

BUREAU OF ENVIRONMENTAL REMEDIATION/REMEDIAL SECTION
POLICY

**Considerations for Groundwater Use and
Applying RSK Standards to Contaminated
Groundwater**

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BUREAU OF ENVIRONMENTAL REMEDIATION POLICY

Considerations for Groundwater Use and
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INTRODUCTION

Risk-based Standards for Kansas (RSK) guidance provides health risk-based actionable values (cleanup or action levels) for surface soil, soil to groundwater protection, groundwater, and indoor air. Generally, RSK values default to the Federal Drinking Water Standards known as the Maximum Contaminant Levels (MCLs) for aquifers utilized as a public drinking water source.

There are various programs within the Bureau of Environmental Remediation (BER) that allow for consideration of groundwater use in developing groundwater cleanup levels. This policy has been developed to establish a mechanism for consistency across BER programs in protecting public health and the environment, in addition to protection of groundwater resources of the State.

CONSIDERATIONS

- 1) Kansas Statutes Annotated, K.S.A. 65-34, 167, provides among other things, that remedial alternatives to address contamination consider actual risk to human health and environment, present and proposed future uses of a contaminated property and surrounding properties, and the potential movement of contamination in a form or manner which would result in exposure to humans or the environment at an unacceptable level of risk.
- 2) Kansas Administrative Regulation, K.A.R. 28-71-11 provides the framework used to develop site-specific cleanup levels for properties in the Voluntary Cleanup and Property Redevelopment Program (VCPRP). In terms of groundwater protection and groundwater cleanup levels, the following direction is provided [ref. K.A.R.28-71-11 (k) through (n)]:
 - A. The department shall approve soil cleanup levels to insure that migration of contaminants present in the soil shall not cause the cleanup levels established for groundwater, surface water, or both, to be exceeded;
 - B. Groundwater cleanup levels shall be based on the most beneficial use of the groundwater considering present and proposed future uses;
 - C. The most beneficial use of groundwater is for potable use unless demonstrated otherwise by the voluntary party and approved by the department;

- D. Groundwater potentially or actually used as a potable water source shall require maximum protection in determining cleanup levels; and
 - E. The department shall approve cleanup levels that prevent additional degradation of the groundwater caused by contaminant migration and that encourage remedial actions to restore contaminated groundwater to the groundwater's most beneficial use.
- 3) Kansas Administrative Regulation, K.A.R. 28-30-2 provides the following pertinent definitions:
- A. "Groundwater" means the part of the subsurface water which is in the zone of saturation; and,
 - B. "Aquifer" means an underground formation that contains and is capable of transmitting groundwater.
- 4) Kansas Administrative Regulation, K.A.R. 28-16-28b (uu), defines "Potable Water" to mean water that is suitable for drinking and cooking purposes in terms of both human health and aesthetic considerations.
- 5) Kansas Administrative Regulation, K.A.R. 28-29-2(d) "Aquifer means saturated soils and geologic materials that are capable of recharging a well within 24 hours and whose boundaries can be identified and mapped from hydrogeologic data. The term shall include all hydraulically connected aquifers."
- 5) Kansas Administrative Regulation, K.A.R. 28-29-2(x) "Groundwater means that part of the subsurface water in the ground that is in the zone of saturation."
- 6) Kansas Administrative Regulation, K.A.R. 28-16-28b (cc) "Groundwater means water located under the surface of the land that is or can be the source of supply for wells, springs, or seeps, or that is held in aquifers or the soil profile."
- 7) Kansas Statutes Annotated, K.S.A.82a-1021 (a) "Aquifer means any geological formation capable of yielding water in sufficient quantities that can be extracted for beneficial purposes."
- 8) Federal Regulations, specifically 40CFR143, establish National Secondary Drinking Water Regulations pursuant to the Safe Drinking Water Act with the intent of controlling contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water. Secondary Maximum Contaminant Levels (SMCLs) are the maximum permissible levels of contaminants for public water supplies; SMCLs are,

as considered by the United States Environmental Protection Agency Administrator, requisite to the protection of the public welfare. RSK guidance adopts the SMCL for a contaminant, which provides for application of SMCLs to both public and private drinking water sources.

- 9) Statewide in Kansas, groundwater is relied upon as a source for public and private water. This includes areas where SMCLs are exceeded as a result of non-anthropogenic activity in addition to areas where aquifer yield is extremely low.

POLICY

This policy outlines the considerations that should be applied in making determinations regarding the need for groundwater cleanup and the target cleanup levels for contaminated sites/properties where there is an actual or potential impact to groundwater. The intent of this policy is not to further define an aquifer or groundwater; adequate definitions already exist for these terms, as outlined above.

- 1) The BER shall consider the following when determining the groundwater cleanup standard for any given site.

- A. Groundwater cleanup levels shall be based on the most beneficial use of the groundwater considering present and proposed future uses. The most beneficial use of the groundwater is for a potable water source.

- B. Groundwater potentially or actually used as a potable water source shall require maximum protection in determining cleanup levels. The Federal drinking water standards (MCLs) shall apply as cleanup targets for all potable groundwater sources. If MCLs do not exist for a particular contaminant then the department will determine risk-based values based on "consumptive-use" of the groundwater.

- C. Groundwater cleanup levels must prevent or minimize further degradation of groundwater or surface water through migration.

- D. Soil to groundwater protection will be required through application of BER- developed or BER-approved contaminant levels for the soil to groundwater pathway in accordance with RSK guidance.

- E. The responsible party or voluntary party may request either BER exemption from soil to groundwater and groundwater considerations, or relaxation of cleanup to drinking water standards based on identified groundwater at a property being considered as non-potable water in terms of poor natural groundwater quality and/or limited groundwater yield for potential use. Such determinations will be based on existing, available information in addition to information provided by the responsible party or voluntary party. The nature and

amount of information required for the BER's evaluation may vary depending on property-specific conditions and the amount of readily available information. The BER will have final approval on all such determinations. Programs funded by state-statute that address environmental contamination utilizing KDHE-contractors might have to justify, in a memorandum, the rationale for deviating from the RSK Tier 2 standards.

2) The BER shall consider the following properties to substantiate deviation from the RSK Tier 2 standards:

A. Groundwater Quality

The quality of identified groundwater in the vicinity of a contaminated site/property can be such that it is not suitable for potable use. For the purposes of this policy, potability is based on the natural, untreated state of groundwater. The following occurrences may be considered when making the determination that groundwater quality is not suitable for its most beneficial use.

A1. In the event that a naturally occurring level of an individual contaminant in groundwater causes the groundwater to be unfit to drink then the groundwater may be considered as non-potable. The BER will make such determinations based on the concentrations of the naturally occurring contaminant and available technical information (including the use of secondary MCLs).

A2. In the event that the Total Dissolved Solids (TDS) concentrations are greater than 1200 mg/l in groundwater and the constituents are from a natural source, the BER may make a determination that groundwater is non-potable. Prior to making such determination the BER will evaluate TDS concentrations to determine the contribution from an anthropogenic source/s of TDS. Responsible/voluntary parties may be requested to provide such data as needed by the department.

Note: Total dissolved solids concentration is the sum of the cations (positively charged ions) and anions (negatively charged ions) in the water. There is no primary drinking water standard for total dissolved solids, but the secondary standard for TDS is 500 mg/L. The palatability of drinking water has been evaluated as poor for TDS levels of 900 to 1200 mg/L and unacceptable for levels greater than 1200 mg/l. An elevated total dissolved solids concentration does not mean that the water is a health hazard, but it does mean the water may have aesthetic problems or cause nuisance problems. The principal constituents of TDS are usually the cations calcium, magnesium, sodium, potassium and the anions carbonate, bicarbonate, chloride and sulfate. However, anthropogenic contributions ions that make up TDS are possible, particularly chloride and nitrate.

The quantity of identified groundwater in the vicinity of a contaminated site/property can be such that there is not an adequate supply for potable use. The following occurrences may be considered when making the determination that groundwater quantity is not suitable for its most beneficial use.

B1. In the event that any groundwater-bearing unit is not capable of producing water at a rate greater than 150 gallons per day to a well with a four inch diameter casing or a relative equivalent sustainable rate in gallons per day from a well with a smaller or larger diameter casing the BER may determine the groundwater is non-potable due to inadequate yield.

Note: 150 gallons per day from a well with a four-inch diameter casing is equivalent to 0.1 gallons per minute or 6.25 gallons per hour. Formulas are available to determine potential yield from various diameter casings.

B2. In the event that a groundwater-bearing unit produces water seasonably (i.e., following high precipitation events) the BER may determine the groundwater is non-potable due to unsustainable long-term yield.

C. Other Considerations

The following are additional considerations, which may be used by the BER to determine if groundwater is potable.

C1. The current or historical use of groundwater from a groundwater-bearing unit constitutes use and therefore the groundwater is considered as potable.

C2. All groundwater-bearing zones at a site/property must be evaluated to determine their "beneficial use". A groundwater-bearing zone identified by the BER as non-potable may directly impact underlying groundwater-bearing zones that are potable. The BER will consider the downward migration of groundwater and the underlying groundwater-bearing zones in its determination of groundwater cleanup standards.

C3. Surface water standards must be considered as defined by (Kansas Administrative Regulations K.A.R. 28-16-28b through K.A.R. 28-16-28f) when a contaminated groundwater-bearing zone may be migrating or influencing surface water. The BER will consider the migration of contaminated groundwater-bearing zones that could negatively impact surface water.

D. Soil to Groundwater Considerations

The BER shall consider the following to determine when the Soil to Groundwater RSK Standards are not appropriate:

D1. Soil to Groundwater RSK levels may not be appropriate if the groundwater-bearing zone is deemed by the BER to be non-potable based on any condition outlined in Section 2 of this policy

D2. Soil to Groundwater RSK levels are not appropriate when there is no groundwater-bearing zone beneath the site/property.

D3. Soil to Groundwater RSK levels may not be appropriate if it is apparent to the BER Project Manager that there will not be a groundwater impact from contamination at the site. This determination may be related to the depth from a soil source to groundwater or the presence of a confining layer between the soil source and a groundwater-bearing unit or that groundwater contamination is not present despite many years of soil contamination.

E. Groundwater to Indoor Air Considerations

BER may determine that RSK levels for groundwater and soil to groundwater protection apply even though groundwater may be determined as “non-potable” by this policy if a secondary pathway which could allow or enhance the migration of contaminants from groundwater to other media is identified by BER (e.g., residential indoor air via the vapor intrusion pathway). At sites with volatile organic compounds in groundwater, the BER shall consider the factors outlined in *Kansas Vapor Intrusion Guidance – Chemical Vapor Intrusion and Residential Indoor Air*, dated June 2007, (e.g., concentrations of contaminants present, depth to groundwater, current land use, and proximity of potentially affected properties to soil sources or groundwater plumes, among others) to determine whether further assessment of the vapor intrusion pathway is needed.