



JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



STEVEN E. CHESTER
DIRECTOR

December 10, 2004

TO: Interested Parties

FROM: Andrew W. Hogarth, Remediation and Redevelopment Division

SUBJECT: RRD Operational Memorandum No. 1
Part 201 Cleanup Criteria
Part 213 Risk-based Screening Levels

The Remediation and Redevelopment Division (RRD) of the Michigan Department of Environmental Quality (MDEQ) is issuing the attached RRD Operational Memorandum No. 1. This Operational Memorandum provides general information about the criteria tables and the criteria for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) and Part 213, Leaking Underground Storage Tanks, of the NREPA. The MDEQ has developed interim cleanup criteria developed for acetate, dicamba, methane, metribuzin, and sodium azide, and is allowing a 45 day public comment period on these criteria. The following information is intended to assist in understanding the process followed for criteria changes within this Operational Memorandum. The criteria tables of this Operational Memorandum (Attachment 1) have been revised in accordance with rule provisions that allow criteria to be added and revised in the following categories:

Changes in the Target Detection Limits

Criteria with the footnote (M) promulgated with the Part 201 Administrative Rules represent situations where the calculated risk-based criterion was below the designated analytical target detection limit. In accordance with provisions of R 299.5103(I) "target detection limits" (TDL) is defined as the detection limit for a hazardous substance in a given environmental medium that is specified by the MDEQ on a list that it publishes not more than once a year. The TDL for a given hazardous substance is greater than or equal to the method detection limit for that hazardous substance. In establishing a TDL, the department must consider:

- The low level capabilities of methods published by governmental agencies
- Reported method detection limits published by state laboratories.
- Reported method detection limits published by commercial laboratories
- The need to be able to measure a hazardous substance at concentrations at or below cleanup criteria.

The TDLs previously designated by the MDEQ in Operational Memoranda were reviewed considering these factors, and proposed revisions were provided to the Michigan Environmental Laboratory Association for comment. Revised TDLs were included in the TDLs published with RRD Operational Memorandum No. 2. The effective date of the revised TDLs has been extended to February 1, 2005, to allow adequate implementation time for laboratories and monitoring plans. The criteria tables reflect the revised TDLs as indicated in Attachment 2 of this Operational Memorandum. Criteria revisions based on revised TDLs will also become effective February 1, 2005.

Changes in Drinking Water Criteria

If a new state drinking water standard is established or a state drinking water standard is changed the drinking water standard developed under the Michigan Safe Drinking Water Act, Section 5 of 1976 PA 399, becomes the generic residential cleanup criterion (R 299.5706a(12), R 299.5744, Section 20120a(5) and 21304a(4) of the NREPA). The criteria tables reflect changes in the state drinking water standards as indicated in Attachment 2 of this Operational Memorandum. These criteria are effective immediately.

Changes in Criteria Previously Designated as “ID” or “NA”

Criteria promulgated with the Part 201 Administrative Rules that were designated with a footnote “ID” or “NA”, represent situations where insufficient data was available to calculate risk-based criterion. In accordance with provisions of R 299.5706a(11) if the MDEQ obtains sufficient information to support the calculation of a cleanup criterion the MDEQ must use best available information to calculate a criterion for the hazardous substance. The MDEQ has calculated water quality standards pursuant to R 323.1057 of Part 31 of the NREPA for hazardous substances previously designated as “ID” or “NA”. These water quality standards become groundwater surface water interface (GSI) criteria pursuant to R 299.5716(6), and Section 20120(15) of the NREPA. The new GSI criteria are effective immediately. The soil criteria tables also include an interim Soil Volatilization to Indoor Air criterion for methane. This criterion was developed specifically to address acute physical hazards, specifically explosivity (R 299.5728(1)(d)). The MDEQ is allowing a 45 day public comment period on this methane criterion. A final criterion will be published following the comment period.

Hazardous Substances Not Previously Listed in the Criteria Tables

For a substance not previously listed in the cleanup criteria tables the MDEQ may determine that it is a hazardous substance and develop generic criteria using best available information about the toxicological and physical chemical properties of the substance (R 299.5706a(10)). There are four new hazardous substances for which interim criteria have been developed. They are: acetate; dicamba; metribuzin; and sodium azide. The MDEQ is allowing a 45 day public comment period on these criterion. Final criteria will be published following the comment period. A brief summary of the toxicological bases for the interim criteria follows.

Acetate: The drinking water criteria were derived using a chronic reference dose (RfD) of 5.7E-1 mg/kg-day (MDEQ/ERD, 1992). A no-observed-adverse-effect-level (NOAEL) of 1.0 g/kg/day was identified for calcium magnesium acetate in male and female rats dosed by gavage (Chevron Environmental Health Center, 1987). The GSI criterion is based on the water quality standard calculated pursuant to R 323.1057 as provided by R 299.5716(6).

Key reference: Chevron Environmental Health Center. 1987. Twenty-eight day oral toxicity study in rats with Ortho Ice-B-Gon Deicer. J.R. Cushman, Study Director. Richmond, CA.

Dicamba: A chronic RfD of 3.0E-2 mg/kg/day was obtained from the U.S. EPA Integrated Risk Information System (IRIS) file dated July, 1992. This reference dose serves as the basis for the criteria. See IRIS for details.

Metribuzin: The criteria are based on a chronic RfD of 2.5E-2 mg/kg/day from IRIS (January 1995). See IRIS for details.

Sodium azide: An RfD of 1.2E-2 mg/kg/day was derived July 2003 by RRD toxicologists. The key study is a two-year gavage study in rats. Low dose animals exhibited decreased body

weights and necrosis of the cerebrum. The RfD is based on lowest observed adverse effect level (LOAEL).

Key reference: National Toxicology Program. 1991. Toxicology and Carcinogenesis Studies of Sodium Azide. September 1991. NTP TR 389. U.S. Department of Health and Human Services.

Comments on the interim criteria for methane, acetate, dicamba, metribuzin, and sodium azide should be postmarked no later than January 24, 2005, and should be sent to the attention of Ms. Christine Flaga, Chief, Toxicology Unit, Remediation and Redevelopment Division, Michigan Department of Environmental Quality, P.O. Box 30426, Lansing, Michigan, 48909 (Mail Code: 76115).

Attachments

A handwritten signature in blue ink, appearing to read "Andrew H. Hogue". The signature is written in a cursive style with a large, stylized initial "A".



Remediation and Redevelopment Division

Michigan Department of Environmental Quality

December 10, 2004

RRD OPERATIONAL MEMORANDUM NO. 1

**SUBJECT: PART 201 CLEANUP CRITERIA
PART 213 RISK-BASED SCREENING LEVELS**

Key definitions for terms used in this document:

NREPA:	The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended
Part 201:	Part 201, Environmental Remediation, of NREPA
Part 213:	Part 213, Leaking Underground Storage Tanks, of NREPA
MDEQ:	Michigan Department of Environmental Quality
RRD:	Remediation and Redevelopment Division
U.S. EPA:	United States Environmental Protection Agency
CAP/RAP:	“Corrective action plan” pursuant to provisions of Part 213 of NREPA and “remedial action plan” pursuant to provisions of Part 201 of NREPA
Criteria or criterion:	Includes the cleanup criteria for Part 201 of NREPA and the Risk-Based Screening Levels as defined in Part 213 of NREPA and R 299.5706a(4)
Facility:	Includes “facility” as defined by Part 201 of NREPA and “site” as defined by Part 213 of NREPA
Response actions:	Includes “response activities” as defined by Part 201 of NREPA and “corrective action” as defined by Part 213 of NREPA
TSD:	Technical Support Document

This operational memorandum has been prepared to facilitate implementation of Part 201 and Part 213 of NREPA. The RRD Operational Memorandum No. 1 supersedes all previous MDEQ operational memoranda pertaining to Part 201 and Part 213 criteria. The attached tables (Attachment 1) identify the generic cleanup criteria for groundwater and soil developed pursuant to Sections 20120a and 21304a of NREPA, according to relevant statutory provisions and the methods and equations presented in the respective attached TSDs. The criteria in Attachment 1 reflect some new and revised criteria developed in accordance with R 299.5706a and are based on new and revised target detection limits which were developed in accordance with R 299.5103(l). The revisions to criteria which are associated with revised target detection limits (TDLs) are effective February 1, 2005. Other new and revised criteria developed in accordance with R 299.5706a are, by operation of rule and law, effective immediately.

This operational memorandum provides general information about the criteria tables and the criteria. It also provides direction for the implementation of the criteria for site investigation and response actions under Part 201 and Part 213 of NREPA. Details about methodology and implementation of the criteria are provided in the respective TSDs. The TSDs are also



applicable to Part 213. This operational memorandum must be used in coordination with other MDEQ operational memoranda regarding implementation of Part 201 and Part 213.

The Part 201 Administrative Rules took effect on December 21, 2002, and include the criteria. Existing cleanup criteria cannot be modified unless the rules are repromulgated. However, for substances currently not listed in the cleanup criteria tables, the MDEQ can determine if the substance is hazardous using the best available information and use that information to develop cleanup criteria (R 299.5706a(10)). For substances currently listed in the cleanup criteria tables and designated "ID" or "NA" for certain pathways, the MDEQ can use the best available information to generate cleanup criteria for those pathways (R 299.5706a(11)). If a new state drinking water standard is established or an existing state standard is changed, the drinking water standard will become the generic drinking water criterion (R 299.5706a(12)). These new criteria will take effect when published and announced by the MDEQ (R 299.5706a(13)). Any questions regarding substances for which criteria are not included in the criteria tables can be directed to the MDEQ-RRD Toxicology Unit.

GENERAL INFORMATION ABOUT THE CRITERIA TABLES

Hazardous substances in the attached criteria tables are listed alphabetically. The criteria are presented in three tables entitled: Table 1. Groundwater: Residential and Industrial-Commercial; Table 2. Soil: Residential and Commercial I; and Table 3. Soil: Industrial and Commercial II, III, and IV. A footnote is designated by a letter in parentheses and is explained in the footnotes section that follows the criteria tables. Chemical Abstract Service numbers are provided to assist with identification of the correct hazardous substance. Table 4 of Attachment 1 presents the toxicological and chemical-physical data used to generate the criteria.

Each column of criteria has a numbered heading that is associated with two guide sheets; one for statistics and one for cleanup criteria. These guide sheets are part of the Part 201 criteria and statistics training material prepared for staff. The criteria guide sheets contain implementation information for the various criteria, and the statistical guide sheets provide direction on the use of statistics. The criteria guide sheets are contained in the Training Material for Part 201 Cleanup Criteria and the statistical guide sheets are contained in the MDEQ Sampling Strategies and Statistics Training Materials. These are both located on the MDEQ web site (<http://www.michigan.gov/deq> select "Land," "Land Cleanup," "Site Investigation and Cleanup"). The criteria tables within the criteria training material provide the hazardous substances listed according to analytical group.

The attached criteria tables present some of the criteria within a bolded box; these boxed values represent the lowest generic residential soil or groundwater criterion for a given hazardous substance. Values in bold boxes are presented for those hazardous substances having either a full set of criteria or a partial set where professional judgment can be made that the lowest presented criterion is protective of pathways lacking criteria. Therefore, groundwater or soil concentrations equal to or less than the value in the bolded box comply with generic criteria for all pathways although some of these pathways may not be relevant. For example, the drinking water criteria are not applicable at locations where it is documented that groundwater is not in an aquifer and not in contact with an aquifer. However, if the drinking water criterion is in a bolded box and groundwater concentrations do not exceed this value, it may be concluded that groundwater complies with the criteria for all other groundwater pathways. The values in bolded boxes are most useful for determining whether a location is a facility.

The lowest criterion is not bolded for hazardous substances lacking groundwater surface water interface (GSI) criteria. With respect to hazardous substances lacking GSI criteria, it may not



be possible to reach definitive conclusions regarding status as a facility or compliance with cleanup criteria until a GSI criterion is generated.

For all criteria and pathways, a person proposing or implementing response activities where a criterion for a relevant pathway is not available must supply the data necessary for the MDEQ to generate a criterion. An exception may be made where the MDEQ can determine that measured concentrations are protective (R 299.5706(3)).

GENERAL INFORMATION ABOUT THE CRITERIA

The criteria, flammability and explosivity screening levels (FESLs), and acute inhalation screening levels (AISLs) are presented in the tables. The screening levels are, however, considered to be protective for the concerns they address. If a concentration of a hazardous substance is higher than the FESL or the AISL, then the person proposing or implementing response activities shall document whether additional response activity is required to protect against those acute hazards (R 299.5706a(1)). Further details about these screening levels are presented in the FESL/AISL TSD (RRD Operational Memorandum No. 1, Attachment 10).

The criteria were developed using available chemical-specific toxicological and chemical-physical data, exposure data, or other data. Chemical-specific data used to develop the criteria and screening levels are presented in R 299.5752.

The criteria are presented in two significant figures. Some chemical-physical data are presented in more than two significant figures to retain mathematical precision. Cleanup criteria from the attached table should be compared to analytical data presented in two significant figures. Any statistical manipulation of the data should be done using the reported (unrounded) data with rounding occurring as the last step.

Analytical target detection limits (TDLs) and available analytical methods that are capable of achieving the TDLs have been designated by the MDEQ pursuant to R 299.5103(l) and are provided in RRD Operational Memorandum No. 2, Attachment 1. If the TDL is greater than the risk-based cleanup criterion for a hazardous substance in a given environmental medium, the TDL is used in place of the risk-based value as the cleanup criterion. In such cases, TDLs are presented in the criteria tables and footnoted where appropriate; risk-based criteria are presented along with the TDLs. A background concentration may be substituted for the generic cleanup criterion when the cleanup criterion is less than background (R 299.5707, R 299.5706a(5)(b)). Background soil may be represented by the statewide default background level, regional background developed using the Waste and Hazardous Materials Division (WHMD) Michigan Background Soil Survey April 1991, or facility-specific background developed by the party proposing response activities. Background levels have not been substituted for criteria in the tables since these three options exist. However, the background footnote is presented for substances where background may be substituted. Statewide default values are shown for those substances for which they have been derived. See column 10 of the soil criteria tables. Background for groundwater must be determined on a facility-specific basis if proposed as a default cleanup criterion. Additional guidance regarding establishing facility-specific background concentrations is available in the RRD Operational Memorandum No. 4.



If a generic criterion is greater than the respective soil saturation concentration (C_{sat}), the person proposing or implementing response activity must document whether additional response activity is required to control free-phase liquids or protect against related hazards (R 299.5706a(2)(a)). In the criteria tables, the C_{sat} value is included when the calculated risk-

based soil criterion is greater than C_{sat} and footnoted as such in the tables. R 299.5718(2) states that when the health-based criterion is greater than the C_{sat} concentration, the C_{sat} concentration becomes the criterion for that pathway unless a facility-specific C_{sat} concentration is generated. Concentrations greater than C_{sat} are acceptable cleanup criteria for the footnoted pathways where a site-specific demonstration indicates that free-phase material containing a hazardous substance is not present (R 299.5750(C)). Calculated values which exceed C_{sat} are not presented in the tables but may be obtained by contacting the MDEQ-RRD Toxicology Unit.

A groundwater criterion that exceeds the hazardous substance specific water solubility value defaults to the water solubility value (R 299.5708(2) and R 299.5750(S)) and is footnoted as such in the tables.

NEW INFORMATION ABOUT THE CRITERIA

Lead concentrations in both the fine (less than 250 microns) and coarse soil fractions are necessary to evaluate the risks from exposure to lead in soil. For comparison to the soil direct contact criteria and the particulate soil inhalation criteria for lead, the concentration of lead in the fine fraction must be determined. For all other soil criteria, the total concentration of lead in soil must be determined. Refer to the RRD Operational Memorandum No. 2, Attachment 1, Footnote 13 and Attachment 5, Page 3 for additional details on lead analyses.

IMPLEMENTATION OF THE CRITERIA

The following information describes the process that should be followed for identifying the relevant pathways and applicable criteria for response actions under Part 201 and Part 213 of NREPA.

Selecting Final Cleanup Criteria

The following process should be used in determining the final cleanup criterion for a given hazardous substance in soil and/or groundwater.

1. Identify the relevant pathways.

Sections 20120a and 21304a require that the MDEQ utilize only reasonable and relevant exposure pathways in determining cleanup criteria. Each set of generic criteria correspond to a specific exposure pathway. R 299.5103(h) defines relevant pathway as an exposure pathway that is reasonable and relevant because there is a reasonable potential for human or non-human exposure to a hazardous substance to occur. An exposure pathway is the course a chemical takes from a source to an exposed organism. The components of an exposure pathway are a source or release of a hazardous substance, an exposure point, an exposure route, and, if the exposure point is not the source or point of release, a transport medium. It represents a mechanism by which an individual or population is exposed to chemicals at or originating from a facility. A pathway is relevant when exposure can occur even if exposure controls are or will be relied upon to prevent exposure and even if concentrations are less than applicable criteria. For example, ingestion of contaminated drinking water is a relevant pathway even in the presence of institutional controls or use restrictions. A pathway may not be

relevant due to natural physical characteristics that preclude the pathway from occurring. For example, the absence of a hydraulic connection to surface water in the vicinity of the facility and no indirect discharge to a surface water via a storm drainage system eliminates the potential for surface water to be impacted by the groundwater venting to surface water pathway (R 299.5716(1)).

R 299.5532(7) states that a Part 201 RAP shall evaluate all of the pathways, risks, and conditions listed in the rule to identify those that are relevant for the facility. Further information about the relevance of a pathway is presented in the rules for each exposure pathway. Part 213 CAPs must similarly evaluate the potential exposure pathways and identify those that are relevant. The evaluation must be based on the same exposure assumptions used for the development of the criteria that are contained within these rules.

2. Identify all the applicable criteria.

R 299.5101(c) defines an applicable criterion as a cleanup criterion for a relevant pathway. A criterion is not applicable if the exposure pathway is not relevant at a particular facility or if the exposure it addresses is reliably restricted by a restrictive covenant or institutional control or other allowed mechanism. Whenever a pathway is relevant, the associated criteria are applicable unless exposure can be reliably controlled by land or resource use restrictions or institutional controls.

Cleanup criteria may be applicable to waste material if the generic assumptions for the criteria are representative of the waste material. If the criteria are not applicable to the waste material, a site-specific evaluation must be conducted.

3. Select the lowest applicable generic groundwater and soil criterion.

The lowest applicable criterion determines the need for response action unless a higher criterion can be justified by providing reliable exposure controls for the controlling pathway. In addition, special characteristics of the facility and/or contamination may require a greater degree of response action (e.g., hazardous substances are present which are documented to have interactive toxicological effects) (R 299.5728, R 299.5734(2)(3), and R 299.532(9)). In lieu of using generic criteria, less restrictive facility-specific generic or site-specific cleanup criteria may be proposed. If facility- or site-specific criteria are to be used in lieu of generic criteria, it is the responsibility of the person proposing the plan to adequately document the basis for the limited or site-specific cleanup criteria in any RAP (R 299.5732) or CAP.

Types of Remedial Actions Under Part 201

Section 20120a(1) of NREPA allows for the development of cleanup criteria and remedial actions in the following land use categories:

- a) generic and limited residential
- b) generic and limited commercial
- c) generic and limited industrial
- d) generic and limited recreational (Generic recreational criteria have not been developed by the MDEQ. Recreational criteria are handled on a site-specific basis.)



Generic Remedial Actions: Generic remedial actions are based on generic cleanup criteria for all relevant pathways for the facility in question. Generic residential remedial actions allow for the property to be used without any type of restriction. Generic industrial and commercial remedial actions require an assurance that the land use will continue to be consistent with the generic land use category. A Notice of Approved Environmental Remediation (NAER) for the property consistent with provisions of Section 20120b(2) filed with the Register of Deeds forms an acceptable assurance regarding land use for generic commercial and industrial remedial actions. RAPs must include a statement confirming that the expected activity patterns at the facility are consistent with the exposure assumptions used to calculate the applicable generic criteria. The RAP must also include documentation of the current zoning of the property and any legal nonconforming uses that are relevant to the RAP.

Facility-Specific Generic Remedial Actions: Facility-specific generic remedial actions are generic remedial actions, however, one or more of the generic criteria have been modified based upon characteristics of the property that are not expected to change, such as soil characteristics. Those criteria which incorporate soil parameters (soil volatilization to indoor air inhalation criteria (SVIIC), groundwater volatilization to indoor air inhalation criteria (GVIIC), generic volatile soil inhalation criteria for ambient air, generic particulate soil inhalation criteria for ambient air, generic soil saturation concentrations (C_{sat}), and generic soil-water partitioning values) can be adjusted to incorporate facility-specific soil parameters and still allow the facility to satisfy the generic categorical criteria under Section 20120a(1)(a) to (e) of NREPA. Facility-specific measurements of the following parameters may be substituted individually for the generic assumptions and still allow the facility to satisfy the categorical criteria in Section 20120a(1)(a) to (e) of NREPA (R 299.5714(4), R 299.5724(4), and R 299.5726(7)):

- a) dry soil bulk density
- b) fraction of organic carbon in soil
- c) soil vapor permeability
- d) temperature adjustment factor for Henry's Law Constant
- e) source-building foundation separation distance (GVIIC only)
- f) vertical thickness of the capillary fringe (GVIIC only)
- g) vertical thickness of soil contamination (SVIIC only)
- h) emission due to wind (E_w) (soil inhalation criteria (SIC) only)
- i) dispersion factor (Q/C) (SIC only)

Adjustments to the source-building foundation separation distance and vertical thickness of the capillary fringe must be made in consideration of seasonal variation and meteorological conditions. Consult the appropriate TSD for details. Facility-specific generic industrial-commercial RAPs do not require any limitations or restrictions except a NAER.

Site-Specific Remedial Actions: Site-specific remedial actions may be acceptable under Part 201 Section 20120(a)(2). A site-specific remedial action utilizes cleanup criteria that are based on site-specific assumptions which are substituted for the default assumptions specified in the rules for the various cleanup criteria. However, the equations presented in the pertinent rule must be used to calculate the site-specific criteria (R 299.5706a(9)). Site-specific criteria are also developed for exposure pathways and scenarios for which generic methodology has not been developed. The following pathways are approached on a site-specific basis:

- a) recreational exposures/land uses
- b) sediments (R 299.5730)

c) surface water column (R 299.5730)

Use controls must be in place to assure that activities or characteristics of the facility continue unchanged into the future such that unacceptable exposures will not occur. In this respect, a site-specific closure is a type of limited remedial action. A RAP relying on site-specific cleanup criteria must include documentation of the current zoning of the property and any legal nonconforming uses that are relevant to the RAP. Except for response actions which meet generic residential criteria, site-specific response actions also apply to property that is not zoned. The site-specific RAP for property not zoned must include documentation of the reasonably foreseeable future use of the property and natural resources in question (R 299.5532(8)(b)). Because Section 20120a(6) constrains application of generic or limited categorical cleanup designations to cases where the category is consistent with zoning, a facility that is not zoned cannot be addressed under Section 20120a(1). For property not zoned, any remedial action that does not meet generic residential criteria is considered a site-specific remedial action under Section 20120a(2) of NREPA. In these cases, the generic criteria that correspond to the land use may still be used to assess the adequacy of the remedial action. The person proposing the plan must document the land use and include a statement in the RAP confirming that exposures associated with that land use at the facility do not exceed the exposures used to develop the generic criteria proposed to be applied. If a site-specific remedial action for unzoned property relies on generic cleanup criteria appropriate to the land use, land use restrictions in a form similar to a NAER (rather than a restrictive covenant) may be appropriate and, generally, other RAP elements of Section 20120b(3) may not be needed.

Limited Remedial Actions: A limited remedial action under Section 20120(a)(1)(e) through (h) is necessary whenever a use restriction is required, which is beyond those required to assure activities are consistent with the land use category being applied. The need for use restrictions is established by comparison of facility conditions to generic assumptions used in the generic criteria equations (in contrast to site-specific closures described above). A limited RAP requires a land use or natural resource use restriction or an institutional control such that unacceptable exposures to media exceeding acceptable cleanup criteria cannot occur, along with the other RAP elements of Section 20120b(3). The necessary restrictions must be provided in a restrictive covenant consistent with the provisions of Section 20120b(4) filed with the Register of Deeds for the county where the facility is located or provided with an institutional control consistent with the provisions of Section 20120b(5).

Types of Closures Under Part 213

The Michigan-specific risk-based corrective action approach utilizes a tiered evaluation to determine whether site conditions satisfy generic criteria or allow for the utilization of facility-specific data to adjust the generic criteria; or whether site-specific criteria or institutional controls allow for closure. Closure categories include:

- a) Tier 1 residential unrestricted closure
- b) Tier 1 commercial or industrial closure with Notice of Corrective Action (NoCA)
- c) Tier 2 or 3 residential, commercial, or industrial closure with site-specific criteria
- d) Tier 2 or 3 residential, commercial, or industrial closure with institutional controls

A description of the types of closures allowed under Part 213 follow:



Residential Unrestricted Closures: Under this type of closure, the site has been fully characterized and the closure is based on the generic residential criteria or applicable site-specific target levels (SSTLs) that are as protective as the generic residential criteria.

Commercial and Industrial Closures: Under commercial and industrial closures, the site has been fully characterized and the closure is based on the commercial or industrial generic criteria or applicable SSTLs that are as equally protective as the generic criteria. Commercial and industrial closures allow for the property to be used without any type of restriction except an assurance that the land use will continue to be consistent with the generic land use category. A NoCA on the property consistent with the provisions of Section 21310a(1) filed with the Register of Deeds for the county in which the property is located is acceptable assurance regarding applicable commercial or industrial land use.

Restricted Closures: In the case of restricted closures, the site contaminants exceed the generic criteria and use controls, exposure barriers, and/or restrictions need to be in place to control exposure to the contaminants of concern. These controls generally take the form of a restrictive covenant on all properties in the affected area consistent with the provisions of Section 21310a(2) filed with the Register of Deeds for the county in which the property is located. Section 21310a(3) also provides for alternative mechanisms that may be effective in protecting against unacceptable exposures.

Land Use Categories Under Part 201 and Part 213

Descriptions of residential, commercial, and industrial land use categories are presented below. This information can be used to identify the most appropriate land use category for a property. Only the soil direct contact criteria have commercial III and IV subcategories. With the exception of commercial subcategory I, all other criteria that are protective of the worker population are applied to both industrial and commercial land uses.

Residential Land Use Category: The primary activity of the property is residential and includes single family dwellings, condominiums, and apartment buildings. The generic residential remedial action allows the property to be used for any unrestricted use. The generic residential category can be applied to properties that are zoned commercial or industrial, unlike the industrial or commercial category which can only be applied to properties zoned industrial or commercial. The limited residential category cannot be applied to industrial or commercially zoned property.

Industrial and Commercial Land Use Categories: Activities and uses are extremely variable within the industrial and commercial land uses. It is the responsibility of the party proposing a remedy to identify the category of cleanup criteria that is being relied upon and to demonstrate that the facility and exposure setting is consistent with the characteristics of the land use category/subcategory and the cleanup criteria. Similarly, the party proposing the remedy will have to describe those measures that will be put in place (NAER, NoCA, etc.) to assure that the exposure setting of the facility is maintained consistent with the exposure characteristics of the category/subcategory. This will serve to assure that uses of the facility that might yield unacceptable exposures will be precluded in the future. Proper characterization of those facility-specific activities or exposures may warrant the use of generic criteria from another subcategory or category.

Industrial Land Use Category: Industrial land use includes both of the following two elements:

1. The primary activity at the property is and will continue to be industrial in nature (e.g., manufacturing, utilities, industrial research and development, petroleum bulk storage) and access is and will continue to be reliably restricted consistent with its use (e.g., by fences, security personnel, or both). Inactive or abandoned properties can be included in this category if the use was and/or will be industrial, as described above, and access is controlled as necessary to assure unacceptable exposures do not occur. The industrial category does not include farms, gasoline service stations, or other commercial establishments where children may commonly be present.
2. The current zoning of the property is industrial, the zoning is anticipated to be industrial (see below), or the RAP/CAP includes documentation that the current industrial use is a legal nonconforming use. This may include different zoning designations, depending on the community, such as "light industrial" or "heavy industrial." Documentation of zoning must be included in the RAP/CAP and must include a map or current property record card that shows the zoning status of the facility and all adjacent properties. For each designated zoning category, the documentation must also include the text of the zoning code or ordinance for that designation. If the text for the zoning category refers to any other categories, text for those categories must also be included. If the RAP/CAP is based on anticipated zoning changes, documentation of how and when the zoning changes are to be accomplished and that the proposed criteria are consistent with the new zoning designation must be provided. The MDEQ shall not grant final approval until a final determination of that zoning change has been made by the local unit of government. The RAP/CAP must identify the nearest current residential land uses and nearest properties which are zoned for residential use. Any legal nonconforming land uses in the vicinity of the facility must be identified in the RAP/CAP (e.g., residential use on a parcel zoned "transitional industrial").

Commercial Land Use Category: The commercial land use category is extremely varied, encompassing everything from day care centers and schools to gas stations and warehouse operations. The physical setting of commercial properties and the activities which workers and the general public engage in are also extremely variable. Given the breadth of the commercial land use category, it is impossible to assign a single set of "typical" or generic exposure assumptions to characterize the activities of all potentially exposed populations.

In order to facilitate the development of generic commercial criteria, all commercial land uses have been divided into four subcategories based on factors that are critical to the assessment of potential risk. These factors include the potentially exposed populations (workers or general public) and the nature, duration, and frequency of the exposures likely to occur when people occupy, work, visit, or patronize the facility. The division of the commercial land use category into subcategories allows for some useful generalizations to be made.

Some commercial properties may be located in or near residential areas and, therefore, may be used by other populations for purposes (e.g., recreational) other than the intended commercial use. It may be inappropriate to apply the generic criteria developed for a given subcategory of commercial land use if anticipated exposure from noncommercial, unintended uses (e.g., children playing) exceeds the exposures assumed under that subcategory. Adjustments can be made to the exposure assumptions to represent these other uses consistent with the applicable rule provisions, or criteria for a more representative category can be used. Adjustments to the



exposure assumptions may require site-specific remedial action under Section 20120a(2). Alternatively, the RAP/CAP may denote measures designed to preclude uses inconsistent with the exposure assumptions used to develop the criteria.

For the purpose of determining if the generic commercial criteria presented in Attachment 1 are applicable, the party proposing a remedy must first determine that the facility falls within the definition of commercial land use and that the facility-related exposures are similar to those assumed for this category. The definition of commercial land use includes both of the following two elements:

1. The primary activity at the property is and will continue to be commercial in nature (e.g., retail, warehouse, office/business space). This could include abandoned or inactive commercial properties as long as they fit both the definition of a commercial land use and one of the subcategory definitions described below.
2. The current zoning of the property is commercial, future zoning is anticipated to be commercial, or the RAP/CAP includes documentation that the current commercial use is a legal nonconforming use. This may include different zoning designations, depending on the community, such as "community commercial," "regional commercial," "retail," or "office/business." Documentation of zoning must be included in the RAP/CAP and must include a map or current property record card that shows the zoning status of the facility and all adjacent properties. For each designated zoning category, the documentation must also include the text of the zoning code or ordinance for that designation. If the text for the zoning category refers to any other categories, text for those categories must also be included. If the RAP/CAP is based on anticipated zoning changes, documentation of how and when the zoning changes are to be accomplished and that the proposed criteria are consistent with the new zoning designation must be provided. Final MDEQ approval is dependent upon a final determination of the zoning change by the local unit of government. The RAP/CAP must identify the nearest current residential land uses and nearest parcels which are zoned for residential use. Any nonconforming land uses in the vicinity of the property must be identified in the RAP/CAP (e.g., residential use on a parcel zoned "transitional commercial").

Caution should be used when categorizing land uses on the basis of business type. Activities may vary considerably even among businesses of the same type. Current and future activities and exposures should be the primary considerations when determining a land use category for a specific facility.

If the property meets the definition of commercial land use, the party proposing the remedy must document which of the four subcategories of commercial land use defined below is most representative of the exposure setting of the subject property. The subcategories and the features that define them are described below:

Subcategory I: This commercial land use subcategory is characterized by any use which is intended to house, educate, or provide care for children, the elderly, the infirm, or other sensitive subpopulations. The activities engaged in by these populations at the facility are characterized by exposures of relatively significant duration and/or frequency approximating the magnitude of exposures used to develop the residential criteria. The setting may include areas containing surficial soils that may be frequented by potentially exposed populations (e.g., play areas). Any soil contaminants present may, therefore, be readily accessible to the resident populations. If relied on for drinking water, exposure to groundwater would also be significant. In addition, this

subcategory of commercial land use is usually, but not always, located in or near residential areas and, therefore, may be used by other populations for purposes other than the intended commercial use (e.g., recreational). This subcategory could include, but is not limited to, the following uses:

- a) day care centers
- b) any form of educational facility
- c) hospitals, elder care facilities, and nursing homes

Although a site-specific risk assessment may be conducted on properties within this category, no generic commercial cleanup criteria will be developed because in most cases, the site setting and uses will warrant the application of generic residential criteria. There are forms of subcategory I commercial land use that do not possess the exposure characteristics of the residential exposure setting; for example, long-term or convalescent care facilities where patients are not expected to come into contact with soils on a frequent basis. In such cases, site-specific cleanup criteria or criteria from another subcategory can be utilized with proper written documentation.

Subcategory II: The degree of exposure for such employees under subcategory II property is assumed to be equivalent to the exposures used to model outdoor activities in the development of the generic industrial criteria. As a result, a unique set of generic criteria has not been defined for this subcategory of commercial land use. Properties that fall into this subcategory should be addressed through the application of the generic industrial criteria or through a site-specific risk assessment.

This commercial land use subcategory is characterized by the following features. Access to the public is reliably restricted, consistent with its use by fences, security, or both. Affected surficial soils are located in unpaved or landscaped areas that are frequently contacted by worker populations such as groundskeepers, maintenance workers, or other employees whose primary duties are performed outdoors. If groundwater is relied on for drinking water, it is assumed that worker populations receive one-half of their total daily drinking water exposure from the facility.

This subcategory could include, but is not limited to, the following uses:

- a) large scale commercial warehouse operations
- b) wholesale lumber yards
- c) building supply warehouses

Subcategory III (low soil intensive): A worker whose primary duties take place indoors but also include some outdoor activities such as collecting trash is the receptor for this subcategory. A subcategory III commercial property is characterized by the following features. Access to the public is unrestricted, however, the general public's occupancy of the property is expected to be intermittent and significantly less in frequency and duration relative to the population working at the facility. Although some of the activities for both worker populations and the general public at a subcategory III commercial property are conducted indoors, a significant component of their activity will likely be outdoors. The worker/receptor population at these commercial facilities is expected to engage in low soil intensive activities. Routine outdoor tasks performed by these workers are unlikely to result in significant physical interaction with the soil. Affected surficial soils may be contacted, primarily by the worker populations (as may be the cases at gas stations, auto dealerships, or building supply warehouses with unpaved areas). If on-site groundwater is relied on for drinking water, it is assumed that worker populations receive one-half of their total daily

drinking water exposure from the facility. The receptors for this subcategory are expected to work at the kinds of establishments that are listed below and conducting activities that take place both indoors and outdoors.

This subcategory could include, but is not limited to, the following uses:

- a) retail gas stations
- b) auto service stations
- c) auto dealerships
- d) retail warehouses selling the majority of their merchandise indoors but including some limited storage or stockpiling of materials in an outdoor yard (building supply, retail flower, and garden shops not involving on-site plant horticulture and excluding open air nurseries, tree farms, and sod farms which would fall into an agricultural land use).
- e) repair and service establishments including but not limited to, lawn mower, boat, snowmobile, or small appliance repair shops that have small outdoor yards.
- f) small warehouse operations

Subcategory IV (high soil intensive): A groundskeeper worker population has been identified as the appropriate receptor population for development in this subcategory. The worker/receptor population at these commercial facilities is expected to engage in high soil intensive activities. The primary tasks performed by these workers will result in significant physical interaction with the soil.

A subcategory IV commercial property is characterized by the following features. Access to the public is unrestricted, however, the general public's occupancy of the facility is intermittent in frequency and of short duration relative to the worker populations at the facility (i.e., the frequency and duration of general public occupancy at the property is typified by the time necessary to transact business at a retail establishment or to receive personal services). At least a portion of the worker population at this type of commercial property conducts most of their work activities outdoors; this includes those workers from off-site who work at multiple properties such as commercial landscapers. General public contact with these areas is anticipated to be significantly less than the worker's contact, both in terms of frequency and duration. If groundwater is relied upon for drinking water, worker populations would receive one-half of their total daily drinking water exposure at the facility. This subcategory could include, but is not limited to, the following uses where landscaping exists or has the potential to exist:

- a) professional offices (lawyers, architects, engineers, real estate, insurance, etc.)
- b) medical/dental offices and clinics (not including hospitals)
- c) banks, credit unions, savings and loan institutions, etc.
- d) publicly owned office buildings
- e) any retail business whose principal activity is the sale of food or merchandise within an enclosed building
- f) personal service establishments which perform services indoors (health clubs, barber/beauty salons, mortuaries, photographic studios, etc.)

CONCERNS NOT ADDRESSED BY CLEANUP CRITERIA

There are several concerns that have not been addressed with generic cleanup criteria, and as a result, they must be addressed in a RAP/CAP. These concerns are listed and discussed below.



Source Control: Free-phase liquids and abandoned hazardous substances not yet dispersed represent source materials that have the potential to cause harm to public health, natural resources, and the environment. Source removal often provides the greatest opportunity to permanently and significantly reduce volume, toxicity, and mobility of hazardous substances as specified in Section 20118(4). All RAPs must include an analysis of source control measures already implemented, proposed, or both (Section 20118(8), R 299.5532(7)). Also, for persons that are liable and owned or operated the facility after June 5, 1995, there are additional requirements related to source control specified in Section 20114. Under Part 213, if free product is discovered, it must be reported within 24 hours of the discovery. Section 21307(2)(c)(i) requires that free product removal be conducted in a manner that minimizes the spread of contamination into previously uncontaminated zones. In addition, Section 21307(2)(c)(ii) requires the abatement of free product migration as a minimum objective for the design of the free product removal system. The extent of the free product must be defined to adequately demonstrate that the free product is not migrating and that contamination is not spreading into previously uncontaminated areas. Delineation of the free product must be completed and removal of free product initiated within 90 days of its discovery. Interim recovery methods must be initiated immediately upon discovery of the free product.

Contaminated Soil Runoff to Surface Waters: Consideration must be given to the potential for contaminated soil to erode into surface water, and if the potential exists, what response activity may be appropriate (R 299.5532(7)(x)). This concern is relevant for all land uses. It is applicable to facilities where significant potential exists for contaminated soil to reach surface water via direct transport or runoff. The following should be considered in determining whether the transport of contaminated soil to surface waters is a relevant pathway:

- a) proximity to surface waters
- b) extent of exposed and/or erodible soils
- c) extent of erodible contamination
- d) transport or erosion potential based on soil types, compaction, and slope
- e) presence in soil of metals or persistent bioaccumulative chemicals

If this pathway is determined to be relevant, then the following should be considered in determining if the pathway is or will be adequately controlled pursuant to a RAP/CAP:

- a) whether vegetation is adequate and not expected to require maintenance (this would not require a limited closure)
- b) whether an impervious surface or another engineering measure is required to provide adequate control of potential runoff (this would require a limited closure)

If the pathway is relevant, then the RAP/CAP must provide for effective control of the erosion of contaminated soil. Compliance with Part 201/Part 213 should be considered in judging the effectiveness of the control measures.

Surface Water Sediments: Contaminated surface water sediments can cause adverse impacts to aquatic flora or fauna, the food chain, or aesthetics. If this potential exists, the pathway is relevant (R 299.5532(7)(xii)). This pathway has the potential to be relevant for all land uses. Any RAP/CAP that addresses surface water or sediments must include site-specific cleanup criteria based on the evaluation of bulk sediment chemistry, sediment toxicity, and benthic community populations. Additional guidance is available in RRD Operational Memorandum No. 4, Attachment 3. Development of the criteria must also include consideration

of the following use impairments such that those impairments are eliminated or mitigated following implementation of the criteria (R 299.5730).

- a) restrictions on fish or wildlife consumption
- b) tainting of fish and wildlife flavor
- c) degraded fish or wildlife populations
- d) fish tumors or other deformities
- e) bird or animal deformities or reproductive problems
- f) degradation of benthos
- g) restrictions on dredging activities
- h) eutrophication or undesirable algae
- i) restrictions on drinking water consumption, taste, or odor problems
- j) beach closings
- k) degradation of aesthetics
- l) added costs to agriculture or industry, or a local unit of government
- m) degradation of phytoplankton or zooplankton populations
- n) loss of fish and wildlife habitat
- o) unacceptable risk through human contact as a result of absorption of hazardous substances through the skin or by incidental ingestion of sediments
- p) other unacceptable risks to human receptors exposed to hazardous substances in sediments

Acute Toxicity and Physical Hazards

Acute toxicity and physical hazards need to be considered at every facility. Acute inhalation toxicity and flammability/explosivity potential have been addressed via development of FESLs and AISLs for a limited number of hazardous substances where sufficient chemical-specific information is available (Attachment 10). When FESLs/AISLs cannot be developed, an evaluation for flammability/explosivity and acute inhalation toxicity will need to be conducted on a case-by-case basis. In addition, other physical hazards must be evaluated for groundwater (R 299.5532(7)(xiv)). Since AISLs and FESLs have not been developed for soil, it may be necessary to give special consideration to these hazards in soil.

Acute toxicity to aquatic organisms must also be considered. Specific response activities are required if there is a release to surface waters, either directly or through venting groundwater that is acutely toxic (R 299.5526(4)(d) and R 299.5716(14)). Contaminant-specific values for acute toxicity to aquatic life are listed in the R 323.1057 Water Quality Values (available at www.michigan.gov/deq select "Water," "Water Quality Monitoring," "Assessment of Michigan Waters").

Some of the hazardous substances in the criteria tables may present other physical hazards such as ignitability, corrosivity, or reactivity. These substances were identified using the definitions provided in the Resource Conservation and Recovery Act (RCRA; 40 Code of Federal Regulations, Sections 261.20-261.23). Substances which have the hazardous properties of ignitability, corrosivity, or reactivity when in pure form are footnoted in the criteria tables with an (I), (U), or (R), respectively. Further information about these characteristics follows below. Special attention and caution must be exercised when these hazardous substances are known or expected to be present in soil and/or groundwater. Additional hazardous substances listed in the criteria tables may also pose acute or physical hazards that may need to be addressed.

Hazardous substances that are ignitable in pure form may present a combustion hazard under normal environmental conditions (i.e., standard temperature and pressure) and/or may be strong oxidizers capable of exacerbating a fire once ignited. Corrosive substances have either a very high or a very low pH, destroy living tissue upon direct contact, corrode or destroy building materials or other equipment, and mobilize other hazardous substances. Reactive substances may explode under normal environmental conditions when exposed to moisture or when subject to an initiating force. Reactive substances may also generate toxic fumes as is the case for cyanide or sulfide containing substances. All physical and acute hazards need to be evaluated on a case-by-case basis.

Ecological and Aesthetic Impacts: Additional impacts that need to be considered are aesthetics, phytotoxicity, food web contamination, adverse impacts to soil organisms, and adverse impacts to aquatic and terrestrial wildlife (R 299.5532(7)(xv), R 299.5728). Observable evidence of a problem including, but not limited to, soil discoloration, odors, stressed vegetation, and injured wildlife requires that further evaluation of aesthetic and/or ecological impacts occur. In addition, certain hazardous substances such as dioxins, furans, and polychlorinated biphenyl (PCB) compounds present their greatest ecological impacts in reduced reproductive success, embryo survival, and contaminant biomagnification through the food web. These impacts are generally not visibly evident, but these ecological impacts are very significant and must also be evaluated to ensure that the proposed remedy is adequately protective of the environment.

The GSI criteria do consider certain impacts to some aquatic organisms, in addition to human health effects. However, Part 201 generic criteria do not fully address ecological impacts. In addition, only a few criteria account for adverse aesthetic impacts, and this is complicated by the fact that the presence of multiple contaminants may result in aesthetic impacts that would not otherwise be observed or expected. Consequently, aesthetic-based criteria and ecologic-based criteria may need to be developed. The development of these criteria is made difficult because only limited quantitative information currently exists in the published literature. As a result, professional judgment may be required.

The generic criteria for soil do not fully address aesthetic impacts. Soils which are in compliance with the appropriate health-based chemical-specific criteria, yet still exhibit adverse aesthetic impacts, must be addressed on a case-by-case basis. In determining if additional action is required for soils with adverse aesthetic impacts, consideration will be given to the intended use of the property, the depth of the impacted soils, the source of the contamination, and the specific aesthetic impacts exhibited in the soil.

Generic ecologic-based soil or sediment criteria have not been established by the MDEQ. Nonetheless, it is important that all RAPs/CAPs consider the need for conducting ecological risk assessment at the facility. Ecological risk assessments are useful to define the risks to aquatic and/or terrestrial wildlife that are posed by the contaminant concentrations present at the facility. The presence of bioaccumulative contaminants is of particular concern. These contaminants include, but are not limited to, chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclohexanes, alpha-hexachlorobenzene, beta-hexachlorocyclohexane, delta-hexachlorocyclohexane, lindane, mercury, mirex, octachlorostyrene, PCBs, pentachlorobenzene, photomirex, dioxins (2,3,7,8-tetrachlorodibenzo-p-dioxin being the most toxic congener), furans (2,3,7,8-tetrachlorodibenzo-p-furans being the most toxic congener), 1,2,3,4-tetrachlorobenzene, 1,2,4,5-tetrachlorobenzene, and toxaphene.



In most cases, it is important that some form of ecological risk assessment be conducted when aquatic and/or terrestrial habitat(s) will remain at a facility after completion of the RAP/CAP construction activities. In most instances, the initial form of this assessment effort will be what is generally referred to as a prescreening, or screening level, ecological risk assessment. A prescreening risk assessment must examine whether there will be an unacceptable risk to organisms expected to live in habitats located at or near the facility. If unacceptable, ecological risks cannot be ruled out at the facility, then some additional action will be necessary. This additional action could lead to the completion of a more detailed ecological risk assessment involving definition of habitats, identification of receptor species, review of available ecological risk data, food chain modeling, and potentially the collection and analysis of biological samples. This additional assessment effort could eventually lead to the development of ecologically-based criteria at the facility. Alternatively, presumptive actions can be implemented to prevent unacceptable ecological exposures at the facility (e.g., capping or otherwise isolating the contaminants from ecological exposure, or removal of the contaminant). It may be more cost effective to implement presumptive remedies than to conduct a detailed ecological risk assessment.

To assist in conducting or evaluating screening level ecological assessments, the ecological screening level guidance document, dated August 22, 2003, prepared for the U.S. EPA Region 5 RCRA Corrective Action and Permit Program office (<http://www.epa.gov/RCRIS-Region-5/ca/ESL.pdf>) is recommended. The document provides comparison concentration values for a variety of chemical compounds in air, water, sediment, and soil. If concentrations at a facility clearly and consistently exceed these comparison values for the environmental media of concern, then unacceptable ecological risk cannot be ruled out at the facility.

For those facilities regulated under Part 111, Hazardous Waste Management, of NREPA, additional response activities to address ecological risk may be required to assure consistency with the Federal RCRA Program. Please contact the WHMD, Hazardous Waste and Radiological Protection Section for additional information.



For questions concerning the criteria/RBSL tables, criteria/RBSL development, or the technical support documents, please contact Christine Flaga, MDEQ, RRD Toxicology Unit Chief, at 517-373-0160, or flagac@michigan.gov. For questions regarding application of the criteria or RBSLs to specific sites, please contact the appropriate project manager.

Andrew W. Hogarth, Chief
Remediation and Redevelopment Division

Dated: 12/10/04



Attachments

Attachment 1: Tables 1, Groundwater, and 2 and 3, Soil:
Part 201 Cleanup Criteria and Screening Levels
Part 213 Tier 1 Risk-Based Screening Levels Risk-Based Screening Levels
(Table in alpha order: pdf format = 1, 2, 3 and excel format = 1,2,3)

Footnotes for the Part 201 Criteria and Screening Levels
Part 213 Risk-Based Screening Levels

Table 4: Toxicological and Chemical-Physical Data for Part 201 Cleanup
Criteria and Screening Levels (excel format= table 4)
Part 213 Risk-Based Screening Levels

Attachment 2: List of Revisions to Criteria Since December 2002

Attachment 3: Part 201 Drinking Water Criteria/Part 213 Tier 1 Drinking Water Risk-Based
Screening Levels Technical Support Document

Attachment 4: Part 201 Groundwater Contact Criteria
Part 213 Tier 1 Groundwater Contact Risk-Based Screening Levels
Technical Support Document

Attachment 5: Part 201 Groundwater and Soil Volatilization to Indoor Air Inhalation Criteria
Part 213 Tier 1 Groundwater and Soil Volatilization to Indoor Air Inhalation
Risk-Based Screening Levels
Technical Support Document

Attachment 6: Part 201 Soil Direct Contact Criteria
Part 213 Tier 1 Soil Direct Contact Risk-Based Screening Levels
Technical Support Document

Attachment 7: Part 201 Soil Inhalation Criteria for Ambient Air
Part 213 Tier 1 Soil Inhalation Risk-Based Screening Levels for Ambient Air
Technical Support Document

Attachment 8: Part 201 C_{sat} Concentrations/Part 213 Tier 1 C_{sat} Concentrations
Technical Support Document

Attachment 9: Part 201 Soil-Water Partition Value/Part 213 Tier 1 Soil-Water Partition Risk-
Based Screening Levels
Technical Support Document

Attachment 10: Part 201 and Part 213 Flammability and Explosivity Screening Levels, and
Acute Inhalation Screening Levels
Technical Support Document



This memorandum is intended to provide guidance to foster consistent application of Part 201 and Part 213 of NREPA and the associated Administrative Rules. This document is not intended to convey any rights to any person nor itself create any duties or responsibilities under law. This document and matters addressed herein are subject to revision.