

PART 7. CLEANUP CRITERIA REQUIREMENTS FOR REMEDIAL ACTIONS AND INTERIM RESPONSE ACTIVITY DESIGNED TO MEET CRITERIA

**R 299.5701 Definitions; A to I.**

**Rule 701.** As used in this part:

(a) "Acute toxicity" means the ability of a hazardous substance to cause a debilitating or injurious effect in an organism as a result of a single or short-term exposure.

(b) "Background" means the concentration or level of a hazardous substance which exists in the environment at or regionally proximate to a site that is not attributable to any release at or regionally proximate to the site.

(c) "Best available information" means, when used in relation to a risk assessment or the development of cleanup criteria, the most scientifically credible and relevant data available about a particular hazardous substance. Such information may include, but is not limited to, any of the following:

(i) The peer reviewed scientific literature.

(ii) Information sources recognized by the risk assessment community, such as the integrated risk information system database maintained by the United States environmental protection agency or other scientifically reliable databases.

(iii) Other scientific studies that are acceptable to the department.

(d) "Cancer slope factor" means a plausible upper-bound estimate of the probability of a response per unit dose of a hazardous substance over a lifetime. the cancer slope factor is used to estimate an upper bound probability of an individual developing cancer as a result of a lifetime exposure to a particular level of a potential carcinogen.

(e) "Carcinogen" means a hazardous substance which, based on the weight of evidence, causes an increased incidence of benign or malignant neoplasms in animals or humans or that substantially decreases the time in which neoplasms develop in animals or humans.

(f) "Chronic toxicity" means the ability of a hazardous substance to cause an injurious or debilitating effect in an organism that results from repeated exposure to the hazardous substance for a time period representing a substantial portion of the natural life expectancy of the organism.

(g) "Generic commercial" means the cleanup criteria established by the department under section 20120a(1)(b) of the act and these rules. Generic commercial cleanup criteria shall be established in at least all of the following subcategories, based on activity patterns that characterize exposure:

(i) Commercial I. Commercial I cleanup criteria shall be identical to the generic residential cleanup criteria.

(ii) Commercial II. Commercial II cleanup criteria shall be identical to the generic industrial cleanup criteria.

(iii) Commercial III.

(iv) Commercial IV.

(h) "Generic industrial" means the cleanup criteria established by the department under section 20120a(1)(d) of the act and these rules.

(i) "Generic recreational" means the cleanup criteria established by the department under section 20120a(1)(c) of the act.

(j) "Generic residential" means the cleanup criteria established by the department under section 20120a(1)(a) of the act and these rules.

(k) "Increased cancer risk of 1 in 100,000" means the 95% upper bound on the calculated risk of 1 additional cancer above the background cancer rate per 100,000 individuals continuously exposed to a carcinogen at a given average daily dose for a 70-year lifetime.

(l) "Inhalation unit risk factor" means the additional lifetime cancer risk occurring in a population in which all individuals are exposed continuously for life to a concentration of 1 microgram per cubic meter of the hazardous substance in the air they breathe. The inhalation unit risk factor shall be calculated under the provisions of part 55 of the act and the rules promulgated under that part.

(m) "Initial threshold screening level" means a concentration in air of a toxic air contaminant which is used to evaluate noncarcinogenic health effects and is calculated under part 55 of the act and the rules promulgated under that part.

(n) "Ionizing organic hazardous substance" means an organic hazardous substance that has functional chemical groups that become ions when exposed to varying pH conditions.

#### **R 299.5703 Definitions; L to W.**

**Rule 703.** As used in this part:

(A) "Leachate" means liquid, including any suspended components in the liquid, that has percolated through or drained from a hazardous substance or soil contaminated with a hazardous substance.

(b) "Linearized multistage model" means a dose-response model which assumes that there are a number of distinct biological stages or changes that must occur for a normal cell to be transformed into a tumor and which assumes the dose-response relationship to be linear at low doses.

(c) "Reference dose" or "RfD" means a conservative estimate of the daily intake of the human population, including sensitive subgroups, that is likely to be without appreciable risk of deleterious effect during a lifetime. The reference dose is expressed in units of milligrams per kilogram body weight per day.

(d) "Relative source contribution factor" or "RSC" means that portion of a person's total daily intake of a noncarcinogenic hazardous substance that comes from the medium being addressed by the cleanup criterion.

(e) "Risk assessment" means the analytical process used to determine the risk to the public health, safety, or welfare or to the environment associated with a release or threat of release of a hazardous substance at a facility.

(f) "Secondary maximum contaminant level" means the United States environmental protection agency's secondary maximum contaminant level for protection of the public welfare for substances that may adversely affect the taste, odor, color, appearance, or any aesthetic quality of drinking water, as set forth in 40 C.F.R. part 143 (revised as of July 1, 2001), which is adopted by reference in these rules and which is available for inspection at the Lansing office of the department,

525 West Allegan Street, Lansing, Michigan. Copies of the provisions may be purchased, at a cost as of the time of adoption of these rules of \$55.00, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (Stock Number 869-044-00152-7), or from the Department of Environmental Quality, Remediation and Redevelopment Division, 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(g) "Toxicological interaction" means simultaneous exposure to 2 or more hazardous substances which will produce a toxicological response that is greater or less than their individual responses.

(h) "Weight of evidence," a term of art used in risk assessment, means an evaluation of the relevant scientific data conducted to determine the likelihood that a hazardous substance is a human carcinogen or causes noncancer adverse health effects, or both. The evaluation may include any of the following information in addition to toxicological bioassays:

- (i) Structure-activity relationships.
- (ii) chemical-physical properties.
- (iii) Short-term test findings.
- (iv) Results of appropriate physiological, biological, and toxicological observations.
- (v) Comparative metabolism and pharmacokinetic studies.

**R 299.5705 Remedial actions; protection of public health, safety, welfare, and environment required; Part 7 rules applicable to interim response actions designed to meet cleanup criteria; degree of cleanup; modification of cleanup category; aquifers; unacceptability of remedial action plan.**

**Rule 705.** (1) All remedial actions shall be protective of the public health, safety, and welfare and the environment. applicable generic cleanup criteria established by the department pursuant to section 20120a(1) and site specific cleanup criteria approved by the department under section 20120a(2) of the act and these rules reflect the departments judgment, at the time the criteria are established or approved by the department, about the numerical criteria required to meet this protectiveness requirement, subject to the provisions of R 299.5706(3), R 299.5728, and R 299.5734(2).

(2) A remedial action shall provide for response activity that will satisfy cleanup criteria in 1 or more land use-based categories, as allowed for under section 20120a(1) of the act, or site-specific cleanup criteria as provided in section 20120a(2) of the act. The rules in this part also apply to interim response activities that are designed to meet cleanup criteria. references in this part to remedial actions also include those interim response activities.

(3) The category of land use-based remedial action under section 20120a(1) of the act or the site-specific cleanup criteria identified under section 20120a(2) of the act may be modified by the person proposing to conduct the response activity that will result in modification during implementation or after completion of a remedial action, if appropriate to the facility and if that modification is accomplished in a manner that is consistent with the act and these rules.

(4) If a revised land use-based remedial action includes characteristics that are required by R 299.5532 to be approved by the department, then the person implementing the change shall seek department approval as required by part 201 of the act and these rules.

(5) The horizontal and vertical extent of hazardous substance concentrations in an aquifer above the higher of either the concentration allowed by Section 20120a(1)(a) or (11) of the act, as applicable, shall not increase after the initiation of remedial actions to address an aquifer, except as approved by the director as provided in section 20118(5) and (6) of the act.

(6) All remedial actions that address the remediation of an aquifer shall provide for removal of the hazardous substance or substances from the aquifer, either through active remediation or as a result of naturally occurring biological or chemical processes which can be documented to occur at the facility, except as provided in section 20118(5) and (6) of the act.

#### **R 299.5706 General requirements for application of cleanup criteria.**

**Rule 706.** (1) All cleanup criteria used in remedial actions undertaken under part 201 of the act and these rules shall be based on best available information.

(2) The generic cleanup criteria developed by the department using the algorithms presented in part 7 of these rules are derived primarily from data that reflect chronic toxicity endpoints. If a hazardous substance has a more sensitive toxic effect than those associated with the chronic toxicity data used to calculate a generic criterion, then a criterion shall be developed to address the most sensitive effect. Except as provided in R 299.5532(9), generic cleanup criteria established by the department shall be accepted as protective of the most sensitive toxic effect in a given exposure pathway for the hazardous substance in question.

(3) If the department has not calculated a criterion for a hazardous substance for a given exposure pathway, then the person proposing or implementing the remedial action shall supply the necessary data for the department to calculate a criterion or establish a criterion under subrule (4) of this rule, unless the department determines that a numerical criterion is not required to assure that a given remedial action will be protective.

(4) A generic or site-specific cleanup criterion may be established by the department based on best professional judgment instead of a calculation based on minimum toxicity data for a specific hazardous substance when the minimum toxicity data are not available for that hazardous substance, but data of sufficient quality are available to show that the hazardous substance in question can be adequately assessed by comparison to the toxicity of another hazardous substance for which sufficient data are available. A criterion may be established by the department in this manner when the hazardous substances are expected by the department to have similar fate and toxicity.

#### **R 299.5706a Generic cleanup criteria; toxicological and chemical-physical properties; use of generic cleanup criteria as risk based screening levels; procedure for developing additional generic criteria.**

**Rule 706a.** (1) Except as provided in R 299.5532(9) and subrules (10), (11) and (12) of this rule, generic groundwater cleanup criteria for the residential, commercial and industrial categories shall be the values shown in table 1 of R 299.5744. If a generic groundwater cleanup criterion is higher than the flammability and explosivity screening level or the acute inhalation screening level shown in table 1 of R 299.5744, then the person proposing or implementing response activity shall document whether additional response activity is required to protect against those acute hazards.

(2) Except as provided in R 299.5532(9) and subrules (10), (11), and (12) of this rule, generic soil cleanup criteria for the residential and commercial i categories shall be the values shown in table 2 of R 299.5746.

(a) If a generic soil cleanup criterion is greater than  $C_{sat}$ , then the person proposing or implementing response activity shall document whether additional response activity is required to control free-phase liquids or to protect against hazards associated with free-phase liquids that are not accounted for in development of the generic criteria.

(3) Except as provided in R 299.5532(9) and subrules (10), (11), and (12) of this rule, generic soil cleanup criteria for the commercial II, III, IV, and industrial categories shall be the values shown in table 3 of R 299.5748.

(4) The generic cleanup criteria shown in R 299.5744, R 299.5746, and R 299.5748 and identified under subrule (14) of this rule may be used and known as risk-based screening levels for corrective actions required under the part 213 of the act.

(5) Generic cleanup criteria under R 299.5744, R 299.5746, and R 299.5748 are based on R 299.5707 in the following cases:

(a) If a calculated cleanup criterion is less than the target detection limit for that hazardous substance in a given medium, then the target detection limit is the cleanup criterion. Criteria to which this subdivision applies are designated with a footnote in the criteria tables.

(b) A background concentration may be substituted for a generic cleanup criterion when the background concentration is higher than a criterion shown in R 299.5744, R 299.5746, or R 299.5748.

(6) If a hazardous substance imparts adverse aesthetic characteristics to groundwater at a concentration less than the health-based criterion for that hazardous substance, the aesthetic-based criterion derived under R 299.5709 is shown as the drinking water criterion in the table of generic cleanup criteria in R 299.5744 and designated with a footnote.

(7) Except as provided in section 20120a(10) of the act and R 299.5750(1)(o), the toxicological and physical-chemical input values used by the department to derive generic cleanup criteria with the equations and default assumptions provided in R 299.5710, R 299.5712, R 299.5714, R 299.5720, R 299.5722, R 299.5724, and R 299.5726 are shown in table 4 of R 299.5752.

(8) Toxicological and chemical-physical data in table 4 of R 299.5752, if available, shall be used in conjunction with the equations and default assumptions that appear in these rules for the development of generic cleanup criteria under

subrule (10) or (11) of this rule, except as provided in section 20120a(10) of the act and R 299.5750(1)(o).

(9) Except as provided in subdivision (a) of this subrule, site-specific cleanup criteria developed under section 20120a(2) of the act shall use the toxicological and chemical-physical data in table 4 of R 299.5752, or shall be based on the procedures allowed for under subrules (10) and (11) of this rule. Site-specific assumptions may be substituted for the default assumptions specified in R 299.5710, R 299.5712, R 299.5714, R 299.5720, R 299.5722, R 299.5724, and R 299.5726, if appropriate; however, the equations presented in the pertinent rule shall be used to calculate site-specific criteria. Non-human health based toxicological values may be modified through the development of site-specific cleanup criteria under section 20120a(2) of the act and R 299.5716(11).

(a) The following chemical-physical properties may be modified as part of a site-specific cleanup criterion developed under section 20120a(2) of the act, if documented by the person proposing the site-specific criterion to be more appropriate for a specific facility than the generic parameter listed in table 4 of R 299.5752:

- (i) Relative source contribution factor for drinking water.
- (ii) Ingestion absorption efficiency.
- (iii) Dermal absorption efficiency.
- (iv) Relative source contribution factor for soil.
- (v) Soil  $k_{oc}$  for ionizing organic compounds.
- (vi) Soil-water distribution coefficients for inorganic compounds.

(10) For a substance that is not listed in the cleanup criteria tables in R 299.5744, R 299.5746, or R 299.5748, the department may determine if the substance is a hazardous substance using best available information about the toxicological and physical-chemical properties of that substance and use that information to develop a generic or site-specific cleanup criterion.

(11) For a substance that is listed in the cleanup criteria tables in R 299.5744, R 299.5746, or R 299.5748, if the department obtains sufficient information to support calculation of a cleanup criterion which is designated in the cleanup criteria tables or table 4 of R 299.5752 with a footnote "ID" or "NA," the department shall use best available information to calculate a cleanup criterion for the hazardous substance.

(12) If a new state drinking water standard is established or a state drinking water standard is changed after the effective date of this rule, the drinking water standard in effect under section 5 of 1976 pa 399, MCL 325.1005 et seq. shall become the generic residential cleanup criterion under R 299.5744, as provided in section 20120a(5) of the act.

(13) If a generic cleanup criterion is developed under subrule (10) or (11) of this rule, or modified under subrule (12) of this rule, the department shall make the new toxicological and physical-chemical data and criterion available by announcing it on the department's internet web site, and by publishing notice of the change in the department calendar, or by such other means that effectively notifies interested persons. The new criterion shall take effect when published and announced by the department as called for in this rule. The new data and resulting cleanup criterion

shall remain effective and be used as required under these rules until the department promulgates revised data and criteria pursuant to 1969 PA 306, MCL 24.201 et seq.

**R 299.5707 Background concentrations and target detection limits as cleanup criteria.**

**Rule 707.** If the target detection limit or the background concentration is greater than the risk-based cleanup criteria for a hazardous substance in a given environmental medium, then the target detection limit or the background concentration, whichever is larger, shall be used in place of the risk-based value as the cleanup criterion.

**R 299.5708 Groundwater cleanup criteria generally.**

**Rule 708.** (1) Except as provided in subrule (2) of this rule, the generic groundwater cleanup criteria applicable at a given facility shall be the most restrictive of the criteria developed under R 299.5709 to R 299.5716 and section 20120a(15) of the act, considering those pathways that are reasonable and relevant to the facility and the category of cleanup criteria being proposed or implemented.

(2) If a generic groundwater cleanup criterion developed under R 299.5709 to R 299.5716 or section 20120a(15) of the act is greater than the solubility limit of that hazardous substance in water at 25° Celsius, then the solubility limit shall be the generic criteria for that pathway.

**R 299.5709 Calculation of generic cleanup criteria for groundwater in an aquifer based on adverse aesthetic impacts.**

**Rule 709.** (1) If a hazardous substance, singly or in combination with other hazardous substances present at the facility, imparts adverse aesthetic characteristics to groundwater in an aquifer, then the cleanup criterion shall be the secondary maximum contaminant level, or, if there is no secondary maximum contaminant level, then the concentration that is documented as the taste or odor threshold concentration or the concentration below which appearance or other aesthetic characteristics are not adversely affected. The criteria of this subrule shall apply only when the level required by this subrule is less than the level required by section 20120a(4) of the act. A taste or odor threshold concentration or a concentration adversely affecting appearance shall be determined according to methods approved by the United States Environmental Protection Agency.

(2) For the purposes of this rule, the point of exposure shall be presumed to be any point in the affected aquifer.

**R 299.5710 Generic cleanup criteria for groundwater in an aquifer based on ingestion of groundwater for drinking water.**

**Rule 710.** (1) Exposure to groundwater by ingestion shall be considered a relevant pathway for groundwater that satisfies either of the following conditions:

(a) The groundwater is in an aquifer.

(b) The groundwater is not in an aquifer, but can reasonably be expected to transport a hazardous substance into an aquifer in a concentration that exceeds the generic residential criteria developed under subrule (2) of this rule.

(2) The criteria developed pursuant to R 299.5709 and R 299.5710 are not applicable if ingestion of the groundwater is, or as part of the remedial action will be, reliably restricted by a restrictive covenant, a notice of approved environmental remediation, or an institutional control that is allowed for under these rules and approved by the department, if approval is required.

(3) Cleanup criteria for groundwater based on ingestion of groundwater for drinking water shall be calculated according to the following algorithms, except as provided for in R 299.5734. Criteria calculated under this subrule shall be the generic cleanup criterion, unless a state drinking water standard is available or, if a criterion protective of adverse aesthetic characteristics is more restrictive, as provided for in section 20120a(5) of the act.

#### EQUATION FOR CARCINOGENIC EFFECTS:

$$DWC = \frac{TR \times BW \times AT \times CF}{SF \times EF \times ED \times IR_{dw}}$$

where,

DWC	(Drinking water criterion)	=	chemical-specific (ug/L or ppb)
TR	(Target risk level)	=	$10^{-5}$
BW	(Body weight)	=	70 kg
AT	(Averaging time in days)	=	25,550 days (70 years x 365 days/year)
CF	(Conversion factor)	=	1000 ug/mg
SF	(Oral cancer slope factor)	=	chemical-specific (mg/kg-day) <sup>-1</sup>
EF	(Exposure frequency)	=	350 days/year (residential)
		=	245 days/year (industrial and commercial)
ED	(Exposure duration)	=	30 years (residential)
		=	21 years (industrial and commercial)
IR <sub>dw</sub>	(Drinking water ingestion rate)	=	2 liters/day (residential)
		=	1 liter/day (industrial and commercial)

#### EQUATION FOR NONCARCINOGENS:

$$DWC = \frac{THQ \times RfD \times BW \times AT \times RSC \times CF}{EF \times ED \times IR_{dw}}$$

where,

DWC	(Drinking water criterion)	= chemical-specific (ug/L or ppb)
THQ	(Target hazard quotient)	= 1
RfD	(Oral reference dose)	= chemical-specific (mg/kg-day)
BW	(Body weight)	= 70 kg
AT	(Averaging time)	= 10,950 days (30 years x 365 days/year - residential) 7,665 days (21 years x 365 days/year - industrial and commercial)
RSC	(Relative source contribution)	= chemical-specific or 0.2 if chemical-specific data are not available
CF	(Conversion factor)	= 1000 ug/mg
EF	(Exposure frequency)	= 350 days/year (residential) 245 days/year (industrial and commercial)
ED	(Exposure duration)	= 30 years (residential) 21 years (industrial and commercial)
IR <sub>dw</sub>	(Drinking water ingestion rate)	= 2 liters/day (residential) 1 liter/day (industrial and commercial)

(4) For the purposes of this rule, the point of exposure shall be presumed to be any point in the affected aquifer.