

**Title 10 – DEPARTMENT OF NATURAL RESOURCES**  
**Division 20 – Clean Water Commission**  
**Chapter 10 – Underground Storage Tanks – Technical Regulations**

**PROPOSED RULE**

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

**10 CSR 20-10.078 Tiered Risk Assessment Process**

(1) If the maximum soil or groundwater concentrations for chemicals of concern at a site exceed the default target levels established by the department and the remediating party does not choose to undertake corrective action to achieve the default target levels, the remediating party shall evaluate risk for the chemicals of concern at the site in accordance with this rule.

(2) Tier one risk assessment. The remediating party shall assess risks posed by chemicals of concern at the site based on the conceptual model for the site developed in accordance with 10 CSR 20-10.075.

(A) The remediating party shall use the conceptual site model to identify any missing or inadequate data and information and conduct necessary site characterization in accordance with 10 CSR 20-10.076.

(B) The remediating party shall determine the vadose zone soil type or types in accordance with the provisions in section 10 CSR 20-10.076(11). The remediating party may use soil type one as a default in lieu of the determination or the department may require such use.

(C) The remediating party shall determine maximum and representative concentrations for chemicals of concern in each affected environmental media and exposure domain appropriate for each complete exposure pathway in accordance with the provisions in section 10 CSR 20-10.075(19).

(D) The remediating party shall compare maximum or representative concentrations for chemicals of concern to tier one risk-based target levels established by the department 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 the representative concentrations shall not be necessary.

(E) At sites where tier one risk-based target levels applicable to one or more of the indoor air inhalation pathways are exceeded, the remediating party may perform soil gas sampling in accordance with section 10 CSR 20-10.076(20). If the remediating party chooses to conduct soil gas sampling, the department recommends that a work plan be submitted to, and approved by, the department prior to conducting such sampling, regardless of whether the work plan is required to be submitted in accordance with 10 CSR 20-10.076(20).

1. The remediating party shall determine maximum and representative concentrations for chemicals of concern in soil gas in accordance with 10 CSR 20-10.075(19) based on more than one round of soil gas sampling, with the total number of sampling events as approved by the department.
  2. The remediating party shall compare maximum and representative concentrations for chemicals of concern in soil gas to the tier one risk-based target levels for soil gas. The results of the comparison shall be used to determine whether tier one risk-based target levels for the indoor inhalation pathway are exceeded.
- (F) If one or more representative concentrations for chemicals of concern exceed the tier one risk-based target levels, the remediating party shall:
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.
- (G) The remediating party shall submit a risk assessment report for approval by the department that documents the tier one risk assessment and recommendations. If a tier two risk assessment is to be conducted, the results for both the tier one and tier two risk assessments may be submitted in a single report.
1. Based on the results of the tier one risk assessment, the department may require that the remediating party conduct a tier two risk assessment.
- (H) The remediating party may request that the department make a no further remedial action determination for the site if the maximum or representative concentration for all chemicals of concern and all complete exposure pathways are below the tier one risk-based target levels subject to the conditions in section 10 CSR 20-10.X82(4). If a no further remedial action determination is requested based on the results of the tier one risk assessment, the risk assessment report shall include documentation necessary to support the determination.
- (3) Tier two risk assessment. The remediating party shall assess risks posed by chemicals of concern at the site based on the conceptual model for the site developed in accordance with 10 CSR 20-10.075. The department may require that the remediating party conduct a tier two risk assessment if the site-specific fate and transport parameters or other site conditions are different from the default assumptions used to develop tier one risk-based target levels. A tier one risk assessment need not necessarily be conducted prior to conducting a tier two risk assessment.
- (A) Prior to conducting a tier two risk assessment, the remediating party shall use the conceptual site model to identify any missing or inadequate data and information and conduct necessary site characterization in accordance with 10 CSR 20-10.076. Information specific to site characterization may be provided to the department in a report separate from the risk assessment report.
- (B) The remediating party shall determine and evaluate site-specific values for fate and transport parameters and select representative values to be used in developing tier two site-specific target levels.

1. Site-specific values for fate and transport parameters shall be:
    - A. Measured on site at appropriate locations using approved methods;
    - B. Literature values justified as being representative of site conditions; or
    - C. Default values justified as representative of current conditions at the site or shown to be conservative based on site conditions.
  2. The remediating party shall provide a justification for selecting the representative value for each fate and transport parameter explaining why the value is appropriate for the site.
    - A. At sites where site-specific fate and transport parameter values show considerable spatial or temporal variability, the department may require that a sensitivity analysis be performed.
- (C) The remediating party shall determine revised representative concentrations if additional data is available.
- (D) The remediating party shall use the representative site-specific fate and transport parameter values to develop tier two site-specific target levels for chemicals of concern and all complete exposure pathways, including exposure pathways for which representative concentrations did not exceed tier one risk-based target levels, at the site in accordance with Section 10 CSR 20-10.077(10).
- (E) The remediating party shall compare maximum or representative concentrations for chemicals of concern to the tier two site-specific target levels for each complete exposure pathway at the site.
- (F) At sites where tier two site-specific target levels applicable to one or more of the indoor inhalation pathways are exceeded, the remediating party may perform soil gas sampling in accordance with section 10 CSR 20-10.076(20). If the remediating party chooses to conduct soil gas sampling, the department recommends that a work plan be submitted to, and approved by, the department prior to conducting such sampling, regardless of whether the work plan is required to be submitted in accordance with 10 CSR 20-10.076(20).
1. The remediating party shall determine maximum or representative concentrations for chemicals of concern in soil gas in accordance with section 10 CSR 20-10.075(19)(B) based on more than one round of soil gas sampling, with the total number of sampling events as approved by the department..
  2. The remediating party shall develop tier two site-specific target levels for soil gas for the indoor inhalation exposure pathway using representative site-specific fate and transport parameter values in accordance with section 10 CSR 20-10.077(10).
  3. The remediating party shall compare maximum or representative concentrations for chemicals of concern in soil gas to the tier two site-specific target levels for soil gas. The results of the comparison shall be used to determine whether tier two site-specific target levels for the indoor inhalation exposure pathway are exceeded.

(G) If one or more representative concentrations for chemicals of concern exceed the tier two site-specific target levels, the remediating party shall:

1. Develop a corrective action plan based on the DTLs, tier one risk-based target levels, or tier two site-specific target levels; or
2. Conduct a tier three risk assessment.

(H) The remediating party shall submit a risk assessment report for approval by the department that documents the tier two risk assessment and 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.

(I) The remediating party may request that the department make a no further remedial action determination for the site if the maximum or representative concentration for all chemicals of concern and all complete exposure pathways are below the tier two site-specific target levels subject to the conditions in section 10 CSR 20-10.082(4). If a no further remedial action determination is requested based on the results of the tier two risk assessment, the risk assessment report shall include documentation necessary to support the determination.

(4) Tier three risk assessment. A tier three risk assessment is a detailed, site-specific evaluation that a remediating party may conduct only after receiving approval of a tier three risk assessment work plan from the department. The remediating party shall assess risks posed by chemicals of concern at the site based on the conceptual model for the site developed in accordance with 10 CSR 20-10.075. The tier three risk assessment may use the most recent toxicity factors and physical and chemical properties data, alternative fate and transport and risk assessment models, and site-specific fate and transport and exposure factors. The tier three risk assessment shall consider only the complete exposure pathways for which representative concentrations of chemicals of concern at the site exceed the tier two site-specific target levels, and any additional receptors and exposure pathways identified, unless the resulting 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.

(A) Tier three risk assessment work plan. The remediating party 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, at a minimum, include the following:

1. An explanation of the chemicals of concern and complete exposure pathways at the site to be evaluated in the tier three risk assessment.
2. A detailed explanation of the fate and transport models to be used. The remediating party 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. At a minimum, the proposed model shall be peer reviewed, publicly available, have a history of use on similar projects, and be technically defensible. In certain cases where specific computer software is used to conduct the tier three

- risk assessment, the department may require that the remediating party provide a copy of the software to the department to facilitate review of the assessment.
3. An explanation of the 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, the remediating party shall provide justification for the selected 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, the remediating party shall implement the approved work plan. Any changes to the work plan made subsequent to the department's approval shall be documented in writing and submitted to and approved by the department.
- (C) The remediating party shall determine revised representative concentrations for relevant chemicals of concern if additional data is available.
- (D) The remediating party shall determine human health risk or develop tier three site-specific target levels, or both, for the complete exposure pathways using the models and data in accordance with the approved work plan.
1. Human health risk. The remediating party shall determine human health risk accordance with section 10 CSR 20-10.077(11).
  2. Tier three site-specific target levels. The remediating party shall develop tier three site-specific target levels in accordance with section 10 CSR 20-10.077(11).
  3. If lead is a chemical of concern at the site, the remediating party may evaluate human health risk or develop tier three site-specific target levels for lead using the United States Environmental Protection Agency's Integrated Exposure Uptake Biokinetic Model for Lead in Children or another model approved by the department.
- (E) The remediating party shall compare calculated site-specific risk for each chemical of concern and complete exposure pathway being evaluated with the target risk levels in section 10 CSR 20-10.077(4).
- (F) The remediating party shall compare representative concentrations for relevant chemicals of concern to the tier three site-specific target levels for each complete exposure pathway at the site being evaluated.
- (G) 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, the remediating party shall develop a corrective action plan based on the default target levels, tier one risk-based target levels, tier two site-specific target levels, or tier three site-specific target levels or target risk levels.
- (H) The remediating party shall submit a risk assessment report for approval by the department that documents the tier three risk assessment and clearly describes the data and methodology used, key assumptions and results. Any deviation from the

approved work plan, the rationale for the deviation, and approval by the department shall be clearly documented in the risk assessment report.

(I) Subject to the conditions in section 10 CSR 20-10.082(4), the remediating party may request that the department make a no further remedial action determination for the site if the representative concentration for all chemicals of concern and all complete exposure pathways are less than the tier three site-specific target levels or the estimated human health risks are less than target risk levels. If a no further remedial action determination is requested based on the results of the tier three risk assessment, the risk assessment report shall include documentation necessary to support the determination.

(5) Ecological risk assessment. The remediating party shall assess risks posed by chemicals of concern at the site to ecological receptors in accordance with 10 CSR 20-10.075(17).

(A) Level two ecological risk assessment. The remediating party shall compare maximum or representative concentrations for chemicals of concern in soil, groundwater, surface water or sediment with applicable standards or criteria protective of ecological receptors available in literature and approved by the department or to site-specific target levels developed using an appropriate methodology approved by the department.

1. If one or more maximum or representative concentrations for chemicals of concern in soil, groundwater, surface water or sediment exceed the applicable standards or criteria, or the level two site-specific target levels if applicable, the remediating party shall:

- A. Develop a corrective action plan based on the applicable standards or criteria, or the level two site-specific target levels if applicable; or
- B. Conduct a level three ecological risk assessment.

(B) Level three ecological risk assessment. The remediating party shall conduct a detailed site-specific evaluation as per current United States environmental protection agency guidance for ecological risk assessment. The remediating party shall develop a detailed technical work plan that shall be submitted to and approved by the department prior to initiating the level three ecological risk assessment.

1. If the level three ecological risk assessment determines that the risk to ecological receptors at the site exceeds levels deemed acceptable by the department, the remediating party shall develop a corrective action plan to protect ecological receptors.