

SUBSTANTIVE POLICY STATEMENT

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3010.000 USING NARRATIVE AQUIFER WATER QUALITY STANDARDS TO DEVELOP PERMIT CONDITIONS FOR AQUIFER PROTECTION PERMITS

Level Three: Water Quality Division – Water Permits Section

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Authority: A.R.S. §§ 49-221; 49-241(B); 49-243(K); A.A.C. R18-9-202(A); R18-9-A204; R18-11-405(A) and (C).

Purpose: Aquifer protection permit applicants are required to demonstrate that the discharged pollutants will not contribute to a violation of aquifer water quality standards (AWQS). The narrative aquifer water quality standard ("Narrative Standards") are intended as a "safety net" to guard against impacts not addressed by the limited number of numeric standards or the application of best available demonstrated control technology at a facility under the purview of the Aquifer Protection Program. In Aquifer Protection Permits ADEQ specifies Alert Levels (ALs) as an early warning mechanism to prevent exceeding an AWQS. This policy describes the procedures ADEQ intends to follow to establish Aquifer Protection Permit conditions to insure protection of the Narrative Standard as well as ADEQ's preferred form for those conditions. The policy includes descriptions of existing statutory and regulatory authority on which ADEQ may rely in carrying out the policy's terms. The policy itself does not impose any obligations on permit applicants. ADEQ in particular does not intend this policy to establish binding numeric standards. Permit applicants remain free to demonstrate compliance with the Narrative Standard by means other than those set forth in this policy.

This policy also does not create any substantive or procedural rights enforceable by a party in litigation against ADEQ or the State of Arizona. ADEQ reserves the right to act at variance with this policy.

Description of Practice / Policy: Narrative AWQS (A.A.C. R18-11-405) have equal status in protecting the environment and human health as numeric AWQS (R18-11-406).

If a pollutant discharged from a facility subject to the Aquifer Protection Permit (APP) program may endanger human health or threaten reasonably foreseeable uses of water in an aquifer and no numeric AWQS exists for that pollutant, then an AL for the APP may be established to prevent any possible violation of the narrative AWQS for that pollutant. The Water Permits Section will decide whether to establish an AL in a

permit on a case-by-case basis taking into account the following factors:

1. Present or reasonably foreseeable uses of water in the aquifer;
2. Knowledge of human health-based guidance levels or some other risk-based or use-based level for the pollutant;
3. Concentration of the pollutant in the discharge and ambient groundwater;
4. Volume of the discharge;
5. Hydrogeologic conditions; and
6. Potential fate of the pollutant in the aquifer.

If, upon reviewing the above factors, the WPS determines that the application of a narrative standard is warranted, the WPS shall derive a use protection level (UPL). The UPL shall be applied at the point of current or future use that is downgradient from the facility. The WPS will then determine an AL to be applied at a point where the facility's groundwater monitoring for constituents with numeric AWQS is to be conducted. The AL will be set at a level that ensures that concentrations of the pollutant of interest will not reach the UPL at any downgradient point of use. The AL will be based upon calculations that consider the effects of attenuation due to advection, dispersion, and degradation for the specific aquifer conditions, at the site.

The Water Permits Section will seek an agreement with the applicant regarding a contingency action to prevent exceeding a narrative standard reflected by the UPL. If an agreement is reached, the WPS will make the action a condition of the permit. Consequently, the UPL will not be exceeded at the point of current or future use.

Description of Procedure:

1. An AL to protect against violation of a narrative AWQS shall be applied in APPs on a case-by-case basis. WPS staff shall screen facilities early in the APP review process to determine whether narrative AWQS provisions should be considered when setting ALs and establishing groundwater monitoring.
2. As a first step, WPS staff shall determine if a current or "reasonably foreseeable" future use of the aquifer exists in the discharge impact area (DIA) of the discharging facility. A.R.S. § 49-243(A)(5) authorizes the Department to request information about the use of water from aquifers in the DIA. The WPS hydrologist can examine the wells and well uses within the DIA. If one or more users of groundwater exist downgradient of the discharging facility or if there is a nearby community that is growing in a manner that will likely require use of the aquifer in the DIA, then a current or reasonably foreseeable future use of the aquifer is presumed.

Likewise, for the application of R18-11-405(C), if an irrigation, livestock, or industrial use is downgradient of the discharging facility, then the criterion of a current or reasonably foreseeable groundwater use is presumed. Only if these criteria are fulfilled should the narrative AWQS be used for establishing permit conditions. If the applicant demonstrates to the satisfaction of the Department that no current or reasonably foreseeable use of the aquifer exists downgradient of the discharging facility, steps 3-8 below are unnecessary.

3. WPS staff shall determine if a pollutant is present in the discharge that could either impact human health through groundwater use or impair some other use of the groundwater. WPS staff shall use any technical information presented in the application to assess the characteristics of the discharge and determine whether a pollutant of interest is present. The health based guidance levels (HBGLs) will indicate the potential of a pollutant to adversely impact human health. The Water Encyclopedia (1990)

by Fritz van der Leeden, Fred L. Troise, and David Keith Todd also furnishes information about water-quality criteria for various uses. Agricultural crops or livestock may be intolerant to high concentrations of certain pollutants. Documents published by the EPA, Agricultural Extension Service, or the U.S. Department of Agriculture may provide data on crop or livestock tolerances. Numeric surface water quality standards (A.A.C. R18-11-109(A), Appendix A) for drinking water sources, agricultural livestock watering, or agricultural irrigation uses may serve as useful criteria for groundwater uses. If an industrial facility uses or may use groundwater within the DIA, then information about tolerances to supply water quality should be obtained from that user.

If a pollutant of interest is not present in the discharge in quantities that would adversely impact human health or impair groundwater use, then A.A.C. R18-11-405(A) and R18-11-405(C) are not applicable for establishing permit conditions. In such cases only numeric AWQS pursuant to A.A.C. R18-11-406 need be considered, and steps 4-8 below are unnecessary.

4. The discharge characterization included in the application will indicate whether a pollutant of interest exists in the discharge (A.A.C. R18-9-A202(A)(4)(a)). The application's hydrogeologic study will reveal the pollutant of interest's natural background groundwater concentration (R18-9-A202(A)(8)(c)). If the pollutant is not present in the discharge or if the natural background groundwater concentration is greater than that in the discharge, then the narrative AWQS should not be used for establishing permit conditions, and steps 5-8 below are unnecessary.
5. WPS staff should establish the UPL at the existing or potential point of groundwater withdrawal that is downgradient of the point of discharge for the facility.
6. An AL shall be set at the point at which groundwater monitoring for pollutants with numeric AWQS is to be conducted. The WPS shall determine the value of the AL through consideration of the fate and transport of the pollutant to insure that the UPL is not exceeded at the downgradient point of groundwater withdrawal. This method is directly analogous to a risk-assessment approach in that it considers the sources, the transport mechanisms in the groundwater, and the potential receptors. This step may be performed by either WPS staff or the applicant with WPS staff review.
7. WPS will seek to reach an agreement with the applicant on a contingency plan designed to protect downgradient uses of the aquifer in the event that an AL is exceeded. If an agreement is reached, contingencies shall be included as conditions of the APP, and failure to act on them shall be subject to statutory penalties prescribed in A.R.S. § 49-262.
8. As part of the APP permit process, ADEQ will hold a public hearing for facilities affected by using the narrative AWQS to establish permit conditions. ADEQ will notify all well owners of record with the Arizona Department of Water Resources, within the discharge impact area, about the hearing.

If an applicant does not agree to the conditions suggested by WPS, the applicant may demonstrate by some other means that the facility will not cause or contribute to a violation of the Narrative Standard.

Examples

The following fictional cases are offered as examples of how the narrative standard might be used to develop alert levels in an APP. Case 1 is an APP for impoundments at an electrical generating station with discharge of cooling tower blowdown water. The discharge could potentially affect the water quality of a well field that supplies a mine with make-up water for its copper flotation process. Case 2 is an APP for a wastewater

treatment plant where the discharge is very close to a drinking water supply well. Case 3 is an APP for a mine complex with downgradient agricultural uses of the aquifer. The table below presents these circumstances and the UPL and AL derived for specific pollutants of interest:

	Case 1	Case 2	Case 3
Downgradient Use	Mining Flotation Process	Drinking Water	Agriculture
Distance from point of facility discharge	1 Mile	200 Feet	1/4 Mile
Pollutant Source	Cooling Tower Blowdown	Municipal Wastewater	Mining Facilities
Pollutant of Interest	Total Dissolved Solids (TDS)	<i>Cryptosporidium</i>	Boron
Use Protection Level	800 mg/l	0 Oocysts/liter	1.0 mg/l
AL Applied at downgradient point of groundwater monitoring	1600 mg/l	1 Oocyst/liter	20.0 mg/l

For the cases provided above the process of deciding on the AL involves considering the travel distance and the UPL. The concentration of the pollutant of interest in the discharge and the volume of discharge are also critical factors. More importantly, in each case ADEQ would have to give consideration to the transport of the pollutant in the aquifer, allowing for advective and dispersive action to reduce the concentration. The technical process of evaluating these factors is not presented here in the interest of brevity. The important thing to note from these cases is that the AL applied at the downgradient point of groundwater monitoring for the facility should generally be higher, in some cases much higher, than the UPL.

Definitions

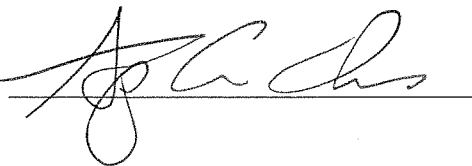
1. "Advection" is the movement of a dissolved pollutant at the speed of the average linear velocity of groundwater.
2. "Alert level (AL)" is as defined in A.A.C. R18-9-101(2) and has the function described in A.R.S. § 49-243(K)(7).
3. "Discharge Impact Area (DIA)" is as defined in A. R. S. § 49-201(13).
4. "Dispersion" is the tendency for a solute to spread out from the expected flow path. Dispersion includes spreading in the direction of bulk flow and spreading perpendicular to groundwater flow.
5. "Health-based guidance levels (HBGLs)" are pollutant concentrations calculated by the Arizona Department of Health Services (ADHS), which indicate the concentration of a pollutant in drinking water that would adversely affect human health. The HBGLs are updated monthly and are available on an ADHS computer bulletin board service.
6. "Pollutant of interest" includes, but is not limited to, the following constituents for which no numeric aquifer water quality standard has been established:
 - a. Constituents for which HBGLs have been established;
 - b. Constituents which impair irrigation (for example, boron, salinity, sodium);
 - c. Constituents for which numeric domestic water source standards have been established under

- A.A.C. R18-11-109(A), Appendix A;
- d. Constituents for which agricultural livestock watering or agricultural irrigation standards have been established under A.A.C. R18-11-109(A), Appendix A;
 - e. Microorganisms which adversely affect human health (for example, viruses, *Giardia*, *Cryptosporidium*);
 - f. Pollutants affecting taste and odor which may impair the use of groundwater as a drinking water source; and
 - g. Calcium, iron, or manganese which may have an adverse economic or aesthetic impact on uses.
7. "Use-protection level (UPL)" is the concentration of a pollutant of interest that the WPS believes will likely result in adverse human health effects or impairment of current or reasonably foreseeable groundwater use. The UPL is developed on a case-by-case basis and applies only to the point(s) of groundwater withdrawal for which it has been developed.

Responsibility: Within WPS, all staff developing permit conditions for APPs shall be responsible for knowledge and implementation of this policy. Staff of the Compliance and Enforcement Section who enforce APP conditions must also be familiar with this policy. Supervisors must ensure that this policy is consistently and equitably applied by employees under their supervision.

Approved by:

Stephen A. Owens
Director



10/3/03
Date