

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 26-2.077 Tiered Risk Assessment

PURPOSE: This rule presents requirements regarding assessing human health and environmental risk posed by chemicals of concern associated with releases from storage tank systems.

(1) Reserved.

(2) Owners and operators shall conduct risk assessments using the following general procedures:

(A) Develop and refine a conceptual site model in accordance with 10 CSR 26-2.075 based on site-specific investigations conducted in accordance with 10 CSR 26-2.076;

(B) Determine applicable target levels in accordance with this rule and 10 CSR 26-2.078;

(C) For each complete exposure pathway, compare the maximum concentration of each chemical of concern in each affected environmental media to applicable target levels;

(D) For each chemical of concern and complete exposure pathway for which the maximum concentration exceeds the applicable target level, calculate a representative concentration. Except for surficial soil in a residential setting, for which in each instance the maximum concentration of each chemical of concern in soil shall be compared to the applicable target level, the representative concentration for an exposure pathway shall be the concentration of each chemical of concern that reflects an average exposure concentration for a receptor in the exposure domain during the duration of exposure. The representative concentration for an exposure pathway shall be determined using the methodology in the *Missouri Risk-Based Corrective Action (MRBCA) Process for Petroleum Storage Tanks* guidance document dated XXXXXX, 2012, published by and available from the Department of Natural Resources, P.O. Box 176, Jefferson City, Missouri 65102-0176, and hereby incorporated by reference without later amendments or additions, or other appropriate methods approved by the department;

1. Soil vapor representative concentrations. Owners and operators shall develop representative concentrations for soil vapor using data from multiple sampling points representative of a single actual or hypothetical building and collected during multiple sampling events representing significantly different climatic conditions.

A. Owners and operators may not combine data for more than one actual or hypothetical building in developing a soil vapor representative concentration without the written permission of the department; and

B. Owners and operators may not combine data from samples collected greater than three vertical feet apart in developing representative concentrations for soil vapor without the written permission of the department.

(E) Compare representative concentrations of chemicals of concern to the applicable target levels;

(F) Conduct a qualitative ecological risk assessment in accordance with 10 CSR 26-2.075(11) and, if warranted, a quantitative ecological risk assessment in accordance with section (8) of this rule;

(G) Prepare and submit a risk assessment report to the department; and

(H) After the risk assessment report has been approved by the department, develop a corrective action plan, as warranted, in accordance with 10 CSR 26-2.079 and submit the plan to the department for approval.

(3) Determination of applicable target levels. Owners and operators shall identify applicable target levels for chemicals of concern in each affected environmental media and for all complete on and off-site exposure pathways. Target levels other than the default target levels are land use and exposure pathway-specific.

(A) Identification of applicable target levels shall be consistent with the risk assessment tier being applied under 10 CSR 26-2.078 and may include:

1. Default target levels in Table 1 of 10 CSR 26-2.078;
2. Tier one risk-based target levels in Tables 2 through 7 of 10 CSR 26-2.078;
3. Tier two site-specific target levels; or
4. Tier three site-specific target levels.

(B) Groundwater use. Target levels applicable to the groundwater domestic use exposure pathway shall be the United States Environmental Protection Agency maximum contaminant level if one exists for a chemical of concern. If a maximum contaminant level is not available for a chemical of concern, the tier one risk-based target level in 10 CSR 26-2.078 Table 2 shall apply.

1. Owners and operators shall identify one or more point of demonstration wells between the source and the point of exposure as per subsection (7)(B) of this rule. Maximum contaminant levels, tier one risk-based target levels, or tier two or tier three site-specific target levels shall apply to the point of demonstration wells to protect against applicable target levels being exceeded at the point of exposure.

2. Chemicals of concern concentration data from temporary groundwater sampling points shall not be used in a risk assessment except with the written permission of the department.

(C) Surface water. At every site, target levels for surface water shall be water quality criteria based on the classification and beneficial use designations of the surface water body in accordance with 10 CSR 20-7.031. If water quality criteria do not exist for a chemical of concern, an applicable target level shall be obtained from the literature or developed using methodology approved by the department. Where groundwater

contamination threatens surface water, owners and operators shall apply the process in subsection (7)(C) of this rule.

(D) Sediment. Owners and operators shall compare sediment sample data with sediment criteria available from literature that are protective of human health and ecological receptors and approved by the department, or develop target levels using methods approved by the department.

(E) Vapor intrusion pathways. In addition to soil and groundwater, tier one risk-based target levels pertaining to vapor intrusion have been developed for soil vapor. The soil vapor target levels pertain to soil vapor at least one foot (1') below the elevation of the bottom of the building slab or foundation, except that the target levels may also be applied to sample data collected adjacent to basement walls. All tier one vapor intrusion risk-based target levels are found in 10 CSR 26-2.078 Tables 2 and 3. Tier two or tier three site-specific target levels for the vapor intrusion pathway may be developed for any or all of the three media (i.e., soil, groundwater, soil vapor) in accordance with 10 CSR 26-2.078(5) and (6).

(4) Tier one risk assessment. A tier one risk assessment need not necessarily be conducted prior to conducting a tier two risk assessment.

(A) Owners and operators shall use the conceptual site model developed in accordance with 10 CSR 26-2.075 to identify any missing or inadequate data and information and conduct necessary site characterization in accordance with 10 CSR 26-2.076.

(B) Reserved.

(C) Owners and operators shall identify maximum concentrations or develop representative concentrations for chemicals of concern and compare the maximum or representative concentration to the tier one risk-based target levels in 10 CSR 26-2.078 Tables 2 through 7 for each complete exposure pathway at the site. If the maximum concentration for a chemical of concern does not exceed the tier one risk-based target level, calculation of a representative concentration is not necessary.

1. When representative concentrations exceed the tier one risk-based target levels applicable to the subsurface soil and/or groundwater to indoor air inhalation pathways, owners and operators may perform soil vapor sampling in accordance with 10 CSR 26-2.076(21).

2. If soil vapor sampling is conducted, the soil vapor data shall be used in the risk assessment in accordance with section (10) of this rule.

(D) If one or more maximum concentrations of chemicals of concern in surficial soil in a residential setting or one or more representative concentrations of chemicals of concern for other exposure pathways exceed the tier one risk-based target levels, owners and operators shall either:

1. Develop a corrective action plan based on default target levels or tier one risk-based target levels; or

2. Conduct a tier two risk assessment.

(E) Reporting. Owners and operators shall submit a risk assessment report to the department that documents the exposure model, the tier one risk assessments, conclusions, and recommendations, except that owners and operators who conduct tier two risk assessments may instead include the tier one risk assessment information in the tier two risk assessment report.

(F) If the results of site characterization or the tier one risk assessment show that the tier one risk-based target levels do not provide an acceptable level of human health and environmental protection because the default fate and transport parameters used by the department to develop the tier one risk-based target levels are not representative of site conditions, the department may require that owners and operators conduct a tier two risk assessment.

(5) Tier two risk assessment.

(A) Prior to conducting a tier two risk assessment, owners and operators shall use the conceptual site model in 10 CSR 26-2.078 to identify any missing or inadequate data and information. Additional site characterization needed to complete the conceptual site model shall be collected in accordance with 10 CSR 26-2.076.

(B) Tier two site-specific target levels shall be developed in accordance with 10 CSR 26-2.078(5) and (6) for chemicals of concern and all complete exposure pathways both on and off-site, including exposure pathways for which representative concentrations did not exceed Tier 1 risk-based target levels.

(C) When representative concentrations exceed the tier two site-specific target levels applicable to the subsurface soil and/or groundwater to indoor air inhalation pathways, owners and operators may perform soil vapor sampling in accordance with 10 CSR 26-2.076(21). If conducted, use of the soil vapor data in the risk assessment shall be in accordance with section (10) of this rule.

(D) Owners and operators shall revise the representative concentrations used at tier one for use at tier two if additional data becomes available.

(E) Owners and operators shall compare maximum or representative concentrations for chemicals of concern to the tier two site-specific target levels for each complete exposure pathway.

(F) If one or more representative concentrations for chemicals of concern exceed the tier two site-specific target levels, owners and operators shall:

1. Develop a corrective action plan based on the tier two site-specific target levels or, if the default target levels or tier one risk-based target levels are more conservative than the tier two site-specific target levels, owners and operators may conduct corrective action to meet the default target levels or tier one risk-based target levels; or
2. Conduct a tier three risk assessment.

(G) Owners and operators shall submit a risk assessment report to the department documenting the tier two risk assessment and providing recommendations. If a tier one risk assessment report was not previously submitted, the results for both the tier one and tier two risk assessments may be submitted in a single report.

(6) Tier three risk assessment. Owners and operators who conduct a tier three risk assessment shall do so in accordance with 10 CSR 26-2.075 through 10 CSR 26-2.078 for the exposure pathways for which chemicals of concern exceed the tier two target levels, unless the tier three site-specific target levels are or are likely to be more conservative than the tier two site-specific target levels, in which case the tier two risk assessment findings shall be re-evaluated and the department may require that tier three site-specific target levels be developed for those pathways. Tier three site-specific target levels may also be developed for any receptors and exposure pathways that cannot be addressed under 10 CSR 26-2.075 through 10 CSR 26-2.078.

(A) Tier three risk assessment work plan. Owners and operators shall develop a detailed technical work plan that shall be submitted to and approved by the department prior to being implemented. The work plan shall include, at a minimum, the following:

1. An explanation of the chemicals of concern and exposure pathways to be evaluated in the tier three risk assessment;
2. If applicable, a detailed explanation of the fate and transport models to be used. Owners and operators may propose the use of a model or models different than those used to develop tier one risk-based target levels and tier two site-specific target levels;
3. An explanation of the model input parameters required to determine tier three site-specific target levels and how the necessary data for each parameter will be obtained. For each input parameter, owners and operators shall provide justification for the value to be used;
4. An explanation of missing or inadequate data that require additional fieldwork and a detailed scope of work for the collection of this data.

(B) Upon approval of the tier three risk assessment work plan by the department, owners and operators shall implement the plan. Any changes to the plan made subsequent to the department's approval shall be documented in writing and submitted to and approved by the department.

(C) Owners and operators shall revise the representative concentrations used in the tier two risk assessment for the relevant chemicals of concern and exposure pathways if additional data is available.

(D) Owners and operators shall determine human health risk or develop tier three site-specific target levels, or both, for the complete exposure pathways in accordance with the approved work plan.

1. Human health risk. Owners and operators shall compare estimated human health risk to target risk levels in 10 CSR 26-2.2078(3).
2. Tier three site-specific target levels. Owners and operators shall compare representative concentrations for chemicals of concern to the tier three site-specific target levels for each complete exposure pathway.

(E) If one or more representative concentrations for chemicals of concern exceed the tier three site-specific target levels, or the estimated human health risks exceed the target risk levels, owners and operators shall develop a corrective action plan in accordance

with 10 CSR 26-2.079 based on the tier three site-specific target levels or target risk levels or, if the default target levels, tier one risk-based target levels, or tier two site-specific target levels are more conservative than the tier three site-specific target levels, owners and operators may conduct corrective action to meet the more conservative target levels.

(F) For a tier three risk assessment, owners and operators may determine free product physical properties and composition in accordance with section (9) of this rule or using analytical methods approved by the department. The equilibrium dissolved and vapor-phase concentrations of chemicals of concern shall be determined based on the mole fraction of each chemical of concern in the free product.

(G) Reporting. Owners and operators shall submit a tier three risk assessment report to the department that documents the tier three risk assessment and clearly describes the data and methodology used, key assumptions, results, and recommendations. Any deviation from the approved work plan, the rationale for the deviation, and approval of the deviation by the department shall be clearly documented in the risk assessment report.

(7) Requirements for specific exposure pathways.

(A) For surficial soil in a residential setting, at all tiers, owners and operators shall compare the maximum concentration of each chemical of concern within the exposure domain to the applicable risk-based or site-specific target level.

(B) For the groundwater domestic use exposure pathway, owners and operators shall identify one or more point of demonstration wells located between the source of chemicals of concern and the groundwater point of exposure, unless the point of exposure is within the groundwater solute plume. Point of demonstration target levels shall be developed that will result in attainment of applicable target levels at the point of exposure. Point of demonstration target levels shall be derived using fate and transport models established by the department and site-specific parameter values.

(C) Where groundwater contamination poses a threat to surface water, owners and operators shall identify one or more point of demonstration wells located between the source and the surface water body, unless the groundwater solute plume has reached the surface water body. Point of demonstration target levels shall be developed that will result in attainment of applicable target levels for the surface water body. Point of demonstration target levels shall be derived using fate and transport models established by the department and site-specific parameter values.

(8) Ecological risk assessment. If appropriate based on the findings of the qualitative ecological risk assessment required at 10 CSR 26-2.075(11), owners and operators shall conduct a quantitative ecological risk assessment in accordance with the following:

(A) Compare maximum or representative concentrations of chemicals of concern in soil, soil gas, groundwater, surface water, or sediment, as appropriate, with applicable standards or criteria protective of ecological receptors. The standards or criteria shall be obtained from the literature and approved by the department or developed using an appropriate method approved by the department.

1. If one or more maximum or representative concentrations for chemicals of concern in any media exceed the applicable standards or criteria, owners and operators shall:

A. Develop a corrective action plan based on the applicable standards or criteria; or

B. Conduct additional ecological risk assessment and, if appropriate, develop a corrective action plan to protect ecological receptors and habitat as directed by the department.

(I) Additional ecological risk assessment shall be consistent with current United States Environmental Protection Agency guidance for ecological risk assessment. Owners and operators shall develop a detailed technical work plan that shall be submitted to and approved by the department prior to undertaking additional ecological risk assessment.

(II) If the additional ecological risk assessment determines that the risk to ecological receptors from chemicals of concern associated with a release exceeds levels deemed acceptable by the department, owners and operators shall develop a corrective action plan to protect ecological receptors.

(9) Evaluation of free product.

(A) Where free product is present, owners and operators shall determine concentrations of chemicals of concern associated with the free product using values for the effective solubility and vapor pressure found in the *Missouri Risk-Based Corrective Action (MRBCA) Process for Petroleum Storage Tanks* guidance document dated XXXXXX, 2012, or by another method or using other values approved by the department. The equilibrium dissolved and vapor phase concentrations of chemicals of concern in free product shall be used to evaluate the risks posed by the free product and to develop representative concentrations for use in the risk assessment.

(B) For tier one and tier two risk assessments, the default composition values for petroleum product or products determined by the department may be used to calculate dissolved and vapor phase concentrations associated with free product.

(10) Soil vapor. Owners and operators who choose to conduct soil vapor sampling under 10 CSR 26-2.077(4)(C)1 or (5)(C), shall conduct sampling in accordance with 10 CSR 26-2.076(21) and the following:

(A) Owners and operators shall determine maximum and representative concentrations for chemicals of concern in soil vapor in accordance with subsection (2)(D)1 of this rule; and

(B) Owners and operators shall compare maximum and representative concentrations for chemicals of concern in soil vapor to the tier one risk-based target levels in 10 CSR 26-2.078 Tables 2 and 3 or to tier two or tier three site-specific target levels developed in accordance with 10 CSR 26-2.078(5) and (6).

(11) If, after a tier one, tier two, or tier three risk assessment is completed, the maximum or representative concentration for all chemicals of concern and all complete

exposure pathways is less than the applicable target level, the owner or operator may petition the department for a determination that no further action is required.

(A) The department shall review the information submitted and respond in writing indicating whether it approves of the work completed and concurs with the conclusions reached by the owner or operator. If the department does not approve or concur, it shall specify why it does not approve or which conclusions it does not accept and the reason or reasons for its disapproval.

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