



# LRS Training – September 2013

- Status of revised de minimis standards
- Review of alternative standards
- Emerging issues
- LRS concerns

# Summary of De Minimis Revisions

- **Soil Standards**

- Reduced number of constituents on Table 60-3B from 396 to 385
- Revised 87 residential and 97 industrial de minimis values
- Revised 220 leach-based de minimis values

- **Groundwater Standards**

- Revised 220 groundwater de minimis values

## Basis of De Minimis Revisions

- Changes in toxicity criteria (n=23)
- Lack of reliable toxicity criteria (n=14)
- Availability of new toxicity criteria (n=3)
- Typographical errors in current table (n=11)
- Change in groundwater exposure scenario for non-carcinogens (n=190)

## Basis of De Minimis Revisions - *Continued*

- Current risk-based groundwater standards for non-carcinogens
  - Based on adult exposure assumptions
- Proposed risk-based groundwater standards for non-carcinogens
  - Based on child exposure assumptions
  - Consistent with residential soil calculations
  - Usually results in lower standard
    - Relevant revised standards are 42 – 100% of current values

**APPENDIX 60-3A**  
**WEST VIRGINIA VOLUNTARY REMEDIATION AGREEMENT FOR**  
**NO FURTHER ACTION INVESTIGATION ACTIVITIES**  
**[For Brownfields and Non-Brownfields Sites]**

**VII. EVALUATION OF SITE ASSESSMENT**

Applicant has submitted a site assessment as a part of the application. The site assessment was accompanied by a final report prepared by \_\_\_\_\_, a licensed remediation specialist, which states that the Site meets the applicable standard described in paragraph 16 of this Agreement.

The parties agree that the *applicable standard for this Site*, consistent with [insert cite to rule relating to remediation standards] is as follows:

[Insert appropriate standard and, where applicable, a description of any engineering or institutional controls for this Site, as agreed upon by the Parties.]

## §60-3-9.1 Types of Remediation Standards.

- **9.1.a.1. A De Minimis Risk-Based Standard** is one in which *contaminant levels pose no substantial risks to human health* based on any current or reasonably anticipated future land and water use as provided in subsection 9.2 of this rule.

## §60-3-9.2. Human Health -- De Minimis Standard.

The De Minimis Standard establishes contaminant levels that do not present a substantial risk to human health

- **9.2.a. De Minimis Standards for Soils.** The De Minimis Standards for **both *surface (<2ft depth)*** and ***subsurface (>2ft depth)*** soils shall be the higher numerical value of the following: 9.2.a.1 or 9.2.a.2, and must not exceed 9.2.a.3 unless it is shown to the satisfaction of the secretary that migration of soil contaminants to groundwater will not result in an exceedance of De Minimis Groundwater Standards.
  - **9.2.a.1. Risk-Based Concentrations (RBCs)** for human health for residential or industrial site uses that consider direct contact exposures.... All RBCs are presented in **Table 60-3B**
  - **9.2.a.2. Natural background levels**
  - **9.2.a.3. De Minimis Soil Standards for the migration of each constituent from soil to groundwater** presented in **Table 60-3B.**



## §60-3-9.2. Human Health -- De Minimis Standard

The De Minimis Standard establishes contaminant levels that do not present a substantial risk to human health

- **9.2.b. De Minimis Standards for Groundwater.** The De Minimis standards for groundwater shall be determined as follows:
  - 9.2.b.1. Groundwater contaminant concentration limits established in *Title 47-Series 12 of the Code of State Rules (47CSR12)*;
  - 9.2.b.2. For those contaminants where a concentration limit has not been established in 47CSR12, *the higher numerical value of the following*:
    - 9.2.b.2.A. **The Risk-Based Concentrations (RBCs)** for human health for residential site uses will be used as presented in Table 60-3B; or
    - 9.2.b.2.B **Natural background levels** for each constituent as determined by sampling and statistical analyses completed using secretary approved methods and/or data sources.

## **§60-3-9.2. Human Health -- De Minimis Standard**

The De Minimis Standard establishes contaminant levels that do not present a substantial risk to human health

- **9.2.c. Carcinogens**
  - For individual known or suspected carcinogens, remediation standards . . . established at levels which represent an excess upper-bound lifetime cancer risk of one in one million ( $1 \times 10^{-6}$ ) for residential land uses and one in one hundred thousand ( $1 \times 10^{-5}$ ) for industrial land uses.
- **9.2.d. Systemic toxicants.**
  - For individual systemic toxicants, remediation standards shall represent levels . . . where the hazard quotient shall not exceed 1.
- **9.2.e.** If a contaminant exhibits both carcinogenic and noncarcinogenic effects, then the more protective risk-based standard . . . shall be used as the remediation standard.

## §60-3-9.2. Human Health -- De Minimis Standard

The De Minimis Standard establishes contaminant levels that do not present a substantial risk to human health

- **9.2.f.** Should soil or groundwater concentrations meet De Minimis levels, and *no exposure pathways exist in addition to those considered in the De Minimis Table 60-3B*, then no further action shall be required and the Certificate of Completion can be issued

## §60-3-9.1 Types of Remediation Standards.

- 9.1.a.1. A De Minimis Risk-Based Standard
- **9.1.a.2. A Uniform Risk-Based Standard** is one which *uses pre-approved analytical methodologies established by the secretary to input exposure factors and other site-specific variables* to calculate compound-specific remediation levels that will be protective of human health based on any current or reasonably anticipated future land and water use, as provided in subsection 9.3 of this rule

### §60-3-9.3. Human Health-Uniform Risk-Based Standard.

This Standard sets forth *uniform, approved methodologies, exposure factors, and other input variables* needed to calculate site risks for residential or nonresidential land uses.

- The secretary recognizes . . . *pre-established input variables may not be applicable* to a site, and thus will *allow for site-specific variables to replace the default variables with adequate technical justification.*
- Typical parameters that may require site-specific input include *soil attenuation factors, site-specific hydrogeologic properties, and institutional controls* used to manage potential exposure to site contamination.

## §60-3-9.3. Human Health-Uniform Risk-Based Standard.

- **9.3.a. Uniform Risk-Based Standards for Surface Soils/Sediments.**
  - Surface soil remediation standards . . . shall be derived by ***applying site-specific information to the equations and constants from the secretary's Uniform Risk-Based Guidance or other equations*** and constants approved by the secretary considering reasonably anticipated future land and water use.
- **9.3.b. Uniform Risk-Based Standards for Subsurface Soils.**

Subsurface soil remediation values shall be derived based on:

  - 9.3.b.1. Migration potentials;
  - 9.3.b.2. Leaching potentials; and
  - 9.3.b.3. Soil saturation concentrations.

## §60-3-9.3. Human Health-Uniform Risk-Based Standard.

- **9.3.c. Uniform Risk-Based Standard for Groundwater.**

Groundwater remediation values shall be derived based on:

- **9.3.c.1.** Current or reasonably anticipated future *land and water use*;
- **9.3.c.2.** The potential for the groundwater to serve as a source of drinking water . . . *background total dissolved solids content greater than 2500 milligrams per liter (mg/l)* . . . the aquifer is *not being used, cannot be used* for future drinking water sources, and is *not hydrologically connected* to an aquifer being used for drinking water . . .
- **9.3.c.3. *Migration potentials*.** The equations and constants described in the secretary's uniform Risk Based Guidance shall be applied.

## §60-3-9.3. Human Health-Uniform Risk-Based Standard.

- **9.3.d. Carcinogens.** . . . remedial standards derived under subdivisions 9.3.a, 9.3.b, and 9.3.c of this rule shall be established at levels which represent an excess upper-bound lifetime risk of between one in ten thousand to one in one million ( **$1 \times 10^{-4}$  to  $1 \times 10^{-6}$** ).
  - Allows for public notice when risk for ***individual constituents*** exceeds  $1 \times 10^{-6}$  for residential use and  $1 \times 10^{-5}$  for industrial/commercial use.
- **9.3.e. Systemic Toxicants.** . . . remedial standards derived under subdivisions 9.3.a, 9.3.b, and 9.3.c of this rule shall represent levels to which the human population could be exposed without appreciable risk of deleterious effect, where the ***hazard quotient shall not exceed one***.



### §60-3-9.3. Human Health-Uniform Risk-Based Standard.

- **9.3.f.** If a contaminant exhibits *both carcinogenic and noncarcinogenic* effects, then the more conservative risk-based standard(i.e., the lower of the two values) shall be used as the remediation standard.
- **9.3.g. Cumulative Site Risk.** Cumulative upper-bound estimate of site risk . . . *shall not exceed one in ten thousand ( $1 \times 10^{-4}$ )*; and where multiple systemic toxicants affect the same target organ or act by the same method of toxicity, . . . *hazard index shall not exceed 1*, or 10 where it is not determined whether multiple systemic toxicants affect the same organ
- **9.3.h.** Should *Uniform Risk-Based soil or groundwater concentrations be met, no further action* shall be required with regard to those media.

## §60-3-9.1 Types of Remediation Standards.

- 9.1.a.1. A De Minimis Risk-Based Standard
- 9.1.a.2. A Uniform Risk-Based Standard
- **9.1.a.3. A Site-Specific Risk-Based Standard** is one which uses a *site-specific analysis of present contamination, and develops a remedial approach that considers the remedy selection criteria* in subdivision 9.8.a of this rule and is protective of human health based upon any current, or reasonably anticipated future land and water use.

## §60-3-9.4. Human Health-Site-Specific Risk-Based Standard

Site-Specific Risk-Based Standards will be determined using one or a combination of a BHHRA as described in subsection 8.4 of this rule or a RRA as described in subsection 8.6 of this rule. In establishing the remediation standard . . . current and reasonably anticipated future land and water use and the application of *institutional and engineering controls shall be considered*.

- **9.4.a. Carcinogens**
- **9.4.b. Systemic toxicants**
- **9.4.c. If a contaminant exhibits both carcinogenic and noncarcinogenic effects, . . .**
- **9.4.d. If probabilistic risk assessment methods are used in establishing the remedial standards . . .**

## **§60-3-9.4. Human Health-Site-Specific Risk-Based Standard**

- **9.4.e. Groundwater.** Remedial standards for groundwater shall be established using the following considerations:
  - **9.4.e.1.** Potential receptors based on the current and reasonably anticipated future use of groundwater;
  - **9.4.e.2.** The potential for groundwater to serve as a drinking water source, as defined in paragraph 9.3.c.2 of this rule;
  - **9.4.e.3.** Site-specific sources of contaminants;
  - **9.4.e.4.** Natural environmental conditions affecting the fate and transport of contaminants, such as natural attenuation processes, as determined by appropriate scientific methods; and
  - **9.4.e.5. *Institutional and engineering controls.***

## §60-3-9.4. Human Health-Site-Specific Risk-Based Standard

- **9.4.f. Soil.** Remedial standards for soil/sediments shall be established using the following considerations:
  - **9.4.f.1.** Potential receptors based on the current and reasonably anticipated use of the site;
  - **9.4.f.2.** Site-specific sources of contaminants;
  - **9.4.f.3.** Natural environmental conditions affecting the fate and transport of contaminants, such as natural attenuation processes, as determined by approved scientific methods; and
  - **9.4.f.4. *Institutional and engineering controls.***
- **9.4.g.** The secretary shall incorporate the ***equations and constants for risk-based standards into a guidance document***, along with other relevant information for establishing and applying such standards to specific sites.

## §60-3-9.1 Types of Remediation Standards.

- **9.1.a. Human Health:**
  - 9.1.a.1. A De Minimis Risk-Based Standard
  - 9.1.a.2. A Uniform Risk-Based Standard
  - 9.1.a.3. A Site-Specific Risk-Based Standard
  - **9.1.a.4. The applicant may use a combination of the remediation standards** to implement a site remediation plan and may choose to use the Site-Specific Risk-Based Standard whether or not efforts have been made to attain the De Minimis or Uniform Risk-Based standards.
- **9.1.b. Ecological:**

## **§60-3-9.1 Types of Remediation Standards.**

- **9.1.a. Human Health:**
  - 9.1.a.1. A De Minimis Risk-Based Standard
  - 9.1.a.2. A Uniform Risk-Based Standard
  - 9.1.a.3. A Site-Specific Risk-Based Standard
  - 9.1.a.4. The applicant may use a combination of the remediation standards . . .
  
- **9.1.b. Ecological:**
  - 9.1.b.1. A De Minimis Ecological Screening Evaluation
  - 9.1.b.2. A Uniform Ecological Evaluation
  - 9.1.b.3. A Site-Specific Ecological Risk-Based Standard

# Common Applications

Standard Required	Type of standard
Constituent is present in soil at a concentration less than its De Minimis value listed in Table 60-3B	De Minimis Standard
Constituent is not listed in Table 60-3B	Uniform Standard
Constituent has a De Minimis value listed in Table 60-3B but exposure occurs via indirect pathway (e.g. vapor intrusion)	Uniform Standard
Constituent is present in soil above its De Minimis value listed in Table 60-3B, but is covered by a concrete parking lot.	Site Specific
Constituent is present in soil above its residential De Minimis Standard but the site will be used as a playground.	Site Specific



# Emerging Issues - WVDEP

- Guidance Revision
  - Update approach to evaluating exposure via inhalation pathway.
  - Address vapor intrusion pathway for petroleum (LNAPL) and non-petroleum (DNAPL) constituents
  - Provide a defined format for risk assessment reports (electronic and hard copy)
- Developmental impacts of early life exposure to lead (i.e. blood [lead] < 10 µg/dL)



# Emerging Issues - LRS

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