



Missouri Risk-Based Corrective Action (MRBCA)
Process for Petroleum Storage Tanks
March 8, 2005

**NOTICE OF MODIFICATIONS TO THE PROCESS
AND INTERIM GUIDANCE PERTAINING TO APPLICATION OF
THE NEW SOIL TYPE DEPENDENT TIER 1 RISK-BASED TARGET LEVELS**

Background

The Missouri Department of Natural Resources released the first version of the Missouri Risk-Based Corrective Action (MRBCA) Process for Petroleum Storage Tanks guidance document in February 2004. Shortly thereafter, stakeholders voiced concerns that the Tier 1 Risk-Based Target Levels (RBTLs), particularly those pertaining to the indoor inhalation pathway, were too conservative. As a result, the department agreed to re-evaluate the RBTLs for the indoor inhalation pathway.

The re-evaluation process resulted in the development of soil type dependent Tier 1 RBTLs and a different Tier 1 process. Under the new Tier 1 process, the Tier 1 RBTLs applicable to a particular site are dependent on the type of soil present at that site. The process includes three sets of Tier 1 RBTLs: one set applicable sandy soils, one set applicable to silty soils, and one set applicable clayey soils. Under the new process, sandy soils are called Soil Type 1, silty soils are called Soil Type 2, and clayey soils are called Soil Type 3. Each set of RBTLs reflects soil type specific fate and transport parameter inputs for total soil porosity and volumetric water content. Soil volumetric air content, a function of volumetric water content, becomes, by default, soil type specific.

Each of the three Soil Types is a composite of three or more individual soils. Therefore, the porosity and water content values assigned to each soil type are average values. Table 1 below provides information regarding the makeup of each Soil Type. In addition, see the following documents available on the department's website at <http://www.dnr.mo.gov/alpd/hwp/tanks.htm>.

- [MRBCA Vapor Pathway Tech Memo Final, December 29, 2004](#)
- [Comparison of Soil Type Dependent Tier 1 Risk-Based Target Levels For Benzene and TPH-GRO](#)

Table 1			
Soil type	Soil (SCS Classification)	Porosity (avg.)	Water content (avg.)
1	Sand	0.38	0.08
	Loamy sand		
	Sandy loam		
2	Clay loam	0.44	0.17
	Silt		
	Loam		
	Silty clay loam		
	Sandy clay loam		
	Silt loam		
3	Clay	0.44	0.21
	Silty clay		
	Sandy clay		

Effective Date

As explained in the “MRBCA Vapor Pathway Tech Memo” referenced above, the new soil type dependent Tier 1 RBTLs became effective on December 29, 2004. The new RBTLs replace those dated February 24, 2004 and April 30, 2004 that are found in the current version of the MRBCA guidance document. Sites evaluated and closed (i.e., for which the department has issued a No Further Remedial Action Letter) using the initial and/or April 30, 2004 RBTLs need not be re-evaluated under the new soil type dependent process. Sites undergoing evaluation at the time that the soil type dependent RBTLs became effective may proceed under either the old RBTLs or the new soil type dependent RBTLs. While the soil type dependent Tier 1 RBTLs became effective on December 29, 2004, the date by which the new RBTLs must be used is March 15, 2005. All releases occurring after March 15, 2005 must be evaluated under the soil type dependent Tier 1 process.

Generally, the new RBTLs are higher (i.e., less stringent) than the old RBTLs, meaning that less corrective action will be necessary to achieve No Further Remedial Action status. Thus we expect that most people will choose to evaluate their site using the new soil type dependent Tier 1 RBTLs.

Accessing the Soil Type Dependent Tier 1 RBTLs

The Soil Type Dependent Tier 1 RBTLs are found on the department’s web site at www.dnr.mo.gov/alpd/hwp/tanks. By mid to late April 2005, the RBTLs will have been incorporated into a revised version of the MRBCA guidance document. The revised guidance will also be available at the web site identified above.

Implementation Guidance

The department anticipates that, by mid to late April 2005, the MRBCA guidance document will be modified to incorporate the soil type dependent Tier 1 process. Until modification of the guidance is complete and available to the public, individuals evaluating a site under the MRBCA process must do so under the following guidance, provisions, and stipulations.

➤ Soil Type Determinations

The department has developed guidelines explaining how soil type determinations are to be made. The guidelines are found at www.dnr.mo.gov/alpd/hwp/tanks. Click on the document titled *Soil Type Determination Guidelines*.

➤ Default Target Levels (DTLs) Under the Soil Type Dependent Process

Under the soil type dependent MRBCA process, the DTLs are the lowest media-specific values for Soil Type 1, residential land use. These DTLs supersede those found in Table 3-1 of the February 2004 MRBCA guidance document and can be found on the department’s website at www.dnr.mo.gov/alpd/hwp/tanks. Click on the document titled *Default Target Levels*.

➤ Delineation Criteria Under the Soil Type Dependent Process

For all sites evaluated under the soil type dependent MRBCA process, the delineation criteria shall be the Soil Type 1 RBTLs applicable to residential land use unless the evaluator can show that the contamination is and will remain fully confined to property or properties that are now and will remain non-residential into the future. This provision supersedes those pertaining to

delineation criteria found in Section 5 of the February 2004 version of the MRBCA guidance document.

➤ RBTL Application when Granular Material is used to Backfill an Excavation

The department is aware that many consultants and contractors backfill tank pits and excavations related to UST closures and remediation projects with granular material such as crushed limestone. Such granular materials do not have the same geotechnical properties as undisturbed soil. Granular material has greater porosity, holds less residual water, and has far less organic content than an undisturbed soil. Therefore, the department believes that applying RBTLs applicable to undisturbed soil to an excavated area that has been backfilled with granular material is inappropriate.

If a granular material is used to backfill a tank pit or an excavation, the applicable cleanup standards shall be the Soil Type 1 RBTLs. The Soil Type 1 RBTLs must be met in the floor of the excavation. For the excavation walls, the cleanup standards shall be those applicable to the native, undisturbed soil forming the walls, provided the native soil type is identified in accordance with the provisions of the *Soil Type Determination Guidelines*. If the native soil type has not and will not be determined, then the Soil Type 1 RBTLs must be met in the walls of the excavation as well.

If an excavation is backfilled with soil that, once properly placed and compacted, has geotechnical properties that are the same as, or similar to, those of the native soil surrounding the excavation, the applicable cleanup standards shall be the RBTLs associated with the Soil Type representative of the native soil. For all such cases, the department will require that appropriate documentation be submitted to demonstrate that the soil used to backfill an excavation is the same as, or very similar to, the Soil Type representative of the native soil. Such documentation shall include the laboratory geotechnical data specified in the *Soil Type Determination Guidelines*.

➤ Application of Soil Type Dependent RBTLs at Closure

At closure, if the tank pit or the tank pit excavation is to be backfilled with granular material, the Soil Type 1 RBTLs shall apply, as discussed immediately above. In such case, chemicals of concern (COCs) in all confirmation samples, both those collected from the floor and the sidewalls of the tank pit or excavation, must be less than the Soil Type 1 RBTLs. At closure, the Soil Type 1 RBTLs must be compared to maximum rather than representative COC concentrations. These provisions assume that a soil type determination has not been made.

If Soil Type 2 or 3 RBTLs are to apply at closure (if either is applicable to the native soil), the following shall be documented:

1. The native soil around the tank pit and from which confirmation samples are collected must be evaluated and assigned a Soil Type as per the *Soil Type Determination Guidelines*. The Soil Type assigned to the native soil shall determine which soil type specific RBTLs apply;
2. Maximum COC concentrations in both floor and sidewall confirmation samples must be less than the applicable (i.e., Soil Type 2 or 3) RBTLs (including the RBTLs

- protective of groundwater and those protective of indoor inhalation from groundwater);
3. The Soil Type representative of the native soil must be determined. If the native soil is a Soil Type 2 or 3, the excavation must be backfilled with soil whose properties meet or exceed those of the native soil. To ensure the properties of the backfill material meet or exceed those of the native soil, the material must be compacted upon placement to ensure the density, porosity, and moisture content of the material meet or exceed those associated with the native soil. Alternatively, the backfill material may be sampled and evaluated prior to placement in the excavation;
 4. If non-residential RBTLs are to apply, regardless of the Soil Type RBTLs that apply, a RAFU determination must be made and adequately documented in accordance with the provisions of Section 5 of the MRBCA guidance;
 5. All other provisions applicable to closure as described in Section 4 of the MRBCA guidance document shall apply.

➤ Tier 2 Process

Tier 2 of the MRBCA process remains unchanged from that presented in the February 2004 version of the MRBCA guidance document. The soil type dependent process discussed herein pertains solely to Tier 1. The only change related to the Tier 2 process is identified in the *Soil Type Determination Guidelines* and pertains to when a Tier 2 evaluation is required.

➤ RBTLs Applicable to the Leaching Pathways

Under the MRBCA process, RBTLs have been calculated for two leaching scenarios:

1. COCs leaching from vadose zone soil to groundwater followed by domestic use of the groundwater (known as the soil concentration protective of domestic use of groundwater); and
2. COCs leaching from vadose zone soil to groundwater followed by vapor migration from groundwater to indoor air (known as the soil concentration protective of indoor inhalation from groundwater).

Because the soil type dependent process includes three different soil types, and because the type of soil has a strong effect on the degree of leaching, the department has calculated three sets of soil concentrations protective of groundwater, one set for each soil type. Because the soil concentrations are also dependent on the depth to groundwater, each set contains three separate sheets, one for each of three default groundwater depths.

The soil concentrations protective of indoor inhalation from groundwater are dependent both on the soil type and on whether the affected site is used for residential or non-residential purposes. Therefore, the department has calculated six sets of soil concentrations protective of indoor inhalation from groundwater, one for each soil type and land use. Because the soil concentrations are also dependent on the depth to groundwater, each set contains three separate sheets, one for each of three default groundwater depths.

The leaching values discussed above must be considered for every site evaluated under the MRBCA process. These leaching values should be considered as part of the suite of RBTLs that

must be met to achieve site closure. The soil type dependent leaching values are found on the aforementioned department website.

Modification of the MRBCA Guidance Document

Department staff, in consultation with interested stakeholders, is currently revising the February 2004 MRBCA guidance document, in part to account for changes associated with the new soil type dependent Tier 1 process. The revision process is also striving to correct previously undiscovered errors, clarify certain provisions, and provide expanded guidance on issues identified as problematic since the implementation of the MRBCA process in February 2004. The guidance presented above will be included in the revised guidance document. The department anticipates completing the revision process and releasing the revised document for general public use in April 2005.

Questions Regarding the Soil Type Dependent Tier 1 Process

Questions regarding any aspect of the soil type dependent Tier 1 process should be directed to Tanks Section staff at (573) 751-6822 or by email at hazwaste@dnr.mo.gov.