 550 gallons per acre per day; and
 - 2. The application rates of the reclaimed water shall be based on 1 of the following:
 - a. The water allotment assigned by the Arizona Department of Water Resources;
 - b. A water balance that considers consumptive use of water by the crop, turf, or landscape vegetation; or
 - c. An alternative method approved by the Department.
- D.** In addition to the notification requirements of R18-9-711, the applicant shall provide a list of impoundments and the liner characteristics and the method chosen from the list in subsection (B)(2).
- E.** Signs shall be posted according to R18-9-705(F).

R18-9-720. Type 3 Reclaimed Water General Permit: Reclaimed Water Blending Facility

- A.** A Type 3 Reclaimed Water General Permit is established for a Reclaimed Water Blending Facility provided that all of the conditions of this Section and this Article are met. A person shall file with the Department a Notice of Intent to Operate a Reclaimed Water Blending Facility no less than 90 days before the date the proposed activity will start. The notice shall include all of the following:
- 1. Name, address, and telephone number of the permittee;
 - 2. Name, address, and telephone number of the contact person;
 - 3. Source and volume of reclaimed water to be blended;
 - 4. Class of reclaimed water to be blended;
 - 5. Source, volume and quality of other water to be blended;
 - 6. Location of reclaimed water blending facility, including city or town, county, Township, Range, Section, 1/4, 1/4, 1/4, and latitude and longitude coordinates;
 - 7. Description of the reclaimed water blending facility, including demonstration that the proposed blending methodology will meet the standards established in A.A.C. R18-11-301 et seq. for the class of reclaimed water the facility will produce;
 - 8. A signature on the notice of intent certifying that the applicant agrees to comply with the requirements of this Article, A.A.C. R18-11-301 et seq. and the terms of this reclaimed water general permit.
 - 9. The applicable permit fee following A.A.C. R18-14-101 et seq. and this rule.
- B.** A reclaimed water blending facility shall not operate until the Department issues a written Verification of General Permit Conformance.
- C.** The permittee shall monitor the blended water quality at least monthly for total nitrogen and at least weekly for fecal coliform as applicable to the final blended water quality.
- 1. If the concentration of either total nitrogen or fecal coliform, as applicable, exceeds the limits for the reclaimed water class established in A.A.C. R18-11-301 et seq., the permittee shall submit a report to the Department within 30 days with a proposal to change the blending process. The permittee shall also double the monitoring frequency for the next 2 months.
 - 2. If another exceedance occurs within the interval of increased monitoring, the permittee shall submit an application within 45 days for a Reclaimed Water Individual Permit.
- D.** The permittee shall monitor the volume of reclaimed water, the volume of the other water and the total volume of blended water delivered for direct reuse on a monthly basis.

Arizona Administrative Register
Notices of Proposed Rulemaking

E. The permittee shall report the results of the monitoring in subsections (C) and (D) on an annual basis and shall make this information available to the end users.

R18-9-721. Type 3 Reclaimed Water General Permit: Reclaimed Water Agent

A. A Type 3 Reclaimed Water General Permit is established for a Reclaimed Water Agent provided that all of the conditions of this Section and this Article are met. A person shall file with the Department a Notice of Intent to Operate as a Reclaimed Water Agent no less than 90 days before the date the proposed activity will start. The notice shall include all of the following:

1. The name, address, and telephone number of the proposed reclaimed water agent;
2. The name, address, and telephone number of the contact person; and
3. The following information for each end user supplied reclaimed water by the reclaimed water agent:
 - a. Name, address and telephone number of the end user;
 - b. Location of each direct reuse site, including city or town, county, Township, Range, Section, 1/4, 1/4, 1/4, and latitude and longitude coordinates;
 - c. Description of the direct reuse activity, including the type of vegetation to be irrigated, if applicable to the type of direct reuse activity;
 - d. Description of the acreage to be irrigated if the reclaimed water is not a plus classification; and
 - e. The annual volume of reclaimed water to be used at each direct reuse site.
4. The source, class and annual volume of reclaimed water to be directly reused;
5. Description of contractual arrangement between the reclaimed water agent and each end user.
6. The applicable permit fee following A.A.C. R18-14-101 et seq. and this rule.

B. A reclaimed water agent shall not distribute reclaimed water to end users until the Department issues a written Verification of General Permit Conformance.

C. The permittee shall monitor and report to the Department on an annual basis the total volume of reclaimed water provided to all end users.

D. For Classes A, B, or C reclaimed water, the permittee shall monitor and report to the Department on an annual basis the total acreage and the type of vegetation irrigated by each end user.

E. The permittee shall notify the Department, before the end of each calendar year, of any changes in the information submitted under subsection (A).

R18-9-722. Type 3 Reclaimed Water General Permit: Gray Water

A Type 3 Reclaimed Water General Permit is established for a gray water irrigation system if the gray water irrigation does not qualify for the general permit described in R18-9-714 provided that the flow is not more than 3000 gallons per day and the gray water system satisfies design and installation criteria contained in the Arizona Uniform Plumbing Code, Appendix G.

1. A person shall file with the Department a Notice of Intent to Operate a Gray Water Irrigation System no less than 90 days before the date the proposed activity as described in subsection (A) will start. The notice shall include all of the following:
 - a. Name, address and telephone number of the permittee;
 - b. Location of the direct reuse site, including city or town, county, Township, Range, Section, 1/4, 1/4, 1/4, and latitude and longitude coordinates;
 - c. Design plans;
 - d. A signature on the notice of intent certifying that the applicant agrees to comply with the requirements of this Article and the terms of this reclaimed water general permit; and
 - e. The applicable permit fee following A.A.C. R18-14-101 et seq. and this rule.
2. The Department may accept under this Type 3 Reclaimed Water General Permit a gray water system that differs in design and installation criteria contained in the Arizona Uniform Plumbing Code, Appendix G if the system provides equivalent performance and protection of human health and water quality. In addition to the requirements of subsection (A)(1), the applicant shall provide for the Department's review design plans and details to demonstrate equivalent performance.

R18-9-723. Enforcement and Penalties

Any person who violates a condition specified in a permit issued under Article 7, falsifies data or information submitted to the Department as a result of the requirements of Articles 6 or 7, or otherwise violates a provision of Article 6 or 7, is subject to the enforcement actions prescribed in A.R.S. §§ 49-261 and 262.

Arizona Administrative Register
Notices of Proposed Rulemaking

Appendix A

| <u>Type of Direct Reuse Application</u> | <u>Minimum Class of Reclaimed Water Required</u> |
|---|--|
| <u>Irrigation of food crops</u> | <u>A</u> |
| <u>Recreational and other open access impoundments</u> | <u>A</u> |
| <u>Residential landscape irrigation</u> | <u>A</u> |
| <u>Schoolground landscape irrigation</u> | <u>A</u> |
| <u>Other open access landscape irrigation (e.g., parks, cemeteries, greenbelts, common areas).</u> | <u>A</u> |
| <u>Toilet and urinal flushing</u> | <u>A</u> |
| <u>Fire protection systems</u> | <u>A</u> |
| <u>Commercial nurseries</u> | <u>A</u> |
| <u>Spray irrigation of an orchard or vineyard</u> | <u>A</u> |
| <u>Commercial air conditioning systems</u> | <u>A</u> |
| <u>Vehicle and equipment washing</u> | <u>A</u> |
| <u>Surface irrigation of an orchard or vineyard</u> | <u>B</u> |
| <u>Golf course irrigation</u> | <u>B</u> |
| <u>Restricted access landscape irrigation (e.g., highway medians and landscapes and similar areas)</u> | <u>B</u> |
| <u>Restricted access impoundment</u> | <u>B</u> |
| <u>Irrigation of food crops for human consumption that will be processed by pasteurizing or sterilizing</u> | <u>B</u> |
| <u>Dust control</u> | <u>B</u> |
| <u>Soil compaction and similar construction activities</u> | <u>B</u> |
| <u>Pasture for milking animals</u> | <u>B</u> |
| <u>Concrete and cement mixing</u> | <u>B</u> |
| <u>Materials washing and sieving</u> | <u>B</u> |
| <u>Street cleaning</u> | <u>B</u> |
| <u>Pasture for non-milking animals</u> | <u>C</u> |
| <u>Livestock watering (nondairy animals)</u> | <u>C</u> |
| <u>Irrigation of sod farms</u> | <u>C</u> |
| <u>Irrigation of fiber, seed, forage, fodder and similar crops</u> | <u>C</u> |
| <u>Silviculture</u> | <u>C</u> |

NOTICE OF PROPOSED RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY STANDARDS

ARTICLE 3. RECLAIMED WATER QUALITY STANDARDS

PREAMBLE

- 1. Sections Affected**

| | <u>Rulemaking Action</u> |
|------------|--------------------------|
| Article 3 | New Article |
| R18-11-301 | New Section |
| R18-11-302 | New Section |
| R18-11-303 | New Section |
| R18-11-304 | New Section |
| R18-11-305 | New Section |
| R18-11-306 | New Section |
| R18-11-307 | New Section |
| R18-11-308 | New Section |
| R18-11-309 | New Section |
| Appendix A | New Appendix |
- 2. The specific authority for the rulemaking, including both the authorizing statute (general) and the statutes that the rules are implementing (specific):**

General statutory authority: A.R.S. § 49-203(A)(1)

Specific statutory authority: A.R.S. § 49-221(E)
- 3. A list of all previous notices appearing in the Register addressing the proposed rule:**

Notice of Rulemaking Docket Opening: 6 A.A.R. 1442, April 14, 2000
- 4. The name and address of agency personnel with whom persons may communicate regarding the rule:**

Name: Mr. Steven Pawlowski

Address: Arizona Department of Environmental Quality
3033 N. Central Avenue
Phoenix, Arizona 85012

Telephone: (602) 207-4219

Fax: (602) 207-4528

E-mail: pawlowski.steven@ev.state.az.us
- 5. An explanation of the rule, including the agency's reasons for initiating the rule:**

Statutory authority

A.R.S. § 49-221(E) provides the Arizona Department of Environmental Quality (ADEQ) with the authority to adopt, by rule, water quality standards for the direct reuse of reclaimed water. A.R.S. § 49-221(E) states:

The director may adopt by rule water quality standards for the direct reuse of reclaimed water. In establishing these standards the director shall consider the following:

1. The protection of public health and the environment.
2. The uses that are being made or may be made of reclaimed water.
3. The degree to which standards for the direct reuse of reclaimed water may cause violations of water quality standards for other hydrologically connected water categories.

Applicability

The proposed reclaimed water quality standards apply to *the direct reuse of reclaimed water*. "Reclaimed water" is defined by A.R.S. § 49-201(31) and means water that has been treated or processed by a wastewater treatment plant or an onsite wastewater treatment facility. Reclaimed water includes gray water and industrial wastewater with a

component of sanitary wastewater. "Direct reuse" means the beneficial use of reclaimed water for a purpose allowed by the Department's proposed reclaimed water permitting rules and includes industrial wastewater used for the production or processing of any crops used as a human or animal food. The following do not constitute direct reuse of reclaimed water:

1. Use of water subsequent to its release under the conditions of a National Pollution Discharge Elimination system permit,
2. Use of water subsequent to discharge under the conditions of an Aquifer Protection Permit issued under 18 A.A.C. 9, Articles 1 through 4, or
3. Use of industrial wastewater or reclaimed water, or both, in a workplace that is subject to federal programs that protect workers from workplace exposures.

Existing reclaimed water quality standards

ADEQ intends to replace the current reclaimed water quality standards that are codified in Title 18, Chapter 9, Article 7 of the Arizona Administrative Code [*See* R18-9-701 through R18-9-707] with the proposed reclaimed water quality standards. The current reclaimed water quality standards have not been revised since their effective date, May 24, 1985. A.A.C. R18-9-703 and Tables I - IV in the current wastewater reuse rules prescribe numeric reclaimed water quality criteria and monitoring requirements for the reuse of treated wastewater. In general, the current rules prescribe allowable limits for pH, fecal coliform, turbidity, enteric viruses, and certain parasites in reclaimed water for different types of wastewater reuse [*See* Table I below].

The current wastewater reuse rules establish allowable limits for concentrations of bacteria, viruses, and parasites in reclaimed water to protect human health. In general, the stringency of the reclaimed water quality criteria depends on the type of reuse and the expected degree of human exposure to the reclaimed water. The current rules use the concentration of fecal coliform organisms as an indicator of the microbiological quality of the reclaimed water. The fecal coliform criteria are expressed as 5-sample geometric means and as single sample maximum concentrations. The geometric mean concentrations range from 2.2 cfu / 100 ml. to 1000 cfu / 100 ml depending on the type of reuse. The single sample maximum concentrations range from 25 cfu / 100 ml to 4000 cfu / 100 ml. Very stringent fecal coliform criteria (2.2 cfu / 100 ml) apply to the reuse of reclaimed water where the risk of ingestion of pathogens in the reclaimed water is considered to be high such as irrigation of food crops that are consumed raw. Stringent fecal coliform criteria (25 cfu / 100 ml) apply to the reuse of treated wastewater for open access landscape irrigation where there is a greater risk of human exposure to the reclaimed water by ingestion or exposure to reclaimed water aerosols and potential exposure of vulnerable populations (e.g., children, the elderly, and persons with compromised immune systems). Relatively stringent fecal coliform criteria apply to the reuse of reclaimed water in impoundments where full body contact recreation is intended (200 cfu / 100 ml). These fecal coliform criteria were established at concentrations that, at the time of their adoption in 1985, were equivalent to the existing surface water quality standards for full body contact recreation. Less stringent criteria (1000 cfu / 100 ml) apply to reuse applications where the risk of human exposure to pathogens is considered to be low (e.g., non-food crop irrigation, livestock watering).

The current wastewater reuse rules include reclaimed water quality criteria for turbidity for some reuse applications. The current turbidity criteria apply only to reclaimed water that is reused for open access landscape irrigation, the irrigation of food crops that are consumed raw, and for recreational impoundments (e.g., where partial body contact recreation and full body contact recreation may take place). The turbidity criterion that applies to the reuse of reclaimed water for full body contact recreational impoundments and irrigation of food crops that are consumed raw is very stringent: 1 nephelometric turbidity unit, or 1 NTU. This turbidity criterion is equivalent to the turbidity criterion that applies to finished drinking water after filtration. The turbidity criterion for reclaimed water that is reused for open access landscape irrigation and recreational impoundments where partial body contact recreation may take place is less stringent: 5 NTUs. However, both the 1 and 5 NTU turbidity criteria are technology-forcing parameters that can be achieved only if wastewater undergoes treatment that includes filtration. In fact, it has been reported to ADEQ that is difficult for a wastewater treatment plant to achieve consistent compliance with a 1 NTU turbidity standard even when coagulation and filtration are provided. The 1 NTU turbidity standard may operate as a regulatory barrier to the reuse applications where it applies. Currently, there are no reuse permits for the irrigation of food crops that are consumed raw or for impoundments of reclaimed water where full body contact recreation is an intended reuse of reclaimed water.

The current wastewater reuse rules prescribe reclaimed water quality criteria for enteric viruses. Stringent enteric virus criteria apply to the reuse of reclaimed water for irrigation of food crops that are consumed raw and for impoundments where full body contact recreation takes place. The applicable enteric virus standard for these reuse applications is 1 plaque forming unit, a most probable number of 1, or 1 immunofluorescent foci per 40 liters. Like

Arizona Administrative Register
Notices of Proposed Rulemaking

the 1 NTU turbidity standard, the stringency of this enteric virus criterion may operate as a regulatory barrier to the reuse applications where it applies. Less stringent enteric virus criteria apply to the reuse of reclaimed water for open access landscape irrigation and for recreational impoundments where partial body contact recreation may take place [125 enteric virus units per 40 liters]. While the current reuse rules prescribe enteric virus standards, the rules do not require reuse permittees to monitor routinely for viruses [See R18-9-703(B)].

The current reuse rules prescribe reclaimed water quality criteria for parasites, including *Entamoeba histolytica*, *Giardia lamblia*, *Ascaris lumbricoides*, and the common large tapeworm. The applicable criterion for each of these parasites is “none detectable.” Reclaimed water quality criteria for parasites apply to the reuse of reclaimed water for recreational impoundments, irrigation of food crops that are consumed raw, irrigation of pastures, livestock watering, and open access landscape irrigation [See Table I below]. Again, the current rules prescribe reclaimed water quality standards for parasites, but they do not require routine monitoring for parasites [See R18-9-703(B)].

Finally, reclaimed water that is used for agricultural irrigation, livestock watering, and in recreational impoundments must comply with surface water quality standards for trace substances, organic chemicals, toxic substances, and radiochemicals [See R18-9-703(A)]. Like the monitoring requirements for viruses and parasites, the current rules state that reuse permittees are not required to conduct routine monitoring for the presence of trace substances, organic chemicals, toxic substances, or radiochemicals in reclaimed water [See R18-9-703(B)].

Table I. Allowable Permit Limits for Specific Reuses in Current Wastewater Reuse Rules

| Parameter | Orchards | Fiber, Seed & Forage | Pastures | Livestock Watering | Processed Food | Restricted Access Landscape Irrigation | Open Access Landscape Irrigation | Food Consumed Raw | Partial Body Contact | Full Body Contact |
|-------------------------|----------|----------------------|----------|--------------------|----------------|--|----------------------------------|-------------------|----------------------|-------------------|
| pH | 4.5 - 9 | 4.5 - 9 | 4.5 - 9 | 4.5 - 9 | 4.5 - 9 | 4.5 - 9 | 4.5 - 9 | 4.5 - 9 | 6.5 - 9 | 6.5 - 9 |
| Fecal coliform | | | | | | | | | | |
| 5-sample geometric mean | 1000 | 1000 | 1000 | 1000 | 1000 | 200 | 25 | 2.2 | 1000 | 200 |
| Single sample maximum | 4000 | 4000 | 4000 | 4000 | 2500 | 1000 | 75 | 25 | 4000 | 800 |
| Turbidity [NTUs] | | | | | | | 5 | 1 | 5 | 1 |
| Enteric Viruses | | | | | | | 125 / 40 L | 1 / 40 L | 125 / 40 L | 1 / 40 L |
| Entamoeba Histolytica | | | | | | | | None Detectable | | None Detectable |
| Giardia Lamblia | | | | | | | | None Detectable | | None Detectable |
| Ascaris Lumbricoides | | | | | | | None Detectable | None Detectable | None Detectable | None Detectable |

Arizona Administrative Register
Notices of Proposed Rulemaking

| | | | | | | | | | | |
|-----------------------------|--|--|--------------------|--------------------|--|--|--|--|--|--|
| Common Large Tapeworm | | | None Detectable | None Detectable | | | | | | |
|-----------------------------|--|--|--------------------|--------------------|--|--|--|--|--|--|

The reuse of effluent from onsite wastewater treatment plants

The current wastewater reuse rules include reclaimed water quality standards and monitoring requirements for surface irrigation with on-site wastewater treatment plant effluent and gray water [See R18-9-703(C)(5) and (6)]. The current rules include microbiological water quality standards that are expressed as fecal coliform concentrations and chlorine residual requirements. The monitoring requirements in the current rules are minimal. Under the current rules, a reuse permittee must take a series of five samples of reclaimed water in one calendar month at least once a year and have the samples analyzed for fecal coliform. The current rules require monitoring for chlorine residual at least once a month.

Table II. Allowable Limits and Monitoring Requirements for Surface Irrigation With Onsite Wastewater Treatment Plant Effluent and Gray Water in Current Wastewater Reuse Rules

| Parameter | Allowable Limits | Samples Required |
|---|-------------------------|--|
| Fecal Coliform [geometric mean] | 25 | Series of 5 in one calendar month; 1 series / year |
| Fecal Coliform [Single sample maximum] | 75 | Series of 5 in one calendar month; 1 series / year |
| Chlorine Residual [in mg/L] | 2.0 | 1 / month |

The reuse of reclaimed water in constructed wetlands

The current wastewater reuse rules prescribe water quality criteria for reclaimed water that is released to a manmade wetlands marsh [See Table III below]. R18-9-703(C)(7) states that the formation of a wetlands marsh is “an allowable reuse.” Table III prescribes criteria for fecal coliform, pH, maximum daily pH change, dissolved oxygen, and temperature. Under the current wastewater reuse rules, reclaimed water that is released to a manmade wetlands marsh must comply with surface water quality standards for trace substances to protect aquatic life and wildlife. Again, reuse permittees are not required to monitor routinely for trace substances.

Table III. Allowable Limits and Monitoring Requirements for Reclaimed Wastewater Released to Wetlands Marshes in Current Wastewater Reuse Rules

| Parameter | Allowable Limit | Samples Required |
|---|--|--|
| Fecal Coliform [30-day geometric mean] | 1000 cfu / 100 ml | 5 / month if flow is < 1 MGD |
| [Single sample maximum] | 4000 cfu / 100 ml | 10 / month if flow is greater than or equal to 1 MGD |
| pH | 6.5 - 8.6 | 1 / week |
| pH change | 0.5 | Monitoring frequency not prescribed |
| Dissolved oxygen | 6 mg/L | 2 / week |
| Temperature | Shall not interfere with aquatic life and wildlife | 2 / week |

Arizona Administrative Register
Notices of Proposed Rulemaking

| | | |
|------------------|-------------------------------------|-------------------------------------|
| Trace Substances | Per A&W criteria in 18 A.A.C. 11 | Monitoring frequency not prescribed |
|------------------|-------------------------------------|-------------------------------------|

Why does ADEQ propose to change the existing reclaimed water quality standards?

ADEQ proposes to change the current reclaimed water quality standards for the following reasons:

1. ADEQ questions the scientific defensibility of the current fecal coliform criteria that are prescribed for the various reuse applications.
2. ADEQ proposes to conform the pH values that are prescribed in the current wastewater reuse rules to pH values that are required under federal secondary treatment regulations for wastewater treatment plants. The range of pH values in the current rules (4.5 to 9.0 standard units) is inconsistent with the range of effluent values for pH that must be maintained under the federal secondary treatment regulations (6.0 to 9.0 standard units).
3. ADEQ questions whether it is technically or economically feasible for a wastewater treatment plant to achieve compliance with the 1 NTU turbidity criterion that applies to the reuse of reclaimed water for the irrigation of food crops that are consumed raw and for recreational impoundments where full body contact recreation is an intended use. ADEQ questions the necessity of requiring this high a level of clarification before reclaimed water can be safely reused for food crop irrigation or in recreational impoundments.
4. ADEQ questions the scientific defensibility of the current enteric virus criteria for reclaimed water and whether they can be practically implemented. There are significant problems with monitoring compliance with enteric virus criteria. The routine examination of reclaimed water for enteric viruses is not recommended in Standard Methods for the Examination of Water and Wastewater because of the need for highly specialized laboratories and trained virologists to conduct the viral assays. There are problems with: 1) a lack of laboratory capacity, 2) significant limitations of the available analytical methodologies, 3) the lack of timeliness of analytical results of viral assays, and 4) a lack of consensus regarding the health significance of enteric virus concentrations in reclaimed water.
5. ADEQ questions the scientific basis for the current reclaimed water quality standards for parasites. Again, laboratory capacity and a lack of reliable analytical methods for the identification of *Entamoeba histolytica*, *Giardia lamblia*, *Ascaris lumbricoides* and the common large tapeworm are problems. Also, ADEQ believes that analyses for specific parasites are unnecessary if minimum treatment requirements and required analyses for a microbiological indicator parameter are included in the reclaimed water quality standards rules.
6. ADEQ believes that the current reclaimed water quality standards can be revised to be more clear, concise, and understandable. The reclaimed water quality standards can be written to provide more regulatory certainty to the operators of water reclamation plants. Clearer design or performance standards which provide more regulatory certainty are an incentive for water reclamation. The encouragement of water reclamation through the development of clear, concise, and understandable reclaimed water quality standards is an important objective of this rulemaking.
7. The numeric, criteria-based approach to establishing reclaimed water quality standards reflected in Arizona's current rules has been criticized because it is not clear how many reclaimed water quality standards should be established or for which parameters.
8. Implementation of a numeric, criteria-based approach relies upon extensive end-of-process monitoring. Critics of this approach point out that not all criteria that have been established are capable of being adequately analyzed [e.g., enteric viruses and parasites]. It is argued that the required monitoring often involves complex, time-consuming, and expensive analytical procedures and that few operators of wastewater treatment plants employ the personnel or have the equipment necessary to perform the necessary analyses. Provisions in the current wastewater reuse rules that establish standards for enteric viruses, parasites, and chemical pollutants but which also state that reuse permittees are not required to conduct routine compliance monitoring lend support to this criticism. It has been argued that better protection of the public health and the environment is provided by an approach which requires that wastewater undergo a prescribed set of minimum treatment processes and meet a limited number of reclaimed water quality criteria that give reasonable assurance that a water reclamation plant is operating properly and that the reclaimed water can be reused safely.
9. The reclaimed water quality standards should be revised to recognize new types of wastewater reuse.
10. The reclaimed water quality standards should be revised to be more consistent with EPA recommendations for wastewater reuse.

In 1992, The U.S. Environmental Protection Agency [EPA] published a guidance document containing recommended guidelines for wastewater reuse [*See Guidelines for Water Reuse*, U.S. Environmental Protection Agency, EPA/ 625 / R-92 / 004, September, 1992]. The EPA guidelines include recommended reclaimed water quality standards that are expressed as a combination of minimum treatment process requirements and reclaimed water quality criteria. EPA's recommendations are based upon an extensive review of water reclamation practice in the United States; research and pilot plant or demonstration study data; a review of the literature on wastewater reuse; various state reuse regulations, policies or guidelines; current engineering practice; and technical feasibility. In the *Guidelines for Water Reuse*, EPA explained that its recommendations for wastewater reuse were expressed as a combination of recommended treatment processes and reclaimed water quality limits for the following reasons:

1. Specific reclaimed water quality criteria that employ the use of surrogate parameters may not adequately characterize reclaimed water quality,
2. A combination of required treatment processes and reclaimed water quality requirements known to produce reclaimed water of acceptable quality obviates the need to monitor reclaimed water for many pollutants [e.g., some health-significant chemical constituents or pathogenic microorganisms], and
3. Expensive, time-consuming, and, in some cases, questionable monitoring for pathogenic organisms, such as viruses, is eliminated without compromising public health protection.

[*See EPA Guidelines for Water Reuse*, p. 139]

ADEQ proposes to adopt reclaimed water quality standards following the regulatory approach outlined in the EPA *Guidelines for Water Reuse*. ADEQ intends to establish 5 reclaimed water quality categories that specify minimum levels of treatment. ADEQ also will propose a limited number of numeric reclaimed water quality criteria. Together, the proposed requirements will provide reasonable assurance that the reclaimed water can be reused safely without adversely affecting public health or the environment. Wastewater treatment plants will be required to monitor for compliance with reclaimed water quality criteria in the plant or at the point where reclaimed water enters a distribution system. The monitoring requirements will provide timely data on whether required wastewater treatment processes are operating correctly. For example, ADEQ also will propose reclaimed water quality criteria and monitoring requirements for turbidity, total nitrogen, and fecal coliform or *E. coli* bacteria. Compliance with required secondary treatment requirements will be determined by monitoring compliance with certain conventional pollutants such as pH, total suspended solids, and 5-day biochemical oxygen demand.

ADEQ's proposed revisions of the reclaimed water quality standards are based, in part, on other states' approaches to wastewater reuse regulation, particularly the states of California and Florida. The State of California has established statewide reclamation criteria based upon prescribed wastewater treatment processes. Descriptive terms for required treatment processes are used rather than numeric criteria for specific pollutants. For example, the California regulations require that wastewater be "oxidized, clarified, coagulated, filtered, and disinfected" before it can be reused for open access landscape irrigation. To ensure that reclaimed water can be expected to be free of pollutants and pathogens, required treatment processes, monitoring requirements, operation and maintenance procedures, and treatment reliability requirements are prescribed. The California regulations also prescribe a limited number of numeric reclaimed water quality criteria. For example, the California rules include disinfection requirements that are expressed as maximum allowable total coliform concentrations. The California rules also prescribe numeric criteria for turbidity and pH. Many western states, including Colorado, Idaho, Montana, and Oregon have followed the California model. The California approach provides regulatory flexibility by recognizing that methods of treatment other than the specific treatment trains prescribed in the California reclamation criteria may be used. The California rules state that an alternative method of treatment is acceptable if it can be demonstrated to the satisfaction of the regulatory agency that the alternative method of treatment and its reliability features are equivalent to the treatment processes and reliability features prescribed in the statewide reclamation criteria [*See Title 22, California Administrative Code, Wastewater Reclamation Criteria, Article 5.5, § 60320.5. Other Methods of Treatment*].

The State of Florida uses a similar approach to wastewater reuse regulation. The Florida Department of Environmental Protection has written rules governing the reuse of reclaimed water to ensure that communities and wastewater utilities that practice wastewater reclamation provide enough treatment and disinfection so that continuous and reliable supplies of high quality reclaimed water are produced. Chapter 62-600 of the Florida Administrative Code prescribes requirements for domestic wastewater management facilities, including minimum treatment and disinfection requirements. Secondary treatment is a minimum treatment standard for wastewater treatment plants in Florida. Chapter 62-610 specifically addresses the reuse of reclaimed water. Florida prescribes basic, intermediate, and high level disinfection requirements depending upon the type of reuse. Disinfection requirements consist of minimum chlorine residual requirements and fecal coliform limits. Florida's wastewater reuse regulations are generally consistent with EPA recommendations in the *Guidelines for Water Reuse*.

Why does Arizona need reclaimed water quality standards?

Water reclamation is an important strategy for conserving and augmenting Arizona's potable water supply. Source substitution, or the reuse of reclaimed water to replace potable water that currently is used for nonpotable purposes, conserves higher quality sources of water for human consumption and domestic purposes. Many urban, commercial, industrial, and agricultural water demands can be satisfied with reclaimed water that is not of drinking water quality. For example, it is not necessary to use drinking water for landscape irrigation, agricultural irrigation, industrial processing, cooling water, or for toilet flushing. Reclaimed water can be reused safely for these nonpotable uses. Every gallon of reclaimed water that is reused for a nonpotable purpose conserves a gallon of drinking water that otherwise would be used for that purpose.

Treated wastewater, or reclaimed water, can be reused safely in many beneficial ways [See Appendix A of the proposed rules]. For example, reclaimed water can be reused for agricultural irrigation, including the irrigation of food crops. Reclaimed water can be reused to irrigate orchards, vineyards, pastures, sod farms, plant nurseries, and tree farms. Reclaimed water may be used for livestock watering. Reclaimed water can be reused for landscape irrigation, including the irrigation of golf courses, parks, highway landscapes, cemeteries, greenbelts, common areas, and large turf areas. If adequately treated, reclaimed water can be reused safely to irrigate school grounds, playgrounds, and residential lawns. Reclaimed water can be reused in industrial facilities for cooling water, stack scrubbing, or process water. Reclaimed water can be used in separate distribution systems for flushing toilets and urinals and priming drain traps in industrial, commercial, and residential buildings. Reclaimed water can be reused to create artificial lakes, lagoons, ponds, and other recreational and landscape water features. Reclaimed water can be reused in various urban and construction applications, including soil compaction, dust control, street washing, equipment washdown, materials washing, and for making concrete. In some states, reclaimed water is being used for stream augmentation, snow-making, aquaculture, and to recharge groundwater that is a source of drinking water (i.e., indirect potable reuse).

How does ADEQ propose to change the standards for reclaimed water?

ADEQ proposes to establish 5 classes of reclaimed water. The 5 classes of reclaimed water are expressed as a combination of minimum treatment requirements and a limited set of numeric reclaimed water quality criteria. For reuse applications where there is a relatively high risk of human exposure to potential pathogens in the reclaimed water, Class A reclaimed water will be required. Where the potential risk to public health is lower, Classes B and C reclaimed water are acceptable. ADEQ proposes to require a minimum of secondary treatment for all 5 classes of reclaimed water.

The proposed rules include Class A+ and Class B+ reclaimed water. The two "+" categories of reclaimed water include nitrogen removal treatment requirements. Both "+" categories require treatment to produce a reclaimed water with a total nitrogen concentration of less than 10 mg / L. ADEQ's purpose in establishing the "+" categories is to create two categories of reclaimed water whose reuse minimizes the risk of nitrate contamination of groundwater beneath reuse application sites. ADEQ would like to emphasize that the proposed rules do *not* require the reuse of the "+" categories of reclaimed water. However, ADEQ hopes to encourage the production and reuse of the "+" categories of reclaimed water by providing regulatory incentives in a parallel rulemaking to revise the reuse permit program rules.

Class A+ reclaimed water

Class A+ reclaimed water is a wastewater that has undergone a minimum of secondary treatment, filtration, nitrogen removal treatment, and high level disinfection. A wastewater treatment plant that produces Class A+ reclaimed water must have chemical addition facilities so it has the capability of adding coagulants or polymers if they are necessary to achieve consistent compliance with the Class A+ reclaimed water quality criteria. Class A+ reclaimed water may be safely reused for any reuse application that is listed in Appendix A of the proposed rules. However, Class A+ reclaimed water is *not* required for any reuse application. Wastewater treatment plant operators may choose to produce Class A+ reclaimed water, but nothing in the proposed rules requires a wastewater treatment plant to provide Class A+ treatment. ADEQ hopes to encourage the production and reuse of Class A+ reclaimed water by making it easier to reuse Class A+ reclaimed water. ADEQ will encourage the reuse of Class A+ reclaimed water by reducing the regulatory burden on reuse permittees who directly reuse it. For example, water balance requirements that are typically written into wastewater reuse permits now to ensure consumptive use of reclaimed water and to prevent nitrate contamination of groundwater will not be necessary in individual and general reuse permits for the reuse of Class A+ reclaimed water. This is because the total nitrogen concentration in Class A+ reclaimed water will be less than 10 mg / L. Class A+ reclaimed water already complies with the applicable aquifer water quality standard for nitrate at the point of use.

Class A+ Reclaimed Water

Arizona Administrative Register
Notices of Proposed Rulemaking

Secondary treatment + nitrogen removal treatment + chemical feed facilities¹ + filtration + disinfection

No detectable fecal coliform organisms (7-sample median); < 23 / 100 ml (single sample maximum)

Filtered effluent turbidity prior to disinfection: 2 NTU (24-hour average); not to exceed 5 NTU at any time

Total nitrogen: < 10 mg/L (5-sample geometric mean)

¹ Coagulation or polymer addition may be required if filtered effluent prior to disinfection does not meet turbidity criteria.

Class A reclaimed water

Class A reclaimed water is the same as Class A+ reclaimed water without the nitrogen removal requirement. Class A reclaimed water is a wastewater that has undergone a minimum of secondary treatment, filtration, and high level disinfection. Chemical addition facilities and the capability of adding coagulants or polymers are required to ensure treatment reliability and compliance with Class A reclaimed water quality criteria. However, chemical addition facilities may remain idle if the turbidity criteria for filtered effluent prior to disinfection can be met without chemical addition. Class A reclaimed water may be safely reused for any reuse application listed in Appendix A of the proposed rules. ADEQ proposes to require Class A reclaimed water for irrigation of food crops that are consumed raw, spray irrigation of orchards and vineyards, open access landscape irrigation, recreational impoundments [e.g., where fishing and boating take place], reuse in fire protection systems, vehicle washing, commercial air conditioning, and for toilet and urinal flushing.

Class A Reclaimed Water

Secondary treatment + chemical addition facilities¹ + filtration + disinfection

No detectable fecal coliform organisms (7-sample median)

< 23 / 100 ml (single sample maximum)

Filtered effluent turbidity prior to disinfection: 2 NTU (24-hour average);

Not to exceed 5 NTU at any time

¹ Coagulation or polymer addition may be required if filtered effluent prior to disinfection does not meet turbidity criteria.

ADEQ proposes to adopt an alternative methods rule for Class A+ and Class A reclaimed water. Under the proposed alternative methods rule, ADEQ may allow a water reclamation plant to use an alternative treatment train or to operate at average turbidities higher than 2 NTUs prior to disinfection provided:

- 1) The wastewater treatment plant complies with all of the disinfection criteria for Class A reclaimed water,
- 2) The wastewater treatment plant operator demonstrates that the alternative wastewater treatment process achieves a four log removal of enteric virus (99.99%), and 3) the wastewater treatment plant conducts routine monitoring for enteric viruses to demonstrate that the water reclamation plant reliably produces an essentially pathogen-free reclaimed water using alternative methods.

There are existing water reclamation systems currently in operation in Arizona that produce an essentially pathogen-free reclaimed water using a combination of wastewater treatment processes and blending but which operate at average turbidities that are greater than the proposed average operating turbidity of 2 NTUs for Class A reclaimed water. For example, the Tucson Water reclamation system treats secondarily-treated effluent using a combination of filtration, blending of groundwater from their Sweetwater Underground Storage and Recovery facility, and disinfection. Tucson Water has submitted reclaimed water quality data to ADEQ which indicate that the average turbidities of the reclaimed water provided to their reclamation system in 1994 and 1995 were approximately 4 NTUs. However, in 1994, only 12 of 365 daily samples tested positive for fecal coliform and only one sample exceeded the proposed single sample maximum concentration of 23 cfu / 100 ml. for Class A reclaimed water. In 1995, only 2 out of 361 reclaimed water quality samples tested positive for fecal coliform. Only one sample exceeded the proposed single sample maximum concentration for fecal coliform for Class A reclaimed water. Tucson Water also conducted virus monitoring during this time period and no enteroviruses were detected in 7 samples taken over the 2-year period. The operating experience and the water quality data from the Tucson Water reclamation system demonstrate that it is possible to use alternative methods of treatment, operate at higher average turbidities than 2 NTUs, and still produce a Class A reclaimed water that is essentially pathogen-free. For this reason, ADEQ included a provision in the pro-

posed Class A reclaimed water quality standard rule that permits alternative methods of treatment and operation with average operating turbidities greater than 2 NTUs provided the reclaimed water provider demonstrates that the alternative methods reliably produce a reclaimed water that is equivalent to Class A reclaimed water.

Class B+ reclaimed water

Class B+ reclaimed water is a wastewater that has undergone a minimum of secondary treatment, nitrogen removal treatment, and disinfection. The disinfection requirements for Class B+ reclaimed water are equivalent to those required for a wastewater treatment plant that discharges treated wastewater to a surface water that is protected for full body contact recreation (e.g., swimming). The Class B+ category includes pH, 5-day biochemical oxygen demand (BOD₅), and total suspended solids (TSS) criteria for Class B+ reclaimed water that are based upon federal secondary treatment regulations [See 40 CFR § 133.105]. Again, ADEQ does not propose to require Class B+ reclaimed water for any reuse application. However, a water reclamation plant operator may choose to produce denitrified Class B+ reclaimed water to reduce the regulatory burden on customers who reuse Class B+ reclaimed water under individual or general reuse permits. Class B+ reclaimed water may be used for any reuse application where Class B or Class C reclaimed water is acceptable.

Class B+ Reclaimed Water

Secondary treatment + nitrogen removal treatment + disinfection

| | |
|--------------------|--|
| <i>E. coli</i> : | 126 cfu / 100 ml (7-sample median) 576 / 100 ml (single sample maximum) |
| Total nitrogen: | < 10 mg/L (5-sample geometric mean) |
| pH: | 6.0 to 9.0 |
| BOD ₅ : | 30 mg / L (30-day average) 45 mg/L (7-day average) 30-day average percent removal: 85% |
| TSS: | 30 mg/L (30-day average) 45 mg/L (7-day average) 30-day average percent removal: 85% |

Class B reclaimed water

Class B reclaimed water is a wastewater that has undergone a minimum of secondary treatment and disinfection. The Class B requirements for pH, 5-day biochemical oxygen demand, and total suspended solids are based on the federal definition of secondary treatment under 40 CFR § 133.105. The disinfection requirements for Class B reclaimed water are expressed as *E. coli* concentrations. The proposed *E. coli* criteria for Class B reclaimed water are equivalent to the level of water quality protection provided to a surface water that is protected for full body contact recreation (e.g., swimming) under the surface water quality standards rules. ADEQ believes that Class B reclaimed water should be safe for the reuse applications where it is required because the relative risk of human exposure to pathogens in Class B reclaimed water in the reuse applications where it is allowed is lower than the risk of exposure to pathogens in a surface water that a person may swim in at an acceptable level of risk.

Class B reclaimed water may be reused safely for irrigation of nonfood crops and pastures, surface irrigation of orchards and vineyards, irrigation of food crops that are commercially processed to destroy pathogens, restricted access landscape irrigation, golf course irrigation, landscape impoundments, livestock watering, construction applications [e.g., soil compaction, materials washing and sieving, and making concrete], dust control, and street washing. Class B reclaimed water also may be used for any reuse application where Class C reclaimed water is acceptable such as irrigation of pasture for non-milking animals, livestock watering (non-dairy animals), sod farm irrigation, silviculture, and irrigation of fiber, seed, forage, and other nonfood crops.

Class B Reclaimed Water

Secondary treatment + disinfection

| | |
|------------------|--|
| <i>E. coli</i> : | 126 cfu / 100 ml (7-sample median) 576 cfu / 100 ml (single sample maximum) |
|------------------|--|

Arizona Administrative Register
Notices of Proposed Rulemaking

| | |
|--------------------|--|
| pH: | 6.0 to 9.0 |
| BOD ₅ : | 30 mg / L (30-day average) 45 mg/L (7-day average) 30-day average percent removal: 85% |
| TSS: | 30 mg/L (30-day average) 45 mg/L (7-day average) 30-day average percent removal: 85% |

Class C reclaimed water

Class C reclaimed water is a wastewater that has been treated in wastewater stabilization ponds. Wastewater stabilization ponds require relatively large land areas and they are commonly used by smaller, rural communities with the available land. Wastewater stabilization ponds are often arranged in a series of anaerobic, facultative, and maturation ponds with an overall detention time of 20 - 180 days, depending upon the climate and the effluent quality required. Wastewater stabilization ponds are considered a low-rate secondary treatment process. Most organic matter removal occurs in anaerobic and facultative ponds. Maturation ponds, which are largely aerobic, are designed primarily to remove pathogenic microorganisms following biological oxidation processes. A well-designed stabilization pond system is capable of reducing biochemical oxygen demand to 15 - 30 mg/ L and total suspended solids to 15 - 40 mg / L. They are capable of achieving a 6-log reduction of bacteria, a 3-log reduction of helminths, and a 4-log reduction of viruses and cysts [*See EPA Guidelines for Water Reuse*, p. 31]. Pathogen removals by wastewater stabilization pond systems can be erratic, but systems having long hydraulic retention times can effectively reduce pathogen concentrations to low levels.

Disinfection of Class C reclaimed water is not always required. A wastewater stabilization pond system may be able to meet the fecal coliform criteria for Class C reclaimed water without disinfection. Because Class C reclaimed water may not be disinfected, its reuse is restricted to uses where public access to the reuse site and the risk of human exposure to pathogens in the reclaimed water are limited [e.g., irrigation of nonfood crops such as cotton].

Class C Reclaimed Water

Secondary treatment by wastewater stabilization ponds with multiple cells

Minimum total retention time: 30 days

Fecal coliform: 1000 cfu / 100 ml (7-sample median)

4000 cfu / 100 ml (single sample maximum)

The protection of the public health is the primary objective of the proposed reclaimed water quality standards. The public health may be protected by: 1) reducing the concentrations of pathogenic bacteria, parasites, and viruses in reclaimed water through appropriate wastewater treatment; and 2) limiting human exposure to reclaimed water at sites where reclaimed water is reused. Where human exposure to reclaimed water is likely, reclaimed water should be highly treated prior to its reuse to minimize the risk to public health. Conversely, where public access to a reuse site can be restricted so that human exposure to the reclaimed water is unlikely, a lower level of treatment is acceptable, provided worker safety is not compromised. Other reclaimed water quality objectives include prevention of ground-water contamination, avoiding the creation of nuisance conditions, producing an aesthetically acceptable reclaimed water, and meeting the specific water quality requirements of reusers.

What reuse applications are recognized in the current rules and does ADEQ propose to amend or eliminate any of them in this rulemaking?

Existing reuse applications allowed by the current rules include the use of reclaimed water for the irrigation of orchards; irrigation of fiber, seed and forage crops; irrigation of pastures; irrigation of food crops that are eaten raw; irrigation of food crops that undergo additional processing; livestock watering; landscape irrigation (open access and restricted access); creation of artificial wetlands; industrial reuse applications and the creation of impoundments where full body contact and incidental human contact may occur [*See Table I above*].

ADEQ proposes to retain most of the reuse applications listed in the previous paragraph. ADEQ intends to prohibit full body contact recreation [e.g., swimming] in impoundments of reclaimed water. While advanced wastewater treatment can substantially reduce the risk of human exposure to pathogenic microorganisms in reclaimed water, ADEQ believes that the risk of human exposure to disease-causing organisms while swimming in reclaimed water is unac-

essary and avoidable. Even with advanced wastewater treatment, there is no guarantee that even Class A+ or Class A reclaimed water is completely pathogen-free. As noted before, the public health can be protected by requiring appropriate wastewater treatment *and by limiting human exposure to reclaimed water at reuse sites*. A prohibition on swimming in impoundments of reclaimed water is a reasonable limitation on human exposure to any pathogens that may be in the reclaimed water. A prohibition against swimming in reclaimed water impoundments provides an additional margin of safety and will protect public health. It also is consistent with ADEQ regulations for effluent dependent waters and rules that prohibit the use of treated wastewater as make-up water in swimming pools and spas.

ADEQ intends to repeal the current reclaimed water quality standards that apply to the creation of constructed wetlands. Most constructed wetland systems are used to provide natural wastewater treatment or they are created for final disposal of effluent and not primarily a reuse of reclaimed wastewater.

The current wastewater reuse rules prohibit direct potable reuse of reclaimed water [See R18-9-702(M)]. ADEQ proposes to retain the current prohibition against direct potable reuse. By "direct potable reuse," ADEQ means the piping of reclaimed water from a wastewater treatment plant directly into a drinking water distribution system [i.e., a closed loop system].

ADEQ recognizes that there has been promising research conducted nationally on the feasibility of using advanced wastewater treatment systems to produce reclaimed water that can be reused in direct potable reuse systems. One of the most well-known direct potable reuse demonstration projects is the Denver Potable Reuse Demonstration Plant located in Colorado. The Denver Potable Reuse Demonstration Plant is a 1 MGD wastewater treatment plant that produces reclaimed water for testing and analysis using alternative treatment processes. The reclaimed water produced by the plant is suitable for direct use as drinking water. The Denver Potable Reuse Demonstration Plant can treat secondary effluent using chemical coagulation, recarbonation, multimedia filtration, ion exchange, ultraviolet disinfection, two-stage carbon adsorption, ultrafiltration, reverse osmosis, air stripping, ozonation, and chlorination. Tests of the reclaimed water show that the quality of the reclaimed water produced by the plant is comparable to the quality of other surface and ground water sources of drinking water for the City of Denver. The Denver Potable Reuse Demonstration Plant also shows that it is technologically feasible to use multiple barriers to treat wastewater so that it is suitable for direct potable use. Notwithstanding the research being conducted at the Denver Potable Reuse Demonstration Plant, ADEQ believes that the current prohibition against direct potable reuse should be retained for the following reasons:

1. At the present time, there is not a demonstrated need for direct potable reuse systems in Arizona. Instead, the reuse rules should encourage the reuse of reclaimed water for nonpotable uses as a way of augmenting the potable water supply.
2. ADEQ does not believe that the public is ready to accept direct potable reuse.
3. The level of treatment reliability needed for a direct potable reuse system needs to be better understood.
4. Additional research on the public health effects of using reclaimed water in direct potable reuse systems needs to be done, especially on the fate of trace organic chemicals in reclaimed water as it recycles through a closed loop system.
5. While various indirect potable reuse projects have been implemented in the United States, currently there are no direct potable reuse systems in operation in the United States.

ADEQ proposes to recognize several new reuse applications for reclaimed water. These include the reuse of reclaimed water for construction purposes such as materials washing and sieving, concrete and cement mixing, soil compaction, and dust control. Other new urban reuse applications include using reclaimed water for street washing, fire protection systems, and in commercial air conditioning systems.

Finally, ADEQ recognizes that new and creative ways to reuse reclaimed water may be developed in the future that are not addressed in the proposed rules. To address this possibility, ADEQ proposes to adopt R18-11-309. This rule gives ADEQ the flexibility of prescribing reclaimed water quality requirements on a case-by-case basis for a new reuse application that is not contemplated in the proposed rules.

What microbiological quality standards does ADEQ propose for reclaimed water?

ADEQ proposes the establishment of 5 classes of reclaimed water. The proposed Class A+ and Class A reclaimed waters will undergo advanced wastewater treatment and high level disinfection so they are essentially free of pathogenic bacteria, viruses, and parasites. Basically, ADEQ proposes a "no detectable" fecal coliform standard for Class A+ and Class A reclaimed water. The operator of a wastewater treatment plant that produces Class A+ or Class A reclaimed water will be required to take daily samples of reclaimed water and have the samples analyzed for the pres-

Arizona Administrative Register
Notices of Proposed Rulemaking

ence of fecal coliform organisms. The proposed “no detectable” fecal coliform criterion is expressed as a 7-day median value. This means that 4 of the last 7 daily samples for which fecal coliform analyses are completed must have “no detectable” fecal coliforms per 100 ml [i.e., less than < 2 fecal coliforms / 100 ml]. Also, no single sample of Class A reclaimed water may exceed 23 fecal coliform organisms / 100 ml. A wastewater treatment plant that produces Class A+ or Class A reclaimed water must comply with a 24-hour average turbidity standard of 2 NTUs prior to disinfection. This turbidity criterion is established to ensure the production of a highly clarified reclaimed water that ensures a high level of disinfection.

A water reclamation plant that consistently meets the minimum treatment requirements, fecal coliform, and turbidity criteria for Class A+ and Class A reclaimed water should reliably produce an essentially pathogen-free reclaimed water that may be reused safely for all of the reuse applications listed in Appendix A of the proposed rules. ADEQ proposes to require Class A reclaimed water where there is a relatively high risk of public exposure to reclaimed water or where there is a risk of food contamination. ADEQ proposes to require Class A reclaimed water for surface or spray landscape irrigation where public access to a reuse site is unrestricted [e.g., irrigation of schoolyards, playgrounds, and parks]. Class A reclaimed water will be required for surface or spray irrigation of food crops that are eaten raw. ADEQ also proposes to require Class A reclaimed water for use in recreational impoundments [i.e., where fishing and boating may take place, but no swimming]. Finally, ADEQ proposes to require Class A reclaimed water for toilet and urinal flushing, fire protection systems, vehicle washing, and commercial air conditioning systems.

Class B reclaimed water is a wastewater that has undergone secondary treatment and disinfection. ADEQ proposes to establish disinfection criteria for Class B+ and Class B reclaimed water that are equivalent to the criteria that ADEQ adopted to maintain and protect water quality in surface waters that are used for full body contact recreation [e.g., swimming]. For this reason, ADEQ proposes disinfection criteria for Class B+ and Class B that are expressed as *E. coli* bacteria concentrations instead of fecal coliform concentrations. The 7-sample median *E. coli* bacteria concentration for Class B+ and Class B reclaimed water is < 126 / 100 ml. and the single sample maximum concentration is < 576 / 100 ml. ADEQ believes that Class B+ and Class B reclaimed water may be reused safely for the reuse applications where it is required because there is a small risk of ingestion of the reclaimed water and the risk of human exposure to potential pathogens in the reclaimed water is less than the risk of exposure to pathogens that may be encountered during full body contact recreation in a surface water. ADEQ proposes to require the use of Class B reclaimed water for golf course irrigation, landscape irrigation where public access is restricted, and landscape impoundments where swimming, boating, and fishing are prohibited. Class B reclaimed water may be used safely for the irrigation of fiber, seed, and forage crops; irrigation of food crops that are commercially processed to destroy pathogens; surface irrigation of orchards and vineyards, irrigation of pastures used by dairy animals; livestock watering; dust control; street cleaning, soil compaction, concrete and cement mixing, and materials washing and sieving.

Class C reclaimed water is a wastewater that has undergone secondary treatment in wastewater stabilization ponds. Class C reclaimed water may be reused without disinfection provided minimum detention times in the lagoon system and fecal coliform criteria are met. The minimum detention time in the wastewater stabilization pond system is 30 days. ADEQ proposes to establish a 7-sample median fecal coliform concentration for Class C reclaimed water of 1000 cfu / 100 ml and a single sample maximum concentration of 4000 cfu / 100 ml. The proposed fecal coliform criteria are equivalent to the fecal coliform criteria in the current rules that apply to the reuse of treated wastewater for irrigation of nonfood crops. Class C reclaimed water may be reused safely for silviculture, sod farm irrigation, irrigation of nonfood crops, livestock watering of non-dairy animals, and irrigation of pastures used by non-dairy animals.

Why are microbiological water quality standards for wastewater reuse necessary?

Wastewater is known to have pathogenic microorganisms in it. The presence of pathogens in wastewater creates a potential for disease transmission and other adverse public health effects if persons come into contact with reclaimed water. Persons may contact, ingest, or inhale bacteria, parasites, and viruses that are present in the reclaimed water. The table below lists some of the pathogenic microorganisms that may be present in raw wastewater and the diseases they cause.

Pathogenic Microorganisms in Wastewater

| <u>Bacteria</u> | <u>Disease</u> |
|-------------------------------------|-------------------------|
| Shigella | Shigellosis [dysentery] |
| Salmonella typhi | Typhoid fever |
| Salmonella [over 1700 serotypes] | Salmonellosis |
| Vibrio cholerae | Cholera |
| Escherichia coli [enteropathogenic] | Gastroenteritis |
| Legionella | Legionnaire's disease |

Arizona Administrative Register
Notices of Proposed Rulemaking

Protozoa

Giardia lamblia
Cryptosporidium
Entamoeba histolytica

Disease

Giardiasis
Cryptosporidiosis
Amoebic dysentery

Helminths

Ascaris lumbricoides [roundworm]
Ancylostoma duodenale [hookworm]
Necator americanus [hookworm]
Ancylostoma [hookworm]
Strongyloides stercoralis [threadworm]
Trichuris trichiura [whipworm]
Taenia [spp.] [tapeworm]

Disease

Ascariasis
Ancylostomiasis
Necatoriasis
Cutaneous larva migrans
Strongyloidiasis
Trichuriasis
Taeniasis

Helminths (continued)

Enterobius vermicularis [pinworm]
Echinococcus granulosus [tapeworm]

Disease

Enterobiasis
Hydatidosis

Viruses

Enteroviruses [72 types] [polio, echo, coxsackie, new enteroviruses]
Heptatitis A virus
Adenovirus [47 types]
Rotavirus [4 types]
Parvovirus [3 types]
Norwalk agent

Disease

Gastroenteritis, heart anomalies, meningitis
Infectious hepatitis
Respiratory disease, eye infections
Gastroenteritis
Gastroenteritis
Diarrhea, vomiting, fever

[Source: EPA Guidelines for Water Reuse, p. 20]

One of the most common pathogens found in wastewater are bacteria of the genus *Salmonella*. Over 1,700 different serotypes of *Salmonella* have been identified. This group of bacteria contains a wide variety of species that can cause disease in humans. *Salmonella* species cause three distinct forms of salmonellosis: enteric fevers, septicemias, and acute gastroenteritis. The most severe form of salmonellosis is typhoid fever, caused by *Salmonella typhi* and the most common form of salmonellosis is acute gastroenteritis.

A less common genus of bacteria that has been isolated from wastewater is *Shigella*, which produces an intestinal disease known as shigellosis or bacillary dysentery. Waterborne outbreaks of shigellosis have been reported where wastewater has contaminated drinking water wells. *Shigella* also has been identified as a leading cause of waterborne disease outbreaks in recreational surface waters [e.g., lakes and rivers].

There are a variety of other pathogenic bacteria that have been isolated from wastewater. These include *Vibrio*, *Mycobacterium*, *Clostridium*, *Leptospira*, and *Yersinia* species. While these pathogens may be present in wastewater, their concentrations are usually too low to initiate disease outbreaks. *Vibrio cholerae* is the disease agent for cholera, which is not common in the United States but is common in many parts of the world. The most frequent mode of transmission of cholera is through contaminated water. Waterborne gastroenteritis of unknown cause is frequently reported and the suspected etiologic agent is often bacterial. A suspected cause of waterborne gastroenteritis are certain gram-negative bacteria. These include enteropathogenic *Escherichia coli* [*E. coli*] and certain strains of *Pseudomonas*. Waterborne enteropathogenic *E. coli* have been implicated in gastrointestinal disease outbreaks. *Campylobacter coli* has been identified as the cause of diarrheal disease and it has been implicated as the etiologic agent in waterborne disease outbreaks.

There are a number of protozoans that are pathogenic to humans and that occur in wastewater. Waterborne disease outbreaks have been linked to the protozoans, *Giardia lamblia* and *Cryptosporidium*. *Giardia lamblia* is the cause of giardiasis, which is characterized by severe gastrointestinal disturbance and diarrhea. Infection is caused by the ingestion of *Giardia lamblia* cysts. *Cryptosporidium* also causes diarrheal disease and infection is caused by ingestion of *Cryptosporidium* oocysts. *Cryptosporidium* in drinking water was the agent implicated in a major waterborne outbreak of cryptosporidiosis in Milwaukee in 1993 where an estimated 400,000 people became sick and 40 - 50 people died. It should be noted that no outbreaks of giardiasis or cryptosporidiosis related to wastewater reuse practices have been reported in the literature on wastewater reclamation.

There are a number of parasitic worms that occur in wastewater. The most important of these are intestinal worms, including the stomach worm, *Ascaris lumbricoides*; the tapeworms, *Taenia saginata* and *Taenia solium*; the whipworm, *Trichuris trichirar*; the hookworms, *Ancylostoma duodenia* and *Necator americanus*, and the threadworm, *Strongyloides stercoralis*. Many worms have complex life cycles. For some parasitic worms, the infective stage is either the adult organism or the larvae. In other helminths, the eggs, or ova, are the infective stage. In general, the eggs and larvae are resistant to environmental stresses and they may survive typical wastewater disinfection. However, eggs and larvae are readily removed by commonly used wastewater treatment processes such as sedimentation, filtration, or wastewater stabilization ponds.

There are over 120 different enteric viruses that are capable of producing disease in humans. These viruses can cause a wide variety of diseases, such as diarrhea, meningitis, paralysis, myocarditis, conjunctivitis, and hepatitis. The most important human enteric viruses found in wastewater are the enteroviruses [polio, echo, and coxsackie], rotaviruses, reoviruses, parvoviruses, adenoviruses, Norwalk-type viruses, and the Hepatitis A virus. Hepatitis A, the virus causing infectious hepatitis, is a virus that is frequently reported to be transmitted by water. There is no evidence that human immunodeficiency virus [HIV], the pathogen that causes acquired immunodeficiency syndrome [AIDS], can be transmitted through water.

While viruses are known to occur in wastewater, little is known about the occurrence of waterborne viral disease. There has been little study of low level occurrence of waterborne viral disease for several reasons:

1. Current virus detection methods are not sufficiently sensitive to accurately detect low concentrations of viruses in water;
2. Enteric virus infections are often not apparent, thus making it difficult to establish the endemicity of viral infections;
3. The mild nature of most enteric virus infections precludes reliable reporting by the patient or the physician;
4. Current epidemiological techniques are not sufficiently sensitive to detect low level transmission of waterborne viral diseases;
5. Illness due to enteric virus infections may not become obvious for several months or years;
6. Once introduced into a population, person-to-person contact becomes a major mode of transmission of enteric viral disease, thereby obscuring the role of water in its transmission.

There is epidemiological evidence of disease transmission from the reuse of raw or minimally treated wastewater. Epidemiological investigations directed at wastewater-contaminated drinking water supplies, the use of raw or minimally-treated wastewater for food crop irrigation, health effects to farmworkers who routinely contact poorly treated wastewater used for irrigation, and the health effects of wastewater aerosols emanating from spray irrigation sites using undisinfected wastewater have provided evidence of the transmission of disease from such practices.

Conversely, there is no epidemiological evidence of disease transmission from the reuse of wastewater that has received a minimum of secondary treatment and disinfection. ADEQ is not aware of any epidemiological studies of populations who have been exposed to reclaimed water that has been treated to such relatively high levels. Epidemiological studies have not been done because of the small size and mobility of study populations, the difficulty in determining the actual levels of human exposure, the low illness rates (if any), and the inability of current epidemiological techniques to detect low level or endemic disease transmission. All that can be said is that wastewater reclamation practices in the United States have not been implicated as the cause of any infectious disease outbreaks.

Diseases may be transmitted to humans either by the ingestion, inhalation, or conjunctival exposure to disease agents in reclaimed water. However, in order for a person to get sick, the following circumstances must occur. First, persons in the community from which the wastewater comes must be infected with a disease for the disease agent to be present in the wastewater and therefore present in the reclaimed water. Second, the disease agent must survive the treatment processes that the wastewater undergoes. Third, the person must be exposed to the reclaimed water. Finally, the disease agent must be present in sufficient numbers in the reclaimed water to cause infection at the time of exposure.

Whether illness occurs depends on a series of complex relationships between the person who is exposed and the disease agent. Variables include the number of disease agents in the reclaimed water at the time of exposure [i.e., dose]; the number of organisms necessary to initiate infection [i.e., infectious dose]; and the vulnerability of the person who is exposed to the disease agent to infection. A person's susceptibility to disease is highly variable and dependent upon his or her general health and the virulence of the specific pathogen in question. For example, infants, the elderly, per-

sons with AIDS or who have compromised immune systems, and persons who are already ill may be more susceptible to disease than healthy adults.

Ideally, microbiological water quality standards for reclaimed water would be based upon epidemiological evidence that demonstrates a quantifiable cause / effect relationship between the concentration of a pathogenic organism in reclaimed water and human disease. Such data can be used to determine minimum or no-risk concentrations of the pathogenic organism. Unfortunately, there is not enough epidemiological evidence to support the development of such risk-based standards. There is little data on the concentrations of specific pathogens in reclaimed water. Also, data on minimum infectious doses are not available for many pathogenic microorganisms because of the high cost of conducting clinical studies and the uncertainty inherent in extrapolating dose-response curves to low exposure levels.

Infectious dose studies with a variety of pathogenic microorganisms have been conducted over the past 30 years with human volunteers. The clinical studies that have been done indicate that there is a wide range of infectious doses for pathogenic microorganisms. The widest dose range required to produce illness has been found with bacterial agents. For example, some *Salmonella* species require doses of up to 10^8 cells to produce a 50% illness rate in the study population. In contrast, some species of *Shigella* produce a significant percentage of illness in subjects dosed with as few as 10 cells. Giardiasis has been produced in subjects who were dosed with gelatin capsules containing as few as 1-10 *Giardia lamblia* cysts. Enteric viruses also have produced infection at low dosage levels via oral ingestion, inhalation, and conjunctival exposure. These studies have shown that certain pathogenic microorganisms from all three categories [e.g., bacteria, parasites, and viruses] can produce infections at relatively low exposure levels. The following table presents estimated infectious doses for some selected pathogens:

Infectious Doses of Selected Pathogens

| <u>Organisms</u> | <u>Infectious Dose</u> |
|-----------------------|------------------------|
| Escherichia coli | 10^6 to 10^{10} |
| Salmonella typhi | 10^4 to 10^{10} |
| Vibrio cholerae | 10^3 to 10^7 |
| Entamoeba histolytica | 20 |
| Shigella dysenteriae | 10 |
| Giardia lamblia | <10 |
| Viruses | 1 to 10 |
| Ascaris lumbricoides | 1 to 10 |

[Source: EPA [Guidelines for Water Reuse](#), p. 22]

The concentration of pathogenic microorganisms in raw wastewater

The occurrence and concentration of pathogenic microorganisms in raw wastewater is variable. This variability makes it difficult to predict the microbiological water quality characteristics of any particular wastewater. Important variables that affect the occurrence and concentration of pathogenic microorganisms in raw wastewater include the wastewater sources in the community, seasonal and diurnal variations in microbiological water quality, and the general health of persons in the community. Notwithstanding these variables, there is general consensus that there may be high concentrations of pathogenic microorganisms in raw or minimally-treated wastewater. The potential presence of high concentrations of pathogenic microorganisms in raw or minimally-treated wastewater precludes any consideration of the safe reuse of such wastewater. This conclusion is supported by epidemiological evidence of human disease transmission associated with the reuse of raw wastewater or minimally-treated wastewater. The table below presents some typical ranges of concentrations of indicator organisms and pathogenic microorganisms in raw wastewater:

Microorganism Concentrations in Raw Wastewater

| <u>Organisms</u> | <u>Concentration [# / 100 ml]</u> |
|------------------------------|-----------------------------------|
| Total coliforms | 10^7 to 10^8 |
| Fecal coliforms | 10^4 to 10^9 |
| Salmonella | 400 to 8000 |
| Helminth ova | 1 to 800 |
| Enteric virus | 100 to 50,000 |
| <i>Giardia lamblia</i> cysts | 50 to 10^4 |

[Source: EPA Guidelines for Water Reuse, p. 22]

It has been estimated that raw wastewater typically contains 10^6 to 10^7 fecal coliform organisms per 100 ml [Hubley, D., et al., "Risk Assessment of Wastewater Disinfection," EPA-600/2-85/037, NTIS No. PB85-188845, U.S. Environmental Protection Agency, Cincinnati, OH, 1985]. Fecal coliform organisms are often used as indicators of the microbiological quality of water. The fundamental assumption underlying the indicator organism concept is that the indicator organism functions as a surrogate parameter that indicates the presence of other pathogenic microorganisms in wastewater. If one accepts the basic premise that other pathogenic microorganisms are present in some proportion to the concentration of the indicator organism, and one considers: 1) the low infectious doses for certain bacteria, viruses, and parasites; 2) the possible presence of a sensitive or vulnerable population that may be exposed to reclaimed water when it is reused; and 3) the available epidemiological evidence, then one cannot escape the conclusion that raw or minimally treated wastewater, which may have *millions* of fecal coliform organisms per 100 ml, cannot be reused safely.

The reduction of pathogenic microorganisms in wastewater through treatment

While everyone may agree that raw or minimally treated wastewater cannot be reused safely, finding consensus on what level of treatment should be required before the treated wastewater can be reused is more difficult. The concentration of pathogenic microorganisms in raw wastewater can be substantially reduced through treatment. Levels of wastewater treatment are generally classified as primary, secondary, and advanced (or tertiary) wastewater treatment. A generalized flow diagram for municipal wastewater treatment is provided below.

Preliminary treatment of wastewater generally consists of physical treatment processes of screening, comminution, and grit removal. Coarse screening is typically the first treatment step to remove large solids and trash that may interfere with downstream treatment processes. Comminution devices may be used to cut up the solids in the wastewater into smaller solids of more uniform size. Grit chambers may be used to remove sand, gravel, cinders, and other heavy solids. Other preliminary treatment processes may include flocculation, pre-aeration, and odor control.

The primary treatment of wastewater consists of physical treatment processes that remove settleable organic and inorganic solids by sedimentation and floating materials by skimming. Primary treatment removes some nitrogen, phosphorus, and heavy metals from wastewater but it does little to remove colloidal or dissolved pollutants. Primary treatment has little effect on the removal of pathogenic microorganisms in wastewater. Some parasitic ova or cysts may settle out during primary treatment. Primary treatment also may remove some bacterial pathogens that are associated with particulates. However, percent removals of pathogenic microorganisms by primary treatment are typically less than 50%. Also, primary treatment does not effectively reduce the levels of enteric viruses in wastewater. Because of the low removal of pathogenic microorganisms and the potential threat to public health, ADEQ proposes to prohibit the reuse of wastewater that has only undergone preliminary or primary treatment. ADEQ intends to require a minimum of secondary treatment before reclaimed water may be reused.

Typical Percent Removal Efficiencies for Primary Treatment

| <u>Constituent</u> | <u>Percent Removal</u> |
|-----------------------|------------------------|
| BOD | 42 |
| COD | 38 |
| TSS | 53 |
| Fecal coliform | <10 |
| Salmonella | 0-15 |
| Shigella | 15 |
| Entamoeba histolytica | 0-50 |
| Helminth ova | 50-98 |
| Enteric viruses | Limited |

[Source: EPA Guidelines for Water Reuse, p. 30]

Secondary treatment utilizes aerobic biological treatment processes to remove organic matter from wastewater. Aerobic biological treatment occurs in the presence of oxygen whereby microorganisms oxidize the organic matter in the wastewater. Several types of aerobic biological treatment are used in secondary treatment. These may include low-

rate processes such as wastewater stabilization ponds and aerated lagoons or high-rate processes such as activated sludge, trickling filters, or rotating biological contactors. Conventional secondary treatment processes reduce the concentration of pathogenic microorganisms by predation or adsorption to particulates that are subsequently removed by sedimentation. It is estimated that conventional secondary treatment processes are capable of removing over 90% of the bacteria and viruses found in raw wastewater. Hubley, et. al assessed the concentration ranges of certain organisms in domestic wastewater, the reductions achievable through secondary treatment, and the estimated secondary treated effluent concentrations. The results of this assessment are summarized in the tables below:

Microorganism Reductions by Secondary Treatment

| <u>Constituent</u> | <u>Percent Removal</u> |
|--------------------|------------------------|
| Total coliforms | 90-99 |
| Fecal coliforms | 90-99 |
| Shigella sp. | 91-99 |
| Salmonella sp. | 96-99 |
| Escherichia coli | 90-99 |
| Virus | 76-99 |

Secondary Effluent Ranges for Pathogenic and Indicator Organisms Prior to Disinfection

| <u>Organisms</u> | <u>Number / 100 ml</u> | |
|------------------|------------------------|----------------|
| | <u>Minimum</u> | <u>Maximum</u> |
| Total coliforms | 45,000 | 2,020,000 |
| Fecal coliforms | 11,000 | 1,590,000 |
| Viruses | 0.5 | 1,000 |

Source: Design Manual: Municipal Wastewater Disinfection, EPA 625/1-86/021, U.S. Environmental Protection Agency, Office of Research and Development, Water Engineering Research Laboratory, Cincinnati, OH [October, 1986], p. 6-7.

Estimated reductions in pathogenic microorganisms of 90% or more by secondary treatment support the establishment of secondary treatment as a minimum level of treatment for wastewater reuse. However, the secondary effluent ranges for viruses and indicator organisms cited above suggest that conventional secondary treatment alone, without disinfection, may be inadequate to prevent disease transmission when reclaimed water is reused. Given the low infectious doses of some bacterial and viral pathogens, the secondary effluent ranges for viruses and indicator organisms without disinfection are unacceptably high.

For this reason, ADEQ proposes (with the exception of Class C) to require a minimum of secondary treatment with disinfection for all reuse applications.

In ADEQ's view, the most important wastewater treatment process for the prevention of waterborne disease transmission is disinfection. ADEQ proposes that reclaimed water, except for Class C, be disinfected before it is reused. Chlorination is the most widely used method for disinfection of wastewater in the United States. Ozonation and ultraviolet light disinfection are other important disinfection technologies that are used in wastewater treatment plants. ADEQ does not propose that any specific disinfection technology be utilized before reclaimed water may be reused. As many as 25 disinfection alternatives could be considered and have been previously identified from the literature [See "Design Manual: Municipal Wastewater Disinfection," U.S. Environmental Protection Agency, Office of Research and Development, EPA/625/1-86/021, October 1986, p. 11]. Major factors that must be considered when evaluating disinfection alternatives include disinfection effectiveness, treatment reliability, wastewater treatment plant size and design flow, capital costs, operation and maintenance costs, safety requirements, formation of hazardous by-products [e.g., trihalomethanes], potential adverse effects on the environment, and practicality [e.g. complexity of the disinfection technology, process control, operator competence and expertise, ease of transport and storage of disinfectants]. ADEQ proposes to require disinfection and will propose certain numeric disinfection criteria. However, ADEQ will leave the selection of the most appropriate disinfection technology to achieve compliance with the disinfection criteria to the owners and operators of wastewater treatment plants.

ADEQ proposes to require advanced wastewater treatment, including filtration, for Class A reclaimed water. Filtration is a common treatment process used to remove particulate matter in wastewater prior to disinfection. Filtration involves passing wastewater through a bed of granular media which filters out the particulates. Typical filter media include sand or anthracite. The pollutant removal efficiency of filtration can be enhanced through the addition of

coagulants or polymers. Coagulation or polymer addition may be necessary to achieve consistent compliance with the reclaimed water quality criteria that are proposed for Class A reclaimed water, especially the proposed turbidity criterion.

It has been estimated that filtration reduces the turbidity of secondary effluent by approximately 70%. The removal of suspended solids or turbidity from secondary effluent by filtration is important because it affects the efficiency of the disinfection process. It is known that many pathogens are associated with particulates that can shield bacteria and viruses from the action of disinfectants. Also, the organic matter in wastewater consumes chlorine, thus making less chlorine available for disinfection. There is general agreement that particulate matter in wastewater should be reduced to low levels prior to disinfection to ensure the reliable destruction of pathogenic microorganisms during the disinfection process.

It has been demonstrated that conventional filtration [i.e., coagulation, sedimentation, and filtration], without disinfection, can remove more than 2 logs [99%] of seeded poliovirus. Conventional filtration reduces the turbidity of the effluent to low levels and enhances the efficiency of the subsequent disinfection process. Direct filtration [i.e., coagulation and filtration without sedimentation], without disinfection, also has been shown to remove up to 2 logs of seeded poliovirus. Virus removal studies have demonstrated that chemical coagulation and conventional filtration followed by chlorine disinfection to very low total coliform levels can remove or inactivate 5 logs [99.999%] of seeded poliovirus. This treatment chain can produce a reclaimed water that is essentially free of measurable levels of pathogenic microorganisms. Equivalent 5-log virus removals have been achieved using direct filtration and high level disinfection if certain design and operational controls are provided. For example, the State of California developed a policy that describes the design and operational controls for direct filtration facilities that are necessary to produce an essentially pathogen-free reclaimed water:

1. Coagulant addition unless secondary effluent turbidity is less than 5 NTU;
2. Maximum filtration rate of 12 m/h [5 gpm/ft²];
3. Average filter effluent turbidity of 2 NTU or less;
4. High-energy rapid mix of chlorine;
5. Theoretical chlorine contact time of at least 2 hours with an actual modal contact time of at least 90 minutes;
6. Minimum chlorine residual of 5 mg/L after the required contact time;
7. Chlorine contact chamber length to width or depth ratio of at least 40:1; and
8. Seven-day median number of total coliform organisms in the effluent of 2.2 / 100 ml or less, not to exceed 23 / 100 ml in any single sample.

Chemical addition and filtration requirements for Class A reclaimed water are supported by research conducted by Professors Charles P. Gerba and Joan B. Rose [See "Assessing Potential Health Risks From Viruses and Parasites in Reclaimed Water in Arizona and Florida," *Water Sci. Tech.*, V. 23, pp. 2091-2098 (1991)]. Professors Gerba and Rose evaluated virus and parasite monitoring data from 24 wastewater plants in Arizona and Florida and concluded that filtration was necessary to achieve an effluent quality suitable for unrestricted irrigation. Professors Gerba and Rose noted that previous studies had demonstrated that sand filtration was efficient for virus removal only when preceded by coagulation. Their monitoring data demonstrated that filtration decreased the concentration of *Giardia lamblia* cysts and *Cryptosporidium* oocysts in reclaimed water. However, without the use of coagulation, *Giardia lamblia* cyst and virus breakthrough was greater. For example, monitoring data from a wastewater treatment facility utilizing coagulants with filtration showed that no *Giardia lamblia* cysts were detected in the reclaimed water. At a wastewater treatment facility utilizing sand filtration alone, 27% of the samples tested positive for *Giardia lamblia*. Monitoring data from a wastewater treatment plant utilizing coagulants with filtration showed that only 8% of the samples contained viruses at levels greater than 1 pfu / 40 L. At a wastewater treatment facility utilizing sand filtration alone, 16% of the effluent samples contained viruses.

Using a probability of infection risk assessment model, Drs. Gerba and Rose reported that the risk of infection from accidental ingestion of 100 milliliters of treated wastewater ranges from approximately 2×10^{-3} to 2×10^{-4} for the levels of viruses typically found in chlorinated secondary effluent. Drs. Gerba and Rose estimated that the risk of infection was reduced to 2×10^{-4} to 2×10^{-6} with filtration and disinfection following secondary treatment. The authors concluded:

[D]epending on the type of reuse (i.e. irrigation of highway medians versus school playgrounds) one may want to achieve equal to or greater than 10^{-6} risk on a routine basis to provide an extra

margin of safety. Thus reliable treatment must be maintained to eliminate the pathogens equal to or below 0.1 organisms / 100 ml routinely. . . . In order to achieve an effluent quality for unrestricted irrigation, filtration is needed in addition to secondary treatment [p. 2097].

Coagulation and filtration requirements for Class A reclaimed water are supported by wastewater reclamation experience and research conducted in Florida. In 1977, the City of St. Petersburg, Florida initiated a dual distribution system to deliver reclaimed water for landscape irrigation. The water reclamation system in St. Petersburg is one of the largest of its kind in the world. The city operates 4 water reclamation plants. Each reclamation plant treats wastewater using activated sludge biological treatment, secondary clarification, coagulant addition, filtration, and disinfection. The 4 water reclamation plants deliver approximately 21 MGD of reclaimed water to more than 7000 customers through more than 250 miles of pipelines. 40% of the reclaimed water is reused by system customers to irrigate parks, golf courses, school grounds, common areas, and residential neighborhoods.

In 1987, in response to the absence of definitive water reclamation criteria, the City of St. Petersburg commissioned a panel of engineering and public health experts to develop recommendations for reclaimed water quality criteria. The panel prepared a white paper entitled, "Urban Water Reuse in the City of St. Petersburg: Water Quality and Public Health Considerations." The panel concluded that there was no evidence of disease transmission associated with reclamation in urban areas when reclaimed water had undergone secondary treatment, coagulation, filtration, and disinfection. The panel recommended that water reclamation facilities be designed as secondary treatment facilities with provision for chemical addition before filtration. The panel recommended that reclamation facilities comply with a 24-hour average turbidity standard of 2.0 NTUs. The panel also recommended that the standard for disinfection of the reclaimed water be 2.2 fecal coliform organisms / 100 ml [30-day average] with an upper limit of 23 / 100 ml in not more than 10% of the samples. Finally, the panel recommended the maintenance of a 4.0 mg/ L chlorine residual in the reclaimed water.

The water reclamation plants in St. Petersburg currently comply with these recommendations and there have not been any reported cases of disease or illness resulting from the reuse of reclaimed water. This finding is significant because many St. Petersburg residents who are served by the city's dual distribution system are elderly who may be considered to be more vulnerable to disease than the general population. For example, data from 1980 to 1985 were reported to the Centers for Disease Control for two enteric viruses, aseptic meningitis and hepatitis A, which are historically associated with waterborne disease transmission. The data gave no indication that the use of reclaimed water in St. Petersburg altered the expected epidemiological patterns of these diseases. The reported incidence rate of aseptic meningitis for the county in which St. Petersburg is located was not significantly different from the national rate for the same period of time and the incidence rate of hepatitis A was lower than the national rate.

The epidemiological data is supported by virus monitoring results of reclaimed water produced by the St. Petersburg reclamation plants between 1981 and 1988. The virus monitoring data from over 200 samples of reclaimed water indicated that reclaimed water that had undergone secondary treatment, coagulation, filtration, and disinfection was essentially virus-free. While detectable levels of viruses were occasionally detected, the few samples that were virus-positive contained less than 1 enteric virus / 100 L.

ADEQ believes that chemical addition, filtration, and high level disinfection should be required before reclaimed water is reused in urban settings where there is a high probability of public exposure to the reclaimed water or where there is a potential risk of food contamination. Wastewater treatment plants should have the capability to add coagulants or polymers prior to filtration to ensure consistent compliance with the proposed reclaimed water quality criteria for fecal coliform and turbidity. The research on virus removal cited in this section supports the proposal of advanced wastewater treatment requirements for Class A reclaimed water. Finally, ADEQ believes that the proposed filtration and disinfection treatment requirements for Class A reclaimed water are both technically and economically feasible.

How do the proposed disinfection criteria compare to disinfection criteria for the reuse of reclaimed water in other states?

All states that have established reclaimed water quality standards prescribe disinfection criteria. In general, the disinfection criteria are commonly expressed as either total or fecal coliform concentrations. Average total coliform or fecal coliform limits that have been established by the states differ depending upon the type of reuse. Arizona and Hawaii are the only states that have established disinfection criteria for enteric viruses and specific parasites.

Disinfection criteria for unrestricted urban reuse applications

For unrestricted urban reuse applications where public exposure to reclaimed water is likely [e.g., irrigation of parks, playgrounds, and common areas], the states have adopted disinfection criteria with average total or fecal coliform limits which range from the nondetectable level to 200 fecal coliform organisms / 100 ml. For example, California, Colorado, Hawaii, Idaho, Montana, and Oregon require that wastewater be oxidized, coagulated, clarified, filtered,

and disinfected before it can be reused for unrestricted urban reuse applications. These states require compliance with a total or fecal coliform criterion of 2.2 coliform organisms per 100 ml [mean or median concentration] and 23 coliform organisms per 100 ml [single sample maximum concentration]. Hawaii also has prescribed an enteric virus criterion of 1 PFU / 40 L for unrestricted urban reuse applications. The state of Utah requires advanced wastewater treatment and compliance with a single sample maximum total coliform concentration of 3 / 100 ml for unrestricted urban reuse.

Florida requires that wastewater be treated by secondary treatment, chemical feed facilities, filtration, and high level disinfection before reclaimed water can be reused for unrestricted urban reuse applications. Florida's disinfection criteria are expressed as concentrations of fecal coliform organisms. Florida requires that 75% of the samples of reclaimed water taken in a 30-day period have no detectable fecal coliforms. Florida also requires compliance with a single sample maximum concentration of 25 fecal coliform per 100 ml. South Carolina has similar treatment requirements and disinfection criteria. The states of Illinois and Kansas require secondary treatment, filtration, and disinfection before reclaimed water may be reused for unrestricted urban reuse applications.

There are several states that require secondary treatment and disinfection only before the reclaimed water can be reused for unrestricted urban reuse applications. These states include Arkansas, Delaware, Georgia, Nevada, South Dakota, Tennessee and Washington. Disinfection criteria in these states range from 2.2 fecal coliforms / 100 ml to 200 fecal coliforms / 100 ml.

Arizona currently requires compliance with an average fecal coliform concentration of 25 fecal coliform organisms / 100 ml with no single sample exceeding 75 fecal coliform organisms / 100 ml for unrestricted urban reuse applications (i.e., open access landscape irrigation). ADEQ proposes to require Class A reclaimed water for open access landscape irrigation. The proposed Class A disinfection criteria are more stringent than the current criteria. ADEQ proposes to adopt a 7-sample median fecal coliform limit of no detectable fecal coliform organisms / 100 ml [i.e., < 2 / 100 ml] and a single sample maximum concentration of < 23 / 100 ml.

Disinfection criteria for restricted access landscape irrigation

Restricted urban reuse applications generally involve the reuse of reclaimed water for irrigation of areas where public access to the reuse site is limited or controlled [e.g., highway medians, cemeteries, and golf courses]. Many states do not recognize restricted urban reuse as a separate reuse category and do not prescribe less stringent disinfection criteria for it. For example, the states of Florida, Delaware, Georgia, Illinois, South Carolina and Utah require that all landscape irrigation meet the reclaimed water quality standards that apply to unrestricted urban reuse applications.

Where states recognize restricted access landscape irrigation as a separate reuse category, there is wide variation in the applicable disinfection criteria. Most states require secondary treatment and disinfection as a minimum level of treatment before reclaimed water may be reused for restricted urban reuse applications. State-adopted disinfection criteria usually are expressed as fecal coliform or total coliform concentrations. There is a wide range of concentrations from the nondetectable level [e.g., Florida] to 1,000 / 100 ml [e.g., New Mexico]. Many western states, including Colorado, Nevada, and Oregon, have adopted the California reclamation criteria for restricted urban reuse applications. These states generally require secondary treatment and disinfection as a minimum level of treatment. The states that have adopted the California reclamation criteria prescribe a disinfection criterion of 23 total coliform organisms / 100 ml as a median value and 240 / 100 ml as a single sample maximum concentration.

Several states prescribe disinfection criteria for restricted urban reuse applications that are less stringent than the California reclamation criteria. For example, the states of Idaho, Missouri, Montana, New Mexico, South Dakota, Tennessee, and Wyoming require secondary treatment and disinfection, but have disinfection criteria that range from 200 fecal coliforms / 100 ml to 1000 fecal coliforms per 100 ml. These disinfection criteria are similar to Arizona's current disinfection criteria for restricted access landscape irrigation. In Arizona, the current wastewater reuse standards for restricted access landscape irrigation are an average fecal coliform concentration of 200 / 100 ml with no single sample exceeding 1000 / 100 ml.

ADEQ proposes to require Class B reclaimed water for restricted access landscape irrigation. The proposed minimum treatment requirements are secondary treatment and disinfection. The proposed Class B reclaimed water quality criteria are expressed as *E. coli* concentrations. The proposed disinfection criteria for Class B reclaimed water are equivalent to the level of water quality protection afforded to surface waters that have the full body contact recreation designated use.

Disinfection criteria for food crop irrigation

Many states prohibit irrigation of food crops with reclaimed water or they permit it only if a food crop is to be commercially processed to destroy pathogens. Other states have established minimum treatment requirements and disin-

fection criteria for reclaimed water that is reused for food crop irrigation. Reclaimed water quality criteria for food crop irrigation vary depending upon the type of food crop [e.g., orchards, vineyards, root crops, raw vegetables] and the type of irrigation [e.g., surface or spray irrigation]. The average fecal or total coliform limits that are prescribed by the states that allow irrigation of food crops with reclaimed water range from the nondetectable level [e.g., Florida] to 2,000 / 100 ml [e.g., Utah]. Most states that allow food crop irrigation with reclaimed water require advanced wastewater treatment and they prescribe very stringent disinfection criteria.

For example, the state of Florida requires that reclaimed water undergo secondary treatment with chemical feed facilities, filtration, and high level disinfection before reclaimed water can be reused for irrigation of food crops. Florida's disinfection criteria require that 75% of the samples of reclaimed water over a 30-day period have no detectable fecal coliform organisms. Florida prescribes a single sample maximum concentration for fecal coliform of 25 / 100 ml.

California requires that wastewater be oxidized, coagulated, clarified, filtered, and disinfected before it can be reused for spray irrigation of food crops. The California disinfection criteria are expressed in terms of concentrations of total coliform organisms. California requires compliance with a disinfection criterion of 2.2 total coliform organisms / 100 ml [as a median value] and a single sample maximum concentration of 25 total coliform organisms / 100 ml. These treatment requirements and disinfection criteria have been adopted by the states of Colorado, Hawaii, Idaho, Montana, Oregon, and Washington.

Arizona current wastewater reuse criteria for food crop irrigation appear to be based upon California's spray irrigation disinfection criteria for reclaimed water that is reused for the irrigation of food crops that are eaten raw. However, Arizona's disinfection criteria are expressed in terms of fecal coliform organisms instead of total coliforms. Arizona currently requires compliance with an average fecal coliform concentration of 2.2 fecal coliforms / 100 ml with no single sample exceeding 25 fecal coliforms / 100 ml.

Arizona and Hawaii are the only states that have established reclaimed water quality standards for viruses or specific pathogenic organisms for irrigation of food crops. Arizona has established limits for enteric virus, *Entamoeba histolytica*, *Giardia lamblia*, and *Ascaris lumbricoides*. The allowable limit for each of these, except enteric viruses, is nondetectable. The allowable limit for enteric viruses is 1 pfu / 100 ml. Hawaii also has established limits on enteric viruses, *Cryptosporidium*, *Giardia lamblia*, and *Entamoeba histolytica*. ADEQ proposes to repeal the current virus and parasite criteria for food crop irrigation and require Class A reclaimed water for irrigation of food crops. The proposed disinfection criteria are a 7-day median fecal coliform limit of no detectable fecal coliform organisms per 100 ml and a single sample maximum concentration of < 23 / 100 ml.

Several states permit surface irrigation of food crops with reclaimed water that has undergone secondary treatment and disinfection [e.g., California, Colorado, Hawaii, New Mexico, Utah, Washington, and West Virginia]. Disinfection criteria for surface irrigation of food crops range from <2.2 fecal or total coliform organisms to 2000 fecal or coliform organisms / 100 ml.

Disinfection criteria for irrigation of food crops that are commercially processed

A few states, including Arizona, have adopted separate reclaimed water quality standards for the irrigation of food crops that are commercially processed to destroy pathogens. In general, the reclaimed water quality standards for food crops that receive commercial processing are less stringent than the standards that apply to irrigation of food crops that are consumed raw. For example, Colorado and Oregon require a minimum of secondary treatment and disinfection and compliance with a limit of 23 total coliforms per 100 ml [median value] for irrigation of food crops that are commercially processed. Idaho allows the reuse of disinfected primary effluent and compliance with a median total coliform limit of 230 / 100 ml. Arizona currently requires compliance with an average fecal coliform limit of 1000 / 100 ml and a single sample maximum concentration of 2500 / 100 ml. ADEQ proposes to require the use of Class B reclaimed water for irrigation of food crops that are commercially processed. If adopted, the disinfection criteria for Class B reclaimed water would be more stringent than the current reclaimed water quality criteria.

Disinfection criteria for irrigation of orchards and vineyards

A few states have adopted disinfection criteria for reclaimed water that is reused for surface and spray irrigation of orchards and vineyards. In general, more stringent disinfection criteria apply to spray irrigation than to surface irrigation of orchards and vineyards. For example, Colorado requires that wastewater be oxidized, coagulated, clarified, filtered and disinfected and comply with a total coliform limit of 2.2 per 100 ml [median value] before it can be reused for spray irrigation of orchards. On the other hand, Colorado allows the use of wastewater that has been oxidized and disinfected and which complies with a total coliform limit of 23 / 100 ml [median value] for surface irrigation of orchards. Nevada permits irrigation of fruit and nut bearing trees with reclaimed water that has undergone secondary treatment and disinfection. Similarly, the state of New Mexico allows the use of "adequately treated" and disinfected reclaimed water for surface irrigation on food crops provided there is no contact between the reclaimed water and the

edible portion of the food crop. California and Idaho allow the reuse of disinfected primary effluent for surface irrigation of orchards and vineyards.

Arizona currently requires compliance with the following disinfection criteria for irrigation of orchards: 1000 cfu / 100 ml [5-sample geometric mean] and 4000 cfu / 100 ml [single sample maximum]. ADEQ proposes that Class A reclaimed water be used for spray irrigation of orchards and vineyards and Class B reclaimed water for surface irrigation of orchards and vineyards.

Disinfection criteria for irrigation of non-food crops

Most states that regulate wastewater reuse allow the reuse of reclaimed water for the irrigation of nonfood crops. In general, the treatment and reclaimed water quality requirements are less stringent than those that apply to irrigation of food crops. Most states require a minimum of secondary treatment and disinfection, although some states allow the reuse of primary effluent for irrigation of non-food crops. Average fecal and total coliform limits range from 2.2 coliform organisms / 100 ml to 2,000 coliforms / 100 ml depending on the type of irrigation [i.e., surface or spray irrigation] and whether there are any buffer zone requirements.

Arizona currently requires an average fecal coliform concentration of 1000 / 100 ml and a single sample maximum concentration of 4000 / 100 ml for irrigation of pastures and fiber, seed and forage crops. ADEQ proposes to require Class C reclaimed water for these reuse applications. The proposed Class C has the same fecal coliform criteria as the current wastewater reuse standards for irrigation of nonfood crops.

Disinfection criteria for recreational and landscape impoundments

Five states [i.e., Arizona, California, Colorado, Nevada, and Oregon] have established reclaimed water quality criteria for impoundments where “unrestricted” recreation may take place. Unrestricted recreational reuse means that full body contact with the reclaimed water [e.g., swimming] is allowed. California, Oregon, and Colorado require that wastewater be disinfected, oxidized, coagulated, clarified, and filtered and comply with a median total coliform count not to exceed 2.2 / 100 ml, with no single sample exceeding 23 / 100 ml. Nevada requires secondary treatment and disinfection and compliance with a median fecal coliform count not to exceed 2.2 / 100 ml with no single sample exceeding 23 / 100 ml.

Of the five states that allow the reuse of reclaimed water in recreational impoundments, Arizona has the least stringent fecal coliform criteria. Arizona does not prescribe minimum treatment processes and currently requires that the reclaimed water meet a median fecal coliform concentration not to exceed 200 / 100 ml with no single sample to exceed 800 / 100 ml. However, Arizona also adopted stringent enteric virus and turbidity standards for unrestricted recreational reuse. The allowable limit for enteric virus in reclaimed water that is reused in an impoundment where full body contact recreation may take place is 1 pfu / 100 ml and the applicable turbidity standard is 1 NTU. Arizona also established limits for *Entamoeba histolytica*, *Giardia lamblia*, and *Ascaris lumbricoides* for unrestricted recreational reuse [the current standard is “none detectable”]. These enteric virus and turbidity standards are technology-forcing parameters. They can be achieved only through the use of advanced wastewater treatment. Consequently, no reuse permits have been issued in Arizona for impoundments that are intended for full body contact recreation.

Seven states [Arizona, California, Colorado, Hawaii, Nevada, Oregon, and Texas] have established disinfection criteria for reclaimed water that is reused in “restricted” recreational impoundments. A restricted recreational impoundment means an impoundment where partial body contact recreation is allowed [e.g., boating and fishing]. California, Colorado, Hawaii, Nevada, and Oregon require secondary treatment and disinfection as a minimum level of treatment for this reuse application. In addition, California, Oregon and Colorado require compliance with a median total coliform count not exceed 2.2 per 100 ml. Nevada requires compliance with a median fecal coliform count not to exceed 2.2 / 100 ml with no single sample that exceeds 23 / 100 ml. Hawaii requires compliance with a mean total coliform count not to exceed 23 / 100 ml with no two consecutive samples exceeding 240 / 100 ml. Texas prescribes stringent criteria for biochemical oxygen demand [10 mg/L] and turbidity [3 NTUs]. Texas also requires compliance with a fecal coliform count not to exceed 75 / 100 ml.

Again, Arizona currently has the least stringent reclaimed water quality standards for impoundments where partial body contact with reclaimed water is allowed. Arizona does not prescribe treatment requirements and requires compliance with a median fecal coliform count of 1,000 / 100 ml with no single sample exceeding 4,000 / 100 ml. Arizona is the only state which has established standards for specific pathogens for this reuse application, including enteric viruses and *Ascaris lumbricoides*. The allowable limit for enteric viruses is 125 pfu / 100 ml and the limit for *Ascaris lumbricoides* is “none detectable.” ADEQ also requires compliance with a 5 NTU turbidity standard. ADEQ proposes to require Class A reclaimed water for restricted recreational impoundments. The proposed fecal coliform limit would be no detectable fecal coliform organisms / 100 ml (7-sample median) and a single sample maximum concentration of 23 / 100 ml.

How do the proposed disinfection criteria compare to EPA's suggested guidelines for water reuse?

ADEQ proposes to adopt most of EPA's recommended guidelines for water reuse. The recommended reuse standards in EPA's Guidelines for Water Reuse are expressed as a combination of minimum treatment unit processes and reclaimed water quality limits. For reuse applications where there is a high probability of human exposure [e.g., urban reuse applications, irrigation of food crops, and recreational impoundments], EPA recommends a minimum of secondary treatment, filtration, and disinfection. The EPA guidelines also state that chemical coagulant or polymer addition prior to filtration may be necessary to meet the recommended reclaimed water quality limits for turbidity and fecal coliform.

EPA recommends compliance with a microbiological quality guideline of no detectable fecal coliforms per 100 ml for reuse applications where there is a high probability of human exposure. This recommended criterion is a median value that is determined from the bacteriological results of the last seven days for which analyses have been completed using either the membrane filter technique or the multiple tube fermentation technique. The EPA-recommended single sample maximum concentration is 14 fecal coliform organisms / 100 ml. ADEQ proposes to adopt EPA's recommended minimum treatment requirements and the "no detectable" fecal coliform criterion [7-day median value] for Class A reclaimed water. However, ADEQ proposes to adopt a different single sample maximum concentration of < 23 fecal coliform / 100 ml for Class A reclaimed water.

For reuse applications where human exposure is less likely [i.e., restricted access landscape irrigation, surface irrigation of orchards and vineyards, irrigation of nonfood crops, landscape impoundments, and construction uses], EPA recommends secondary treatment and disinfection as a minimum level of treatment. EPA recommends compliance with a microbiological quality criterion of 200 fecal coliforms / 100 ml as a median value and 800 fecal coliforms / 100 ml as a single sample maximum concentration.

ADEQ proposes to adopt EPA's recommended minimum treatment requirements of secondary treatment and disinfection for Class B reclaimed water. However, the proposed disinfection criteria for Class B reclaimed water are expressed as *E. coli* concentrations. The proposed *E. coli* criteria are established at concentrations that are equivalent to current surface water quality standards that have been established to maintain and protect water quality for full body contact recreation.

EPA's recommended microbiological water quality limits for reclaimed water are expressed as fecal coliform concentrations. EPA selected fecal coliforms as the indicator organism because EPA thought that they were better indicators of fecal contamination than total coliforms. EPA's Guidelines for Water Reuse do not recommend virus or parasite standards. EPA did not recommend parasite standards because parasites have not been shown to be a problem at wastewater reuse operations in the United States when the suggested minimum treatment and reclaimed water quality limits are met. EPA did not recommend virus standards for the following reasons:

1. Virus criteria are unnecessary if the treatment process approach and fecal coliform disinfection criteria are adopted. Compliance with the prescribed treatment train and recommended fecal coliform criteria will result in effective removal of viruses from reclaimed water.
2. Virus monitoring is expensive and complex, recovery rates are low, and the laboratory procedures to determine the presence of viruses and identify them can take up to a month.
3. There are a limited number of laboratories with the personnel and equipment that can perform viral assays.
4. There is no consensus among public health official regarding the public health significance of low levels of virus in reclaimed water.
5. There are no documented cases of viral disease resulting from the reuse of reclaimed water in the United States.

ADEQ selected fecal coliform and *E. coli* organisms as indicator organisms to be used for the proposed disinfection criteria for Class A and Class B reclaimed water. ADEQ proposes to repeal the current enteric virus and parasite reclaimed water quality standards and rely on microbiological standards that are expressed in terms of the selected indicator organisms.

How do the proposed disinfection criteria compare to surface water quality standards that have been established to protect recreational waters?

Most of the current disinfection criteria for reclaimed water that have been adopted by other states appear to be based upon California's Title 22 reclamation criteria or they appear to be derivations of the EPA water quality criteria for bacteria that have been recommended to protect marine and fresh recreational waters.

Arizona Administrative Register
Notices of Proposed Rulemaking

The two most commonly used microbiological water quality standards for marine and fresh recreational waters in the United States are the total coliform limit of 1000 / 100 ml and the fecal coliform limit of 200 / 100 ml. The total coliform criterion of 1000 / 100 ml was based on a series of studies of bathing waters conducted by the U. S. Public Health Service in the late 1940s and 1950s. The fecal coliform criterion of 200 / 100 ml was developed in 1968 by the National Technical Advisory Committee to the Federal Water Pollution Control Administration [NTAC]. The fecal coliform criterion of 200 / 100 ml was derived from the original total coliform limit established by the U.S. Public Health Service. The fecal coliform criterion was based upon a total coliform to fecal coliform correlation study which found that in the original bathing water studies about 18%, or approximately 1/5 of the total coliforms, were fecal coliforms. The NTAC applied this ratio to the original total coliform limit to come up with a fecal coliform criterion of 200 / 100 ml. The NTAC recommended the use of a fecal coliform criterion because it was thought to be more fecal-specific than total coliforms and therefore represented a more realistic measure of the potential health hazard associated with swimming in sewage-contaminated waters. In 1976, the fecal coliform criteria for recreational waters developed by NTAC were recommended by U.S. Environmental Protection Agency in the national criteria document for bacteria. EPA recommended fecal coliform criteria to protect human health even though the criteria had been criticized for the poor quality of the data base and deficiencies in the study design that were used in their development. By 1979, many states had adopted the EPA-recommended fecal coliform criteria to protect the microbiological water quality of recreational waters. The fecal coliform criterion of 200 / 100 ml is frequently seen in states' reuse regulations and it appears to be basis for the some of the recommendations in EPA's [Guidelines for Water Reuse](#).

In 1986, EPA recommended new water quality criteria to maintain and protect water quality in surface waters that are used for recreation. EPA recommended that states adopt either enterococci or *E. coli* water quality criteria. EPA made this recommendation because EPA's fresh water health effects studies confirmed that there was a strong correlation between *E. coli* densities and swimming-related gastrointestinal illness and that *E. coli* was a better indicator of swimming-associated gastrointestinal illness than fecal coliform [See Dufour, Alfred, Health Effects Criteria for Fresh Recreational Waters, EPA 600 / 1-84-004, Health Effects Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina (August, 1984)]. EPA recommended that the 30-day geometric mean concentration of *E. coli* in fresh water (5-sample minimum) should not exceed 126 cfu / 100 ml. EPA also recommended single sample maximum concentrations of *E. coli* that were calculated using different confidence limits depending upon anticipated levels of use. The recommended single sample maximum concentrations were:

- | | | |
|-------------------------------|----------------------|-------------------|
| • Designated bathing beach: | 75% confidence limit | 235 cfu / 100 ml. |
| • Moderate use for bathing: | 82% confidence limit | 298 cfu / 100 ml. |
| • Light use for bathing: | 90% confidence limit | 276 cfu / 100 ml. |
| • Infrequent use for bathing: | 95% confidence limit | 576 cfu / 100 ml. |

These *E. coli* criteria were published in "Quality Criteria for Water, 1986," EPA 440 / 5-86-001, U. S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington D.C. 20460 (May 1, 1986). ADEQ proposes to adopt the *E. coli* water quality criteria as disinfection requirements for Class B reclaimed water.

Some states have adopted more stringent disinfection criteria for reclaimed water. For example, microbiological water quality criteria to protect shellfish waters were developed by the National Shellfish Sanitation Program. The National Shellfish Sanitation Program was established by the U.S. Public Health Service in the aftermath of a 1924-1925 typhoid epidemic caused by consumption of sewage-contaminated shellfish. In 1964, a National Shellfish Sanitation Workshop established a limit of 70 total coliform organisms / 100 ml as the microbiological water quality criterion to protect shellfish waters. In 1977, EPA recommended a criterion of 14 fecal coliform organisms / 100 ml to protect shellfish waters. This fecal coliform criterion was derived from the total coliform limit of 70 / 100 ml, using the same 5:1 total coliform to fecal coliform ratio that had been used to develop fecal coliform criteria for recreational waters. The criterion of 14 fecal coliform organisms / 100 ml also appears as a recommended single sample maximum concentration for various reuse applications in EPA's [Guidelines for Water Reuse](#).

Some states have adopted even more stringent disinfection requirements for some reuse applications. For example, the California State Department of Health "Uniform Guidelines for Sewage Disinfection" include total coliform standards for different discharge situations. The guideline for nonrestricted recreational uses of wastewater and for shallow ocean discharges in close proximity to shellfish areas specifies a 7-day median total coliform value of 2.2 / 100 ml. This total coliform criterion also appears in California's Title 22 reclamation criteria as the applicable limit for recreational impoundments, irrigation of food crops, and for landscape irrigation. The single sample maximum concentration of total coliforms is 23 / 100 ml. These total coliform criteria frequently appear in other states' reclamation criteria for reuse applications where a high quality reclaimed water is deemed necessary. It should be noted that a < 2

value is the Most Probable Number (MPN) index number when there are no total or fecal coliform-positive tubes using the 5-tube multiple fermentation technique for microbiological analysis of coliforms [*See Standard Methods for the Examination of Water and Wastewater*, 19th Edition, Section 9221(C), p. 9-49]. The MPN Index Number when 5 tubes are fecal or total coliform-positive using the 5-tube multiple fermentation technique is 23 / 100 ml.

ADEQ proposes to adopt disinfection criteria for Class B reclaimed water that are equivalent to the *E. coli* criteria that have been recently recommended by EPA to maintain and protect surface water quality for full body contact recreation. The proposed disinfection criteria for Class A reclaimed water are more stringent than the surface water quality standards that have been established for recreational waters. They are based upon the level of disinfection believed to be necessary to ensure an essentially pathogen-free reclaimed water.

What indicator of microbiological quality of reclaimed water should be used?

It has been common practice in the wastewater treatment industry to analyze for an indicator organism to determine microbiological water quality because it is impractical to analyze for all of the bacteria, parasites, and viruses that may be present in wastewater. This practice raises the question of what is the best indicator organism to determine the microbiological quality of reclaimed water?

A water quality criterion that is developed using an indicator organism has been defined as a quantifiable relationship between the density of the indicator in water and the potential human health risks involved in that water's use [*See V.J Cabelli, et. al, "A Marine Recreational Water Quality Criterion Consistent With Indicator Concepts and Risk Analysis," Journal of the Water Pollution Control Federation, V. 55, No. 10, p. 1309*]. Under this definition, a reclaimed water quality standard that is expressed as a concentration of an indicator organism would represent the upper limit for the density of that indicator organism that is positively correlated with unacceptable health risks associated with each reuse of reclaimed water.

An ideal indicator organism for reclaimed water would have the following characteristics:

1. There would be clear epidemiological evidence of illness or disease transmission which positively correlates with the density of the indicator organism for each reuse application;
2. The upper limit for the density of an indicator organism would be at a concentration that is quantifiable;
3. The indicator organism would have similar survival characteristics to the pathogenic microorganisms of concern in reclaimed water; and
4. The indicator organism would be easily and accurately detected using simple and inexpensive analytical methods.

Unfortunately, no indicator organism for the microbiological quality of reclaimed water meets all of the criteria described above. First, there is no epidemiological evidence of disease transmission associated with the reuse of reclaimed water that can be used to support the use of any indicator organism. ADEQ is not aware of any epidemiological studies that positively correlate disease transmission with the density of an indicator organism in reclaimed water for each type of wastewater reuse. Also, since the upper limits for the density of potential indicator organisms for various reuse applications are unknown, it is not possible to determine whether limits are quantifiable.

It should be noted that California's reclamation criteria, which use total coliform as an indicator of the microbiological quality of reclaimed water, were not developed using epidemiological data or quantitative risk analysis. At the time the California reclamation criteria were adopted in 1978, the California Department of Health Services concluded that it was not possible to develop reclamation criteria based upon quantitative risk assessment. Rather, the total coliform limits were based on best professional judgments regarding the technical feasibility of well-designed reclamation plants to achieve compliance, the experience of existing reclamation facilities, an evaluation of the available health effects data, and the implementation of a conservative regulatory approach to protect public health. Also, the adoption of the total coliform limit of 2.2 / 100 ml was predicated on studies that had been conducted in California to determine the virus removal capability of advanced wastewater treatment systems.

It also should be noted that, given the limited amount of risk assessment information and epidemiological data currently available, the determination of health risks associated with the reuse of reclaimed water is uncertain. While risk assessment models have been used to assess the relative health risks from pathogens in reclaimed water [*See T. Asano and R. Sakaji, "Virus Risk Analysis in Wastewater Reclamation and Reuse," in Chemical Water and Wastewater Treatment, pp. 483-496, 1990; Joan B. Rose and Charles P. Gerba, "Assessing Potential Health Risks From Viruses and Parasites in Reclaimed Water in Arizona and Florida, USA," Water Sci. Tech., V. 23, pp. 2091-2098, 1991*], these risk analyses require numerous assumptions regarding infectious doses, the typical concentrations of pathogens in reclaimed water, amounts of human exposure, and the probability of infection. To ADEQ's knowledge, no state has

adopted reclaimed water quality standards using an indicator organism that is based upon quantitative risk assessment.

Third, no single indicator organism has survival characteristics that are similar to all of the pathogenic microorganisms of concern in reclaimed water. For example, fecal or coliform organisms have survival characteristics that are similar to other bacterial agents. However, pathogenic protozoans and viruses may be more resistant to wastewater treatment processes than fecal or total coliform organisms. ADEQ acknowledges that some pathogens of public health significance [e.g., *Giardia lamblia* cysts] are more resistant to disinfection than total or fecal coliform organisms. It is possible that the disinfection of wastewater could kill or inactivate total or fecal coliform organisms, but not kill or inactivate *Giardia lamblia* cysts.

Finally, not all potential indicator organisms can be detected using simple and inexpensive analytical methods. While total coliform, fecal coliform, and *E. coli* analyses are relatively simple and inexpensive, most virus and parasite monitoring involves complex and expensive analytical procedures. No single procedure is available that can be used to isolate and identify all pathogens. Furthermore, negative findings for specific pathogens are provisional because state-of-the-art analytical methods are often not sufficiently sensitive to detect low levels of pathogens. For example, *Salmonella* bacteria are common in wastewater, but isolation techniques for them involve relatively complicated analytical procedures that exceed the capabilities of most laboratories. The routine examination of wastewater for specific pathogens is limited by factors such as lack of laboratory facilities, lack of adequately trained personnel, insufficient laboratory time, high costs, and inadequate analytical methods.

Also, the routine examination of wastewater for enteric viruses is not recommended in Standard Methods [See Standard Methods of Examination of Water and Wastewater, 19th ed., p. 9-88]. There are several significant analytical problems with virus monitoring. First, the identification and enumeration of viruses in wastewater is limited by low virus recovery rates. Because virus concentrations in wastewater are typically low, viruses in the wastewater must be concentrated. The available methodologies for concentrating viruses from wastewater are limited and the efficiency of the concentration method may vary depending upon water quality. Most virus concentration methods have achieved adequate virus recovery rates with wastewater samples that have been contaminated experimentally with known quantities of a few specific enteric viruses. While the concentration method may adequately recover the known virus, it is difficult to evaluate the effectiveness of the concentration method in recovering "naturally occurring" viruses in wastewater. Second, the methods used to identify viruses are complex procedures that are beyond the capability of most laboratories. Viral assays can be done only by trained virologists working in specially equipped laboratories. Particular problems associated with the detection of enteric viruses include: 1) the small size of enteric virus particles, 2) the typically low virus concentrations in wastewater, 3) the variability in the amounts and types of enteric viruses that may be present, 4) the various dissolved and suspended materials in wastewater that interfere with enteric virus detection procedures, and 5) the present limitations of virus estimation and identification methods. Third, the laboratory culturing procedure to determine the presence or absence of viruses takes about 14 days and another 14 days are required for identification. This length of time does not provide adequate real-time process control. Finally, none of the available virus detection methods have been tested adequately with representatives from all of the virus groups of public health significance. Because of these significant virus monitoring problems, ADEQ proposes to eliminate virus criteria for reuse.

ADEQ proposes to eliminate the criteria for pathogenic protozoa for similar reasons. The analytical methods for the detection of pathogenic protozoa are not well-standardized. Standard Methods states that the available methods should be considered research procedures and not methods that can be used for the routine examination of wastewater. For example, while methods for detecting *Giardia lamblia* cysts in water have been available since 1975, no comparative studies of method efficiency, precision, or sensitivity have been reported with a variety of waters under different conditions. Also, the identification of *Giardia lamblia* cysts requires analysis by an individual with demonstrated proficiency for recognizing and differentiating protozoa. Finally, practical methods for determining the viability of cysts in water samples are not available. Thus, the identification of *Giardia lamblia* cysts in a reclaimed water sample does not provide any information as to whether the cysts are viable and present a health risk.

Most states express the disinfection criteria for reclaimed water in terms of traditional indicator organisms, as total or fecal coliform concentrations. Coliform organisms have been used as indicators of microbiological water quality because they are positively correlated with fecal contamination of water; they typically occur in wastewater in higher concentrations than other pathogenic microorganisms; they are easily detectable using widely available laboratory methods; and they respond similarly to environmental conditions and treatment processes as many bacterial pathogens.

ADEQ acknowledges that there are limitations associated with using fecal coliform organisms as indicators of the microbiological quality of reclaimed water. The determination of the concentration of fecal coliform or *E. coli* organ-

isms does not predict the presence or absence of enteric viruses or parasites. For example, the absence of fecal coliform organisms in a sample of reclaimed water does not necessarily mean that the reclaimed water is free of significant concentrations of enteric viruses. Notwithstanding the limitations of the traditional indicators, ADEQ proposes to express disinfection requirements for reclaimed water in terms of maximum allowable fecal coliform or *E. coli* concentrations. ADEQ believes that the fecal coliform and *E. coli* bacteria groups represent the best indicator organisms currently available to measure the microbiological quality of reclaimed water. ADEQ proposes to use either the fecal coliform or *E. coli* bacteria group as an indicator of the microbiological quality of reclaimed water rather than attempt to establish reclaimed water quality criteria for specific pathogens. It is impractical to monitor reclaimed water for the hundreds of bacteria, viruses, and parasites that may be present in wastewater. The fecal coliform group of bacteria have been used extensively as indicators of the microbiological quality of treated wastewater. They are a traditional and well-understood indicator of disinfection effectiveness and sanitary water quality. In general, they are present in reclaimed water in greater numbers than other bacterial pathogens. Fecal coliforms generally are more resistant to disinfection than many, but not all, pathogens. The analytical test for fecal coliforms is simple and inexpensive which will permit more frequent monitoring of the microbiological quality of reclaimed water. Most importantly, the use of fecal coliform organisms as an indicator of disinfection effectiveness in combination with technology-based requirements which prescribe minimum treatment processes has been shown to provide effective removal of viruses, bacteria, and parasites.

The current rules prescribe reclaimed water quality criteria for fecal coliform, viruses, and parasites. ADEQ proposes to repeal the numeric criteria and monitoring requirements for enteric viruses, *Giardia lamblia*, *Entamoeba histolytica*, *Ascaris lumbricoides*, and tapeworm. Instead, ADEQ proposes to rely on fecal coliform and *E. coli* bacteria as the indicators of the microbiological quality of reclaimed water.

ADEQ invites public comment on whether there are alternative or better indicators of the microbiological quality of reclaimed water that could be used in place of or in addition to fecal coliform or *E. coli*. ADEQ also is interested in obtaining public comments on whether the existing virus and parasite standards for reclaimed water should be retained or repealed.

Are the proposed microbiological criteria overly conservative?

The approach taken by ADEQ in proposing microbiological water quality criteria for reclaimed water is admittedly conservative. However, in the absence of definitive risk assessment information on the health hazards associated with human exposure to reclaimed water through various reuse applications, ADEQ believes that prudent public health policy requires the establishment of reclamation criteria that err on the side of protecting human health. This caution is reflected in the proposed requirement that Class A reclaimed water be essentially pathogen-free.

The literature on the reuse of reclaimed water indicates that wastewater that has undergone advanced treatment [i.e., secondary treatment + filtration + disinfection to meet a total or fecal coliform criterion of 2.2 cfu / 100 ml] is essentially pathogen-free. It has been demonstrated through virus removal studies that the prescribed treatment train and compliance with the proposed disinfection criteria result in the production of a reclaimed water that is essentially free of bacteria, parasites, and viruses. Moreover, there are reclamation facilities currently in operation that produce essentially pathogen-free reclaimed water through this level of advanced wastewater treatment. The successful operation of reclamation facilities in California, Florida, and Arizona demonstrates that it is both economically and technologically feasible to achieve compliance with the proposed reclaimed water quality standards.

There is no consensus on a minimum level of wastewater treatment that adequately protects human health when reclaimed water is reused. There is general agreement among public health experts that untreated or minimally treated wastewater presents an unacceptable risk of disease transmission. There are documented cases of waterborne transmission of disease from the reuse of untreated or minimally treated wastewater for agricultural irrigation. For example, epidemiological studies have been conducted on kibbutzes in Israel where minimally treated wastewater [i.e., short-term retention of wastewater in oxidation ponds] was used for agricultural irrigation. Researchers in Israel found that there was a statistically significant increase in the risk of disease in young children associated with the reuse of such minimally treated wastewater for agricultural irrigation.

The available epidemiological data support the establishment of secondary treatment and disinfection as a minimum level of wastewater treatment before reclaimed water is reused. However, there is uncertainty with regard to the amount of risk that is associated with the reuse of reclaimed water that has received a minimum of secondary treatment and disinfection. It is not clear whether additional treatment beyond secondary treatment and disinfection, if any, is necessary to protect public health. There is general agreement by public health experts that advanced wastewater treatment which includes coagulation, filtration and disinfection can produce an essentially pathogen-free effluent that will protect public health when it is reused. However, some scientists criticize such advanced wastewater treatment requirements as being overly protective and unnecessarily restrictive [See Health Guidelines for the Use of

Arizona Administrative Register
Notices of Proposed Rulemaking

Wastewater in Agriculture and Aquaculture [Technical Report Series #778, World Health Organization, Geneva, Switzerland, 1989].

While ADEQ recognizes that the conservative approach reflected in the proposed reclamation criteria has been criticized as overly protective from some quarters, there is little epidemiological evidence or risk assessment information to support standards that are based upon lower levels of treatment. ADEQ therefore proposes to adopt the EPA recommendations for wastewater reuse for the following reasons:

1. In the face of uncertainty and an inability to develop reuse criteria based upon definitive risk assessments, sound public health policy dictates a conservative approach, especially for reuse applications where the risk of human exposure to reclaimed water is high. ADEQ is confident that the proposed reclamation criteria will protect public health.
2. Compliance with the prescribed Class A treatment train requirements and disinfection criteria will provide effective control of bacteria, parasites, and viruses in reclaimed water.
3. The adoption of less stringent microbiological criteria might be justifiable if reuse site controls and worker protection provisions are fully implemented. However, such precautions are not always fully implemented by operators of reuse sites. The adoption of the proposed technology-based requirements and disinfection criteria, especially for Class A reclaimed water, will provide an adequate margin of safety.

Should ADEQ prescribe turbidity standards for reclaimed water?

Yes. ADEQ intends to prescribe turbidity criteria for Class A reclaimed water. Turbidity is a key parameter for reclaimed water because continuous monitoring of turbidity provides real time process control and an instantaneous measure of reclaimed water quality. Requiring compliance with prescribed turbidity criteria helps to ensure adequate process control. Also, compliance with the proposed turbidity standard for Class A reclaimed water relates to achieving compliance with the proposed disinfection criteria for reclaimed water. Turbidity or total suspended solids standards are necessary to ensure high level disinfection of reclaimed water. Many pathogenic organisms are associated with suspended solids. The suspended solids in reclaimed water can shield bacteria and viruses from the action of disinfectants. Also, the organic matter in wastewater consumes chlorine, making less chlorine available for disinfection. To ensure the reliable destruction of pathogens, suspended solids in wastewater must be reduced to low levels prior to disinfection.

ADEQ proposes to adopt the California reclamation criteria for turbidity. California requires that reclaimed water meet a standard of 2 NTUs before it can be used for irrigation of food crops and for use in recreational impoundments where swimming is allowed. The California reclamation criterion states that turbidity may not "exceed an average operating turbidity of 2 turbidity units and does not exceed 5 turbidity units more than 5% of the time during any 24-hour period." This criterion is based on the professional judgment that compliance with a 2 NTU standard results in the production of an adequately clarified reclaimed water that is suitable for high level disinfection. Also, it has been demonstrated in California that it is technically feasible to comply with a 2 NTU standard. Reclamation experience in California has shown that a 2 NTU turbidity level is achievable by well-operated wastewater treatment plants employing chemical coagulation and filtration treatment processes.

An alternative approach would be to establish criteria for total suspended solids (TSS). The state of Florida uses this approach and has established TSS criteria for irrigation with reclaimed water. Florida requires reclamation facilities to collect a 24-hour composite TSS sample. No daily sample may exceed 5 mg/L TSS. The results of the analysis on a composite sample represent a daily average TSS value. Florida apparently adopted a daily average TSS standard because of the ease of sample collection and analysis. However, Florida also has established an operating protocol for reclamation facilities under which turbidity is monitored continuously. A "set point" is established for turbidity in the range of 2.0 - 2.5 NTU. If turbidity exceeds this set point for a predetermined time, Florida requires that wastewater be routed to a holding facility or to alternative disposal until the treatment problem is fixed. The Florida TSS standard is equivalent to the California average operating turbidity standard of 2 NTU because each NTU translates into approximately 2.3 - 2.4 mg/L of TSS. Thus, an "average operating turbidity" of 2 NTU is equivalent to a daily average of less than 5 mg/L of TSS.

In Guidelines for Water Reuse, EPA recommends a 24-hour average turbidity standard of ≤ 2 NTU, not to exceed 5 NTUs at any time for reclaimed water which undergoes secondary treatment, filtration, and disinfection. The EPA-recommended turbidity limits are intended to be met prior to disinfection. The EPA guidelines also state that if suspended solids criteria are to be used in lieu of turbidity, the average TSS concentration should not exceed 5 mg/L.

A turbidity standard which requires continuous monitoring is superior to a daily average TSS standard. A daily average TSS value does not provide the same level of treatment reliability that the filtration and disinfection systems are

operating properly. ADEQ will propose a 24-hour average turbidity standard of < 2 NTU, not to exceed 5 NTU at any time for Class A reclaimed water.

Should ADEQ adopt total nitrogen standards for reclaimed water?

ADEQ will propose total nitrogen criteria for Class A+ and Class B+ reclaimed water only. However, ADEQ will not require the use of Class A+ or Class B+ reclaimed water for any reuse application. The proposed total nitrogen criterion of 10 mg/L for Class A+ and B+ reclaimed water is based upon Best Available Demonstrated Control Technology [BADCT] requirements that apply to wastewater treatment plants under the Aquifer Protection Permit program. The BADCT guidance document for wastewater treatment plants states that the optimum reduction for total nitrogen as N is 1.0 mg/L to 10.0 mg/L. The BADCT requirement means that a wastewater treatment plant is required to provide treatment to reduce total nitrogen as N to less than 10 mg/L unless it can be shown that site-specific characteristics are available to control the discharge of total nitrogen to ground water.

Nitrogen is an essential plant nutrient that is necessary for the production of food, fiber, seed, and forage crops. Nitrogen and other nutrients are present in reclaimed water and they provide important fertilizer benefits for crops and landscape plants. However, in some cases, the total nitrogen concentrations in reclaimed water may be in excess of crop plant needs. Excessively high total nitrogen concentrations can cause excessive vegetative growth at the expense of fruit production, delay crop maturity, or reduce crop quality (e.g., reduced sugar or starch content, poor flavor and texture). Also, excessively high total nitrogen concentrations in reclaimed water may result in nitrate contamination of ground water. Total nitrogen that is not taken up by crop or landscape plants may leach to ground water as nitrate.

The fate and transport of nitrogen in the soil is complex. There are a number of chemical, physical, and biological processes that affect the fate of nitrogen in the soil after the application of reclaimed wastewater for irrigation. These processes include nitrogen fixing, NH^+4 adsorption and retention, nitrogen transformations in the soil (e.g., mineralization, nitrification, and denitrification), volatilization of ammonia and plant uptake. Total nitrogen that is not removed by these processes may move through the soil profile to ground water as nitrate. The amount of nitrate that is leached to ground water depends upon the processes described above, the quantity of reclaimed water that is applied, evapotranspiration rates, nitrogen utilization, fertilizer applications, and soil profile characteristics.

The nitrate contamination of ground water is a public health concern. The primary public health concern arising from nitrate contamination of drinking water is the risk of methemoglobinemia, or "blue baby disease." High concentrations of nitrate in drinking water may interfere with the oxygen-carrying capacity of the blood of infants. EPA has established a National Primary Drinking Water Maximum Contaminant Level (MCL) for nitrate of 10 mg/l to protect infants from this disease. This MCL has been adopted as an aquifer water quality standard in Arizona.

There are several ways that total nitrogen concentrations in reclaimed water may be regulated to prevent nitrate contamination of ground water:

1. Require a nitrogen budget for reuse sites in an individual reuse permit. Manage total nitrogen loading through irrigation water management. Calculate the allowable annual hydraulic loading rate so the average concentration in percolate will comply with a nitrate limit of 10 mg / l

[See G. Pettygrove and T. Asano, Irrigation with Reclaimed Municipal Wastewater, A Guidance Manual, Chapter 8, Irrigation System Design, p. 8-1 through 8-16].

2. Require nitrogen removal at the source wastewater treatment plant to reduce the total nitrogen concentration in the reclaimed water. Require a wastewater treatment plant to meet a 10 mg/l total nitrogen (as N) standard unless it can be demonstrated that reuse site characteristics permit the release of reclaimed water with higher total nitrogen concentrations.

3. Issue general permits and rely on best management practices developed for reuse sites to control the discharge of nitrate to groundwater.

ADEQ does not believe that total nitrogen concentrations in reclaimed water can be regulated through the development of nitrogen budgets in reuse permits. ADEQ believes that nitrogen budgeting is unrealistic for several reasons. First, a nitrogen budget would have to be prescribed in a reuse permit for each reuse site. Nitrogen budgets in individual or general reuse permits are impractical because hydraulic loading requirements will vary over time and from reuse site to site depending upon nitrogen uptake by crops, the total nitrogen concentration of the reclaimed water, precipitation, evapotranspiration rates, nitrogen removal due to site characteristics, and fertilizer applications. Second, even if a nitrogen budget could be prescribed for each reuse site in a permit, a wastewater treatment plant that provides reclaimed water will not be able to tailor the total nitrogen concentration of the reclaimed water to meet individual nitrogen loading requirements at each reuse site. Finally, it is unlikely that ADEQ can effectively develop or administer individual or general reuse permits with nitrogen budgets because of agency resource constraints. Even if

Arizona Administrative Register
Notices of Proposed Rulemaking

ADEQ could prescribe nitrogen budgets in reuse permits, ADEQ would not have enough field staff to adequately monitor compliance with nitrogen loading requirements.

ADEQ will not regulate the discharge of total nitrogen from reclamation plants through the reclaimed water quality standards program. Instead, ADEQ will rely on the APP program and BADCT requirements to control the discharge of nitrogen from wastewater treatment plants. The BADCT guidance document for domestic and municipal wastewater treatment plants defines the optimum reduction of nitrogen through the application of best available demonstrated control technology as less than 10.0 mg/L as N. Attainment of this level requires the application of nitrogen removal technology at the wastewater treatment plant. The BADCT guidance document states:

Denitrification technology is well developed at full-scale. Wastewater treatment plants with a sufficient economic base, skilled operators, and reliably controlled pH, temperature, loading, and chemical feed can achieve nitrogen effluent concentrations as low as 1 mg/L total nitrogen. Small package treatment plants can readily achieve treatment levels between 5 and 10 mg/L total nitrogen.

The BADCT guidance document states that site characteristics may be available to meet nitrogen removal requirements [See Draft BADCT Guidance Document for Domestic and Municipal Wastewater Treatment Plants, pp. 16-19]. The operator of a wastewater treatment plant may be able to demonstrate, on a case-by-case basis, that reuse site characteristics can be used to attain optimum reductions of total nitrogen, in lieu of engineered nitrogen removal technologies at the wastewater treatment plant.

ADEQ proposes to rely on APP BADCT requirements which will require nitrogen removal at a source wastewater treatment plant to less than 10 mg/L unless it can be demonstrated that reuse site characteristics permit the delivery of reclaimed water with higher concentrations of total nitrogen. Nitrogen removal at source wastewater treatment plants will be required by the APP program unless it is demonstrated that individual reuse site characteristics are available to control the discharge of nitrate to ground water. ADEQ will not establish regulatory requirements in the reclaimed water quality standards rules that require nitrogen removal treatment. Instead, ADEQ will try to encourage the production of denitrified reclaimed water that complies with a total nitrogen limit of 10 mg / L through the establishment of the "+" categories of reclaimed water.

6. A reference to any study that the agency proposes to rely 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, or other supporting material:

Not applicable

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:

ADEQ believes that the proposed reclaimed water quality standards rules will have few economic, small business, or consumer impacts. The establishment of the Class A+ and Class B+ categories of reclaimed water will have no direct economic impact because neither of the "+" categories of reclaimed water impose regulatory requirements. Compliance with the proposed Class A+ or Class B+ reclaimed water quality standards is voluntary. No water reclamation plant is required to meet the minimum treatment requirements or the reclaimed water quality criteria that are proposed in the "+" categories and no person who wants to reuse reclaimed water will be required to obtain Class A+ or Class B+ reclaimed water.

The establishment of the proposed Class A category of reclaimed water may result in the need for upgrades at some existing wastewater treatment plants that are engaged in wastewater reclamation. The minimum treatment requirements for Class A reclaimed water are secondary treatment, chemical feed facilities, filtration, and high level disinfection. If the proposed Class A reclaimed water quality standards are adopted, this level of advanced wastewater treatment will be required for wastewater treatment plants that provide reclaimed water for irrigation of food crops, recreational impoundments, open access landscape irrigation, toilet and urinal flushing, fire protection systems, spray irrigation of orchards and vineyards, commercial air conditioning, and vehicle washing.

ADEQ does not believe that the proposed treatment requirements for Class A reclaimed water impose new regulatory burdens or will require treatment upgrades at reclamation facilities that provide reclaimed water for irrigation of food crops that are consumed raw. While the current wastewater reuse rules do not prescribe minimum treatment requirements, the allowable permit limits for irrigation of food crops prescribed in the current wastewater reuse rules are so stringent that they probably cannot be achieved without providing a level of treatment that is equivalent to that proposed for Class A reclaimed water. For example, the current wastewater reuse rules prescribe a turbidity criterion of 1 NTU, an enteric virus criterion of 1, and a 5-sample fecal coliform criterion of 2.2 cfu / 100 ml. for reclaimed water

that is reused for irrigation of food crops that are consumed raw. The 1 NTU criterion in the current rules is more stringent than the 2 NTU criterion that ADEQ proposes for Class A reclaimed water. The current fecal coliform criteria are equivalent to the fecal coliform criteria that ADEQ proposes for Class A reclaimed water. ADEQ proposes to repeal the current enteric virus criteria that apply to reclaimed water that is used for irrigation of food crops that are consumed raw. It is unlikely that the turbidity, enteric virus, and fecal coliform criteria in the current wastewater reuse rules can be achieved without undergoing the minimum treatment train of secondary treatment, chemical addition, filtration, and high level disinfection that ADEQ proposes for Class A reclaimed water. Finally, to ADEQ's knowledge, there are no existing wastewater reclamation facilities that provide reclaimed water for food crop irrigation.

The proposed Class A reclaimed water standards may require treatment upgrades at existing wastewater treatment plants that provide reclaimed water for open access landscape irrigation. The current wastewater reuse rules prescribe a turbidity criterion of 5 NTUs, an enteric virus criterion of 125 / 40 L, and a 5-sample geometric mean fecal coliform criterion of 200 cfu / 100 ml. for reclaimed water that is used for open access landscape irrigation. Secondary treatment and disinfection are minimum treatment requirements to meet the allowable permit limits for open access landscape irrigation under the current wastewater reuse rules. The current turbidity criterion of 5 NTUs probably requires wastewater treatment plants to provide filtration. Thus, the current wastewater reuse rules and the proposed Class A reclaimed water quality standards both require secondary treatment, filtration, and disinfection. However, the allowable permit limits for open access landscape irrigation in the current wastewater reuse rules may be achievable without chemical addition facilities that are required under the proposed Class A reclaimed water quality standards. Consequently, the proposed rules may require treatment plant upgrades to provide chemical addition facilities at existing wastewater treatment plants if they provide reclaimed water for open access landscape irrigation. ADEQ solicits public comments from wastewater utilities that provide reclaimed water for open access landscape irrigation on whether the proposed Class A reclaimed water standards will require a treatment upgrades at existing wastewater treatment plants.

If the proposed Class A reclaimed water standards are adopted, they may require treatment upgrades at existing wastewater treatment plants that provide reclaimed water for impoundments where partial body contact recreation takes place. The current wastewater reuse rules prescribe a turbidity criterion of 5 NTUs, an enteric virus criterion of 125 / 40 L, and a 5-sample geometric mean fecal coliform criterion of 1000 cfu / 100 ml. for reclaimed water that is reused for reclaimed water impoundments for partial body contact recreation. Under the proposed rules, ADEQ proposes to define such impoundments as recreational impoundments and require Class A reclaimed water. Secondary treatment and disinfection are minimum treatment requirements that are needed to consistently achieve compliance with the allowable permit limits under the current wastewater reuse rules. The current turbidity criterion of 5 NTUs requires that wastewater treatment plants provide filtration. Thus, both the current wastewater reuse rules for partial body contact recreation and the proposed Class A reclaimed water quality standards for recreational impoundments require secondary treatment, filtration, and disinfection. However, the current permit limits for impoundments of reclaimed water where partial body contact recreation takes place may be achievable without chemical addition facilities that are required for the proposed Class A reclaimed water. Consequently, the proposed rules may require treatment plant upgrades to provide chemical addition facilities at existing wastewater treatment plants if they provide reclaimed water for impoundments that are used for partial body contact recreation. ADEQ solicits public comments from wastewater utilities that provide reclaimed water for impoundments that are used for partial body contact recreation as to whether the proposed Class A reclaimed water standards will require a treatment upgrade at existing wastewater treatment plants.

ADEQ proposes to require Class A reclaimed water for spray irrigation of orchards and vineyards. The proposed Class A reclaimed water quality criteria are more stringent than the criteria for orchard irrigation in the current wastewater reuse rules. The current rules require that reclaimed water used for orchard irrigation comply with a 5-sample geometric mean fecal coliform criterion of 1000 / 100 ml and a single sample maximum fecal coliform concentration of 4000 / 100 ml. The current wastewater reuse rules do not distinguish between surface and spray irrigation of orchards as the proposed reclaimed water quality standards rules do. The fecal coliform criteria for orchard irrigation in the current rules probably can be met by wastewater treatment plants that provide secondary treatment and disinfection and by wastewater stabilization pond systems. The proposed Class A rules will require that wastewater treatment plants provide secondary treatment, chemical addition facilities, filtration, and disinfection for spray irrigation of vineyards and orchards. Consequently, the proposed rules will require treatment plant upgrades at wastewater treatment plants that provide reclaimed water for spray irrigation of orchards. These wastewater treatment plants probably will have to be upgraded to provide both chemical addition facilities and filtration. It is not known how many wastewater treatment plants in the state currently provide reclaimed water for spray irrigation of orchards and vineyards. It is estimated that less than 10 reclamation plants provide reclaimed water for orchard irrigation in the state. ADEQ estimates that the proposed Class A reclaimed water quality standards for spray irrigation of orchards

Arizona Administrative Register
Notices of Proposed Rulemaking

will have little or no impact because most, if not all, of the 10 wastewater treatment facilities provide reclaimed water for *surface* irrigation of orchards.

Finally, ADEQ proposes to require Class A reclaimed water for toilet and urinal flushing, fire protection systems, commercial air conditioning, and vehicle washing. These types of wastewater reuse are not specifically recognized in the current rules. ADEQ solicits public comments from the regulated community regarding the direct and indirect costs and benefits of requiring Class A reclaimed water for these types of wastewater reuse.

The proposed Class B reclaimed water quality standards should not impose additional costs on existing wastewater treatment plants that provide reclaimed water for direct reuse. ADEQ believes that most wastewater treatment plants that are engaged in wastewater reclamation already comply with the proposed secondary treatment and disinfection requirements for Class B reclaimed water. While the proposed *E. coli* criteria for Class B reclaimed water are more stringent than the current fecal coliform criteria for some types of wastewater reuse, ADEQ believes that the proposed *E. coli* criteria can be achieved without major wastewater treatment upgrades at existing facilities.

The proposed Class C reclaimed water quality standards should not impose additional costs for wastewater stabilization pond systems engaged in reclamation. The proposed reclaimed water quality criteria are equivalent to the criteria prescribed in the current wastewater reuse rules.

State law requires agencies to reduce the impact of a rule on small businesses by using certain methods when they are legal and feasible in meeting the statutory objectives for the rulemaking. ADEQ considered each of the methods prescribed in A.R.S. §§ 41-1035 and 41-1055(B)(5)(c) for reducing the impact on small businesses.

Methods that may be used include the following: (1) Exempt them from any or all rule requirements, (2) Establish performance standards which would replace any design or operational standards, or (3) Institute reduced compliance or reporting requirements. An agency may accomplish the 3rd method by establishing less stringent requirements, consolidating or simplifying them, or setting less stringent schedules or deadlines. Other than providing flexibility and potentially improving the efficiency of the program, ADEQ has been unable to incorporate other specific methods to reduce the impact on small businesses. Although small businesses represent a portion of the regulated community expected to benefit from this rule, ADEQ expects most businesses to benefit from this rulemaking.

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: Mr. David Lillie
Address: Arizona Department of Environmental Quality
3033 N. Central Avenue
Phoenix, Arizona 85012
Telephone: (602) 207-4436
Fax: (602) 207-2251

10. The time, place, and nature of the proceedings for the adoption, amendment or repeal of the rule:

ADEQ will hold oral proceedings to take formal public comments on the proposed reclaimed water quality standards rules as follows:

June 6, 2000
6:00 p.m to 9:00 p.m
Arizona Corporation Commission Hearing Room 222
State of Arizona Office Complex
400 W. Congress
Tucson, Arizona

June 7, 2000
6:00 p.m. to 9:00 p.m.
Room 1706
Arizona Department of Environmental Quality
3033 N. Central Avenue
Phoenix, Arizona

Arizona Administrative Register
Notices of Proposed Rulemaking

June 13, 2000
6:00 p.m to 9:00 p.m.
Coconino County Board of Supervisors Meeting Room
219 E. Cherry Avenue
Flagstaff, Arizona

The close of the public comment period is June 23, 2000. Written comments should be addressed to the attention of Mr. Steven Pawlowski at the Arizona Department of Environmental Quality, 3033 N. Central Avenue, Phoenix, Arizona 85012-2809.

11. Any other matters prescribed by statute that are applicable to the specific agency or to any specific rule or class of rules:

Not applicable

12. Incorporation by reference and their location in the rules:

None

13. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY

**CHAPTER 11. DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY STANDARDS**

ARTICLE 3. ~~RESERVED~~ RECLAIMED WATER QUALITY STANDARDS

Section

| | |
|--------------------|---|
| <u>R18-11-301.</u> | <u>Definitions</u> |
| <u>R18-11-302.</u> | <u>Applicability</u> |
| <u>R18-11-303.</u> | <u>Class A+ Reclaimed Water</u> |
| <u>R18-11-304.</u> | <u>Class A Reclaimed Water</u> |
| <u>R18-11-305.</u> | <u>Class B+ Reclaimed Water</u> |
| <u>R18-11-306.</u> | <u>Class B Reclaimed Water</u> |
| <u>R18-11-307.</u> | <u>Class C Reclaimed Water</u> |
| <u>R18-11-308.</u> | <u>Industrial Reuse</u> |
| <u>R18-11-309.</u> | <u>Reclaimed Water Quality Standards For an Unlisted Type of Direct Reuse</u> |
| <u>Appendix A.</u> | <u>Minimum Reclaimed Water Quality Requirements for Reuse Applications</u> |

ARTICLE 3. ~~RESERVED~~ RECLAIMED WATER QUALITY STANDARDS

R18-11-301. Definitions

The terms in this Article have the following meanings:

“Direct reuse” means the beneficial use of reclaimed water for a purpose allowed by 18 A.A.C. 9, Article 7 including industrial wastewater used for the production or processing of any crops used as a human or animal food. The following do not constitute direct reuse of reclaimed water:

Use of water subsequent to its release under the conditions of a National Pollution Discharge Elimination system permit.

Use of water subsequent to discharge under the conditions of an Aquifer Protection Permit issued under 18 A.A.C. 9, Articles 1 through 4, or

Use of industrial wastewater or reclaimed water, or both, in a workplace that is subject to federal programs that protect workers from workplace exposures.

“Disinfection” means a treatment process that kills or inactivates pathogenic organisms in wastewater by oxidants, ultraviolet light, or other agents.

“Filtration” means a treatment process for removing particulate matter from wastewater by passage through porous media.

“Graywater” means wastewater collected separately from sewage flows that originates from clothes washers, bathtubs, showers, and sinks, but it does not include wastewater from kitchen sinks, dishwashers, or toilets.

“Industrial wastewater” means water generated from an industrial process.

Arizona Administrative Register
Notices of Proposed Rulemaking

“NTU” means nephelometric turbidity unit.

“Onsite wastewater treatment facility” has the meaning prescribed in A.R.S. § 49-201(24).

“Open access” means that access to reclaimed water by the general public is uncontrolled.

“Reclaimed water” has the meaning prescribed in A.R.S. § 49-201(31) and includes gray water and industrial wastewater with a component of sanitary wastewater.

“Restricted access” means that access to reclaimed water by the general public is controlled.

“Sanitary wastewater” means wastewater originating from toilets, baths, sinks, lavatories, laundries, and other plumbing fixtures in places of human habitation, employment, or recreation.

“Secondary treatment” means a biological treatment process that achieves the minimum level of effluent quality defined by the federal secondary treatment regulation at 40 CFR § 133.102.

R18-11-302. Applicability

A. This Article applies to the direct reuse of reclaimed water except for the:

1. The direct reuse of graywater, or
2. The direct reuse of reclaimed water from an onsite wastewater treatment facility regulated by a general Aquifer Protection Permit under 18 A.A.C. 9, Article 4.

B. A direct reuse of reclaimed water shall comply with applicable standards established in this Article and reclaimed water permitting requirements established in 18 A.A.C. 9, Article 7.

R18-11-303. Class A+ Reclaimed Water

A. Treatment requirements. Class A+ reclaimed water is a wastewater that has undergone secondary treatment, filtration, nitrogen removal treatment, and disinfection. Chemical feed facilities to add coagulants or polymers are required to ensure that filtered effluent prior to disinfection complies with the 24-hour average turbidity criterion prescribed in subsection (B)(1). Chemical feed facilities may remain idle if the 24-hour average turbidity criterion in (B)(1) is achieved without chemical addition.

B. Turbidity. The turbidity of reclaimed water at a point in the wastewater treatment process after filtration and immediately prior to disinfection shall comply with the following criteria:

1. The 24-hour average turbidity of filtered effluent shall be 2 NTUs or less.
2. The turbidity of filtered effluent shall not exceed 5 NTUs at any time.

C. Disinfection criteria. Class A+ reclaimed water shall meet the following criteria after disinfection and prior to direct reuse:

1. There shall be no detectable fecal coliform organisms in 4 of the last 7 reclaimed water samples taken.
2. The single sample maximum concentration of fecal coliform organisms shall be less than 23 colony forming units per 100 ml.
3. If a reclaimed water provider operates under an alternative treatment method or turbidity criterion under subsection (E), there shall be no detectable enteric virus in 4 of the last 7 reclaimed water samples taken.

D. Nitrogen removal. The 5-sample geometric mean concentration of total nitrogen shall be less than 10 mg/L.

E. Alternative methods. Treatment methods or turbidity criteria other than those described in subsections (A) or (B) or blending reclaimed water with other water may be used to produce Class A+ reclaimed water provided the reclaimed water provider demonstrates through pilot plant testing, existing reclaimed water quality data, or other means that the alternative method or turbidity criteria reliably produce a reclaimed water that meets the disinfection criteria in subsection (C) and the total nitrogen criteria in subsection (D) prior to direct reuse.

F. Reuse applications. Class A+ reclaimed water is not required for any reuse application. Class A+ reclaimed water may be reused for any reuse application listed in Appendix A of this Article.

R18-11-304. Class A Reclaimed Water

A. Treatment requirements. Class A reclaimed water is a wastewater that has undergone secondary treatment, filtration, and disinfection. Chemical feed facilities to add coagulants or polymers are required to ensure that filtered effluent prior to disinfection complies with the 24-hour average turbidity criterion prescribed in subsection (B)(1). Chemical feed facilities may remain idle if the 24-hour average turbidity criterion in (B)(1) is achieved without chemical addition.

B. Turbidity. The turbidity of Class A reclaimed water at a point in the wastewater treatment process after filtration and immediately prior to disinfection shall comply with the following:

1. The 24-hour average turbidity of filtered effluent shall be 2 NTUs or less.
2. The turbidity of filtered effluent shall not exceed 5 NTUs at any time.

C. Disinfection criteria. Class A reclaimed water shall meet the following criteria after disinfection treatment and prior to direct reuse:

1. There shall be no detectable fecal coliform organisms in 4 of the last 7 reclaimed water samples taken.

Arizona Administrative Register
Notices of Proposed Rulemaking

2. The single sample maximum concentration of fecal coliform organisms shall be less than 23 colony forming units per 100 ml.
3. If a reclaimed water provider operates under an alternative method or turbidity criterion under subsection (D), there shall be no detectable enteric virus in 4 of the last 7 reclaimed water samples taken.

D. Alternative methods. Treatment methods and turbidity criteria other than those described in subsections (A) or (B) or blending reclaimed water with other water may be used to produce Class A reclaimed water provided the reclaimed water provider demonstrates through pilot plant testing, existing reclaimed water quality data, or other means that the alternative method or turbidity criteria reliably produce a reclaimed water that meets the disinfection criteria in subsection (C) prior to direct reuse.

E. Reuse applications. Class A reclaimed water shall be used for the specific reuse applications designated Class A in Appendix A. Class A reclaimed water may be used for any reuse application where Class B+, Class B, or Class C reclaimed water is allowed.

R18-11-305. Class B+ Reclaimed Water

A. Treatment requirements. Class B+ reclaimed water is a wastewater that has undergone secondary treatment, nitrogen removal treatment, and disinfection.

B. Disinfection criteria. Class B+ reclaimed water shall meet the following *E. coli* criteria after disinfection and prior to direct reuse:

1. The concentration of *E. coli* in 4 of the last 7 samples shall be less than 126 colony forming units per 100 ml.
2. The single sample maximum concentration of *E. coli* shall be less than 576 colony forming units per 100 ml.

C. Nitrogen removal. The 5-sample geometric mean concentration of total nitrogen shall be less than 10 mg/L.

D. Reuse applications. Class B+ reclaimed water is not required for any reuse application. Class B+ reclaimed water may be used for any reuse application where Class B or Class C reclaimed water is allowed. The reuse of Class B+ reclaimed water for a reuse application that requires Class A reclaimed water is prohibited.

R18-11-306. Class B Reclaimed Water

A. Treatment requirements. Class B reclaimed water is a wastewater that has undergone secondary treatment and disinfection.

B. Disinfection criteria. Class B reclaimed water shall meet the following *E. coli* criteria after disinfection and prior to direct reuse:

1. The concentration of *E. coli* in 4 of the last 7 samples shall be less than 126 colony forming units per 100 ml.
2. The single sample maximum concentration of *E. coli* shall be less than 576 colony forming units per 100 ml.

C. Reuse applications. The use of Class B reclaimed water for reuse applications where Class A reclaimed water is required is prohibited. Class B reclaimed water may be used for any reuse application where Class C reclaimed water is permitted. A minimum of Class B reclaimed water is required for the specific reuse applications designated Class B in Appendix A.

R18-11-307. Class C Reclaimed Water

A. Treatment requirements. Class C reclaimed water is a wastewater that has undergone secondary treatment in wastewater stabilization ponds, with or without disinfection.

B. Total retention time. The total retention time in wastewater stabilization ponds shall be at least 30 days.

C. Fecal coliform criteria. Class C reclaimed water shall meet the following fecal coliform criteria:

1. The concentration of fecal coliform organisms in 4 of the last 7 reclaimed water samples taken shall be less than 1000 colony forming units per 100 ml.
2. The single sample maximum concentration of fecal coliform organisms shall be less than 4000 colony forming units per 100 ml.

D. Reuse applications. The use of Class C reclaimed water for reuse applications where Class A or Class B reclaimed water is required is prohibited. Class C reclaimed water may be used for the specific reuse applications designated Class C in Appendix A.

R18-11-308. Industrial Reuse

A. Reclaimed water quality requirements for the following direct reuse applications are industry-specific and shall be determined by the Department on a case-by-case basis in the reclaimed water permit issued by the Department under 18 A.A.C. 9, Article 7:

1. Direct reuse of industrial wastewater containing a component of sanitary wastewater.
2. Direct reuse of industrial wastewater used for the production or processing of any crops used as a human or animal food.

B. The Department shall use best professional judgement in determining the reclaimed water quality requirements needed to protect public health and the environment for the direct reuse applications specified in subsection (A).

Arizona Administrative Register
Notices of Proposed Rulemaking

C. For direct reuse of reclaimed water for an industrial use listed in Appendix A, the reclaimed water quality classes established in this Article are intended for the protection of public health and the environment and will not necessarily prevent scaling, corrosion, foaming or biofouling of industrial process equipment.

R18-11-309. Reclaimed Water Quality Standards For an Unlisted Type of Direct Reuse

A. The Department may prescribe in an individual reclaimed water permit issued under 18 A.A.C. 9, Article 7 reclaimed water quality requirements for a type of direct reuse that is not listed in Appendix A. The Department shall determine the reclaimed water quality requirements needed to protect public health and the environment on a case-by-case basis using best professional judgement. The Department may determine that an existing reclaimed water quality category is appropriate for a new type of direct reuse. The Department may consider the following factors when prescribing reclaimed water quality requirements for a new type of direct reuse:

1. The risk to public health;
2. The degree of public access to the site where the reclaimed water is reused and human exposure to the reclaimed water;
3. The level of treatment necessary to ensure that the reclaimed water is aesthetically acceptable;
4. The level of treatment necessary to prevent nuisance conditions;
5. Specific water quality requirements for the intended reuse application;
6. The means of application of the reclaimed water;
7. The degree of treatment necessary to avoid a violation of surface water quality standards or aquifer water quality standards;
8. The potential for improper or unintended reuse of the reclaimed water;
9. Reuse guidelines, criteria, or standards adopted or recommended by the U.S. Environmental Protection or other federal or state agencies that apply to the new reuse application;
10. Reclamation experience in the United States; and
11. An adequate margin of safety to protect public health and the environment.

B. Class A+ or Class A reclaimed water is allowed for a new type of direct reuse except for direct potable reuse and for make up water in a swimming pool or spa. Direct potable reuse of reclaimed water and the use of reclaimed water in swimming pools or spas are prohibited.

Arizona Administrative Register
Notices of Proposed Rulemaking

Appendix A. Minimum Reclaimed Water Quality Requirements for Direct Reuse Applications

| <u>Type of Direct Reuse Application</u> | <u>Minimum Class of Reclaimed Water Required</u> |
|---|--|
| <u>Irrigation of food crops</u> | <u>A</u> |
| <u>Recreational and other open access impoundments</u> | <u>A</u> |
| <u>Residential landscape irrigation</u> | <u>A</u> |
| <u>Schoolground landscape irrigation</u> | <u>A</u> |
| <u>Other open access landscape irrigation (e.g., parks, cemeteries, greenbelts, common areas).</u> | <u>A</u> |
| <u>Toilet and urinal flushing</u> | <u>A</u> |
| <u>Fire protection systems</u> | <u>A</u> |
| <u>Commercial nurseries</u> | <u>A</u> |
| <u>Spray irrigation of an orchard or vineyard</u> | <u>A</u> |
| <u>Commercial air conditioning systems</u> | <u>A</u> |
| <u>Vehicle and equipment washing</u> | <u>A</u> |
| <u>Surface irrigation of an orchard or vineyard</u> | <u>B</u> |
| <u>Golf course irrigation</u> | <u>B</u> |
| <u>Restricted access landscape irrigation (e.g., highway medians and landscapes and similar areas)</u> | <u>B</u> |
| <u>Restricted access impoundment</u> | <u>B</u> |
| <u>Irrigation of food crops for human consumption that will be processed by pasteurizing or sterilizing</u> | <u>B</u> |
| <u>Dust control</u> | <u>B</u> |
| <u>Soil compaction and similar construction activities</u> | <u>B</u> |
| <u>Pasture for milking animals</u> | <u>B</u> |
| <u>Concrete and cement mixing</u> | <u>B</u> |
| <u>Materials washing and sieving</u> | <u>B</u> |
| <u>Street cleaning</u> | <u>B</u> |
| <u>Pasture for non-milking animals</u> | <u>C</u> |
| <u>Livestock watering (nondairy animals)</u> | <u>C</u> |
| <u>Irrigation of sod farms</u> | <u>C</u> |
| <u>Irrigation of fiber, seed, forage, fodder and similar crops</u> | <u>C</u> |
| <u>Silviculture</u> | <u>C</u> |