



**Title 10 – DEPARTMENT OF NATURAL RESOURCES
Division 26 – Petroleum and Hazardous Substance Storage Tanks
Chapter 2 – Underground Storage Tanks – Technical Regulations**

PROPOSED RULE

10 CSR 26-2.075 Risk-Based Corrective Action Process

PURPOSE: This rule establishes the general requirements for evaluating risks posed to human health, public welfare, and the environment by contamination resulting from a release from a storage tank system.

(1) For each storage tank release for which maximum concentrations of one or more chemicals of concern exceed the default target levels in 10 CSR 26-2.078 Table 1 and where corrective action is not conducted to meet the default target levels, owners and operators shall develop a conceptual model for the site and affected and potentially affected off-site properties that integrates available data and information into a coherent description of geologic and hydrogeologic characteristics and conditions, distribution of chemicals of concern in affected media, actual and potential human and ecological receptors under current and reasonably anticipated future conditions, and exposure pathways. The conceptual model for the site shall consist of a narrative and graphical description of site characteristics and conditions and shall apply to the full extent of the contamination, both on and off-site, as determined in compliance with 10 CSR 26-2.076(15).

(2) The conceptual model shall be used to identify data and information for the site that is missing or inadequate and as a guide for site characterization and corrective action. The conceptual model shall be revised and refined as additional data or information is obtained.

(3) The conceptual model shall be developed via the collection of site data pertaining to the source and distribution of chemicals of concern, geology and hydrogeology, human and ecological receptors, routes of exposure, exposure pathways, chemical of concern transport mechanisms, and other information necessary to adequately evaluate the risk posed by chemicals of concern to human health and the environment. All aspects of the conceptual model shall rely on site-specific data, information obtained from approved literature sources, or both.

(4) Components of Conceptual Site Model. The conceptual site model shall include qualitative and quantitative information that describes the relevant site-specific factors that determine the risk that chemicals of concern pose to human health and the environment. The conceptual site model shall include the following key elements:

(A) The chemical release scenario, known and suspected source(s), and chemicals of concern;

(B) Affected media;

(C) Spatial and temporal distribution of chemicals of concern in each affected media including the presence and extent of free product and associated light non-aqueous phase liquid;

(D) Nature and geometry of free product;

(E) Description of any known existing or proposed land or water use restrictions;

(F) Current and reasonably anticipated future land and groundwater use;

(G) Description of stratigraphy, geology, hydrogeology, soil characteristics, meteorology, and identification of surface water bodies that may potentially be affected by site chemicals of concern;

(H) Remedial activities conducted to date; and

(I) An exposure model developed in accordance with section (10) of this rule that identifies human and ecological receptors, exposure pathways and routes of exposure under current and reasonably anticipated future land use conditions.

(5) Identification of chemicals of concern. Potential chemicals of concern at and associated with a site shall be identified in accordance with 10 CSR 26-2.076(3). Specific types of petroleum and their corresponding chemicals of concern are listed in Table 1 of 10 CSR 26-2.076.

(6) Land use. Owners and operators shall evaluate current and reasonably anticipated future land use for the site and all properties affected or potentially affected by chemicals of concern from the release in accordance with this rule. Land use shall be identified as either residential or nonresidential. Land use information shall be used in the identification of actual and potential receptors affected by the release. Owners and operators shall submit land use information, including the information at subsection (6)(C) below, and specific predictions of reasonably anticipated future land use to the department. The department will make a final decision regarding the reasonably anticipated future use of each affected property in accordance with subsection (6)(B) of this rule.

(A) Current land use. Owners and operators shall conduct a visual survey covering a radius of at least five hundred feet (500') from the outer perimeter of the area of release to clearly describe the current land use of the site and all affected and potentially affected off-site properties. The survey shall identify the use characteristics of each property, such as, but not necessarily limited to, schools, hospitals, apartments, single-family homes, buildings with basements, day care centers, churches, nursing homes, and types of businesses. The survey shall also identify ecological and sensitive areas such as surface water bodies, parks, recreational areas, wildlife reserves, wetlands, karst features, and agricultural areas. The results of the survey shall be accurately documented on a scaled map with a north arrow and the use and boundaries of each affected or potentially affected property shall be identified.

(B) Determination of reasonably anticipated future land use. The department will make final decisions with respect to the reasonably anticipated future land use of each property affected or potentially affected by the release. The department will make such decisions in accordance with the following:

1. Consideration of information relevant to the future use of a property, including predictions of reasonably anticipated future use and supporting documentation that are provided to the department by owners and operators, the owner of an adjacent or nearby property affected by a release, or either party's environmental consultant or other authorized designee;

2. Information obtained by the department from other sources, including but not limited to, governmental entities and actual and prospective purchasers, developers, tenants, and users of the property to which the decision pertains; and

3. The department may request future land use information from the owner, or the owner's authorized designee, of an off-site property affected by a release.

(C) To make predictions of reasonably anticipated future land use for a property affected by a release for the department's consideration, owners and operators must assemble and utilize all reasonably available information, such as:

1. Local zoning ordinances;
2. Current use of the site and each affected or potentially affected off-site property;
3. Known future uses of the site and each affected or potentially affected off-site property;
4. Type and size of adjacent or nearby streets and highways;
5. Local and regional development plans;
6. Existing activity and use limitations affecting the site or an off-site property;
7. Building permits;
8. Financing plans/restrictions; and
9. Interviews with property owners, tenants, and/or prospective purchasers.

(7) Groundwater use. Owners and operators shall identify whether groundwater is or is reasonably likely to be used in the future at and in the vicinity of the site in accordance with this rule and the well survey required by 10 CSR 26-2.076(10). All groundwater zones that are, or may potentially be, targeted for installation of domestic water wells shall be identified and evaluated to determine whether and to what extent the zones are interconnected. Other non-domestic groundwater uses, if any, shall also be identified.

(A) Owners and operators shall evaluate the reasonably anticipated future use of groundwater for each identified groundwater zone in accordance with the process shown in Figure 1 of this rule and the following criteria:

1. Presence of private or public water wells on or near the site as determined in accordance with 10 CSR 26-2.076(10);
2. Activity and use limitations. Determine if a durable and reliable activity and use limitation is in place that eliminates the potential that a specified groundwater zone will serve as a future source of domestic water;

3. Groundwater quality and yield. Groundwater shall be considered suitable for domestic use if both the following criteria are met:

A. The groundwater contains less than ten thousand milligrams per liter (10,000 mg/L) total dissolved solids; and

B. The groundwater zone is capable of producing a minimum of one quarter (0.25) gallon per minute or three hundred sixty (360) gallons per day on a sustained basis;

4. Sole source. A groundwater zone that is the only viable source of water at or in the vicinity of the site shall be considered to be a potential source of domestic water, irrespective of the groundwater quality and yield considerations above;

5. Reasonable probability of future groundwater use. The probability that a groundwater zone could be used as a future source of water for domestic use shall be determined on the weight of evidence, consideration of the criteria described in subsections (10)(A)1 – 4 and 10(C)2.C of this rule, and the following factors:

A. Current groundwater use patterns in the vicinity of the site;

B. Availability of alternative water supplies, including consideration of other groundwater zones, municipal water supply systems, and surface water sources;

C. Urban development considerations for sites in areas of intensive historic industrial or commercial activity, having groundwater zones in hydraulic communication with industrial or commercial surface activity, and located within metropolitan areas with a population of at least 70,000 as established by the 1970 census; and

D. Aquifer capacity limitations that may affect the number of production wells that can be supported.

6. If the owner or operator determines that a groundwater zone has a reasonable probability of future use as a domestic water supply, the groundwater zone shall be evaluated in accordance with 10 CSR 26-2.076(17) to determine if there is a reasonable probability that the groundwater zone is or could be affected by chemicals of concern associated with the site. The evaluation shall consider the nature and extent of contamination at and associated with the site, site hydrogeology including the potential presence of karst features, contaminant fate and transport factors and mechanisms, and other pertinent variables.

7. Conclusions regarding groundwater use shall be subject to review and approval by the department.

(8) Surface water and sediment. In accordance with this rule and 10 CSR 26-2.076(9), owners and operators shall identify any lakes, streams, or other surface water bodies that are or potentially may be affected by the release or by chemicals of concern at the site. The characteristics of the surface water body shall be identified. Actual and potential impacts to lakes, streams, and other surface water bodies from a release shall be evaluated and surface water quality protected in accordance with the requirements of 10 CSR 20-7.031.

(9) Utilities. Owners and operators shall identify and evaluate underground utilities on and near the site and their ability to serve as conduits for migration of free product and

chemicals of concern in accordance with this rule and 10 CSR 26-2.076(7). In addition, owners and operators shall determine whether and to what extent chemicals of concern pose risk due to infiltration or permeation of the utility lines themselves, particularly water lines.

(10) Exposure Model. Owners and operators shall develop an exposure model that identifies the environmental media affected by the release, actual and potential receptors, exposure pathways linking the affected media to a receptor, and routes of exposure for all contaminated media associated with a release under current and reasonably anticipated future land use conditions. If chemicals of concern have or are likely to migrate from the site to one or more off-site properties, exposure pathways at those properties must be evaluated independent of the exposure pathways at the site.

(A) The exposure model shall identify:

1. All human and ecological receptors in accordance with subsection (10)(B) of this rule;
2. All complete exposure pathways under current and reasonably anticipated future land use as per subsection (10)(C) of this rule;
3. The location of current and future buildings on the site and all affected off-site properties in association with 10 CSR 26-2.076(19);
4. The exposure domain for each complete exposure pathway as per subsection (10)(D) of this rule; and
5. The point of exposure for each exposure pathway.

(B) Receptors. Owners and operators shall identify actual and potential human and ecological receptors on and off-site that are or could be exposed to chemicals of concern associated with the release.

1. All actual and potential human receptors on the site and each affected off-site property shall be identified. At a minimum, the following receptors shall be considered at all sites:

- A. Resident, including a child, adult and age-adjusted individual;
- B. Non-resident adult worker;
- C. Adult construction worker.

2. Actual or potential ecological receptors and habitats on the site and all affected off-site properties shall be identified. The screening process in section (11) of this rule shall be used to determine the presence of ecological receptors to be considered.

(C) Exposure pathways. Owners and operators shall evaluate each exposure pathway listed below and determine whether each exposure pathway is complete or incomplete under current and reasonably anticipated future conditions. The conclusions of the exposure pathway evaluation shall be supported with site-specific data.

1. An exposure pathway shall be considered complete where there is affected environmental media, a mechanism by which chemicals of concern in the environmental media can result in exposure to a receptor, and an actual or potential receptor identified

under current or reasonably anticipated future land use conditions. The specific concentration of chemicals of concern in an environmental media shall not be considered in determining whether an exposure pathway is complete.

2. At a minimum, owners and operators shall evaluate the following exposure pathways for human exposure for inclusion in the exposure model for the site:

A. Surficial soil. Exposure pathways applicable to surficial soil shall include, at a minimum:

(I) Ingestion of soil, dermal contact with soil, and outdoor inhalation of vapors and particulates from surficial soils;

(II) Indoor inhalation of vapor emissions from surficial soil;

B. Subsurface soil. Exposure pathways applicable to subsurface soil shall include, at a minimum:

(I) Indoor inhalation of vapor emissions from subsurface soil;

C. Soil column. Exposure pathways applicable to both surface and subsurface soil shall include, at a minimum:

(I) Leaching of chemicals of concern from soil to groundwater and domestic use of the groundwater;

(II) Leaching of chemicals of concern from soil to groundwater followed by migration of vapors from groundwater to indoor air; and

(III) Leaching of chemicals of concern from soil to groundwater and subsequent migration to a surface water body.

D. Groundwater. Exposure pathways applicable to groundwater shall include, at a minimum:

(I) Indoor inhalation of vapor emissions from groundwater;

(II) Ingestion of water, dermal contact with water, and inhalation of vapors from water associated with the domestic use of groundwater;

(III) Migration to a surface water body and potential impacts to surface water(s); and

(IV) Dermal contact with groundwater, i.e., any non-potable use of groundwater that could result in dermal contact (e.g., industrial or agricultural use).

E. The following pathways shall be evaluated from the ground surface to the depth of construction for the construction worker receptor:

(I) Ingestion, dermal contact with, and inhalation of vapor emissions and particulates from soil;

(II) Outdoor inhalation of vapor emissions from groundwater;

(III) Outdoor inhalation of vapor emissions from free product and/or light non-aqueous phase liquid; and

(IV) Dermal contact with groundwater, if the depth to groundwater is or could be less than the depth of construction.

(V) Direct contact with free product constitutes an acute hazard and shall be evaluated qualitatively by owners and operators based on the depth of the free product and the depth of construction.

F. Surface water and sediment. Exposure pathways applicable to surface water and sediment shall include, at a minimum:

(I) Ingestion of surface water;

(II) Contact with surface water during recreational activities (ingestion, inhalation of vapors, and dermal contact);

(III) Contact with sediments (ingestion and dermal contact); and

(IV) Ingestion of fish or other aquatic organisms that have accumulated chemicals of concern as a result of surface water or sediment contamination.

3. Other pathways that may need to be considered include, but are not necessarily limited to, the following:

A. Ingestion of produce grown in soils affected by a release;

B. Use of groundwater for irrigation purposes; and

C. Use of groundwater for industrial purposes.

(D) Exposure domain. Owners and operators shall determine the exposure domain for each complete exposure pathway and develop representative concentrations for chemicals of concern in accordance with 10 CSR 26-2.077(2)(D).

(11) Ecological screening assessment. Owners and operators shall use the conceptual site model and the qualitative screening assessment described below to identify whether any ecological receptors or habitats exist at or near the site and evaluate actual and potential exposure.

(A) Owners and operators must qualitatively assess the existence of ecological receptors on and near the site and whether any actual or potential exposure pathways to such receptors are or will be complete. Owners and operators may use checklists developed by the department for this purpose.

(B) If the qualitative assessment conducted at section (11)(A) of this rule determines that ecological receptors exist on or near the site and actual or potential exposure pathways to such receptors are or will be complete, owners and operators shall conduct additional ecological risk assessment in accordance with 10 CSR 26-2.077(8) to determine whether contamination at the site poses an unacceptable risk to ecological receptors.

(12) Determination of applicable target levels. Owners and operators shall identify applicable target levels for chemicals of concern in each media for all complete exposures pathways in accordance with 10 CSR 26-2.077(3).

(13) Geological data collected under 10 CSR 26-2.075 through 10 CSR 26-2.079 must be collected by or under the direct supervision of a geologist or qualified professional

engineer registered by the State of Missouri. Similarly, the interpretation of geological data under 10 CSR 26-2.075 through 10 CSR 26-2.079 that affects or has the potential to affect public health, safety, and welfare must also be conducted by or under the supervision of a geologist or professional engineer registered by the State of Missouri.

(14) Informal review process. The department provides this process as a convenience to the party adversely affected and as an optional or additional process to any administrative or judicial review procedures otherwise provided by law. The requester may end the informal review process at any time by notification to the department.

(A) Within thirty (30) days of receipt of any written decision by the department implementing the regulations within 10 CSR 26-2.075 to 2.082, any person adversely affected by such decision, including an owner or operator of the site or the owner of an off-site property affected by a release, may contest the decision by requesting an informal review by the director of staff of the Hazardous Waste Program, who may participate in or delegate such review to other designee(s) (“reviewer(s)”). Any such request shall be made in writing and shall clearly explain the relevant background pertaining to the project manager’s decision, any disputed aspects of the decision, why such decision should be reconsidered, and the relief sought by the requester.

(B) An owner or operator or other requester may authorize an environmental consultant, attorney, or other person to participate with such owner or operator during the informal review process. Any such authorization must be provided in writing to a department reviewer.

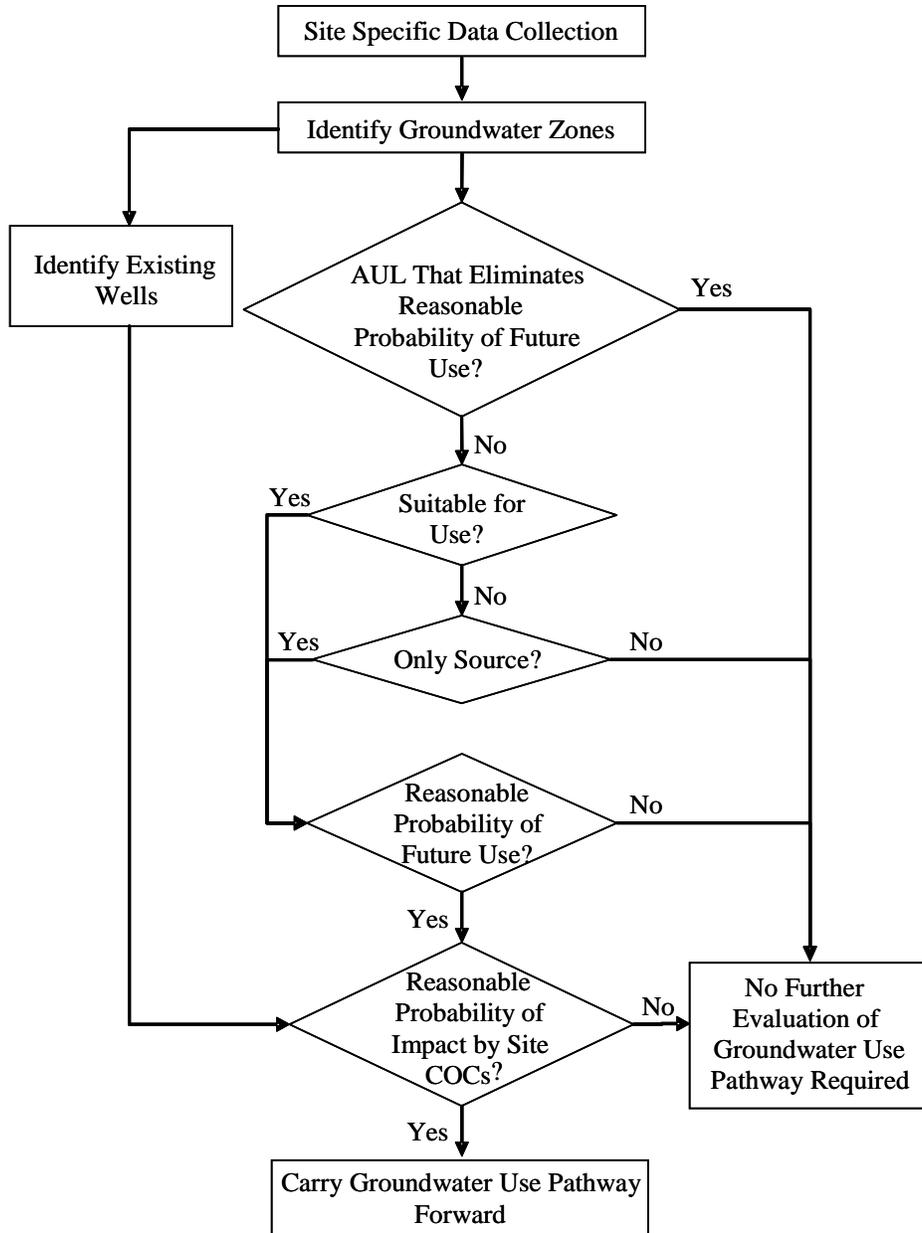
(C) The reviewer(s) may hold an informal conference and may otherwise communicate with the requester or any other knowledgeable parties prior to making a decision to affirm, modify, or vacate the initial decision.

1. The reviewer(s) shall issue the department’s final written decision to the owner or operator and any other appropriate parties within sixty (60) days of receiving the request, unless the department determines that additional time is necessary to develop and issue a decision.

2. Upon receipt of the department’s written decision, the requester may pursue any further administrative or judicial review as otherwise provided by law.

AUTHORITY: 319.109 and 319.137 RSMo Supp. 2007. Original rule filed February 13, 2009.

Figure 1. Conceptual Model for Domestic Consumption of Groundwater Exposure Pathway Analysis



NOTE:

1. In this chart, “use” refers to domestic consumption.
2. The analysis embodied in the chart is performed for each groundwater zone of interest. The conclusion of the analysis (the groundwater use pathway is either carried forward for additional consideration, or no further evaluation of the pathway is required) applies to the individual groundwater zone under analysis. Different conclusions may apply to different groundwater zones at a given site.
3. The attributes of an AUL must be sufficient to “eliminate reasonable probability of future use,” and, by that, allow a conclusion that “no further evaluation of groundwater use pathway required.”