**DEPARTMENT OF ENVIRONMENTAL QUALITY**

**REMEDIATION AND REDEVELOPMENT DIVISION**

**ENVIRONMENTAL CONTAMINATION RESPONSE ACTIVITY**

(By authority conferred on the director of the Department of Environmental Quality by sections 20104(1) and 20120a(18) of 1994 PA 451, MCL 324.20104(1) and 324.20120a(18).

## CLEANUP CRITERIA REQUIREMENTS FOR RESPONSE ACTIVITY

### R 299.1 Definitions; A to I.

Rule 1. As used in this part:

(a) "Act" means 1994 PA 451, MCL 324.101 to 324.90106, known as the Natural Resources and Environmental Protection Act.

(b) "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.

(c) "Ambient air" means the atmosphere outside of buildings.

(d) "Applicable criterion" means a cleanup criterion for a relevant pathway. A criterion is not an applicable criterion if the exposure pathway is not a relevant pathway at the facility or if the exposure it addresses is reliably restricted by a restrictive covenant or institutional control or other mechanism allowed for under part 201 of the act and these rules.

(e) "Aquifer" means a geological formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs.

(f) "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.

(g) "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.

(h) "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.

(i) "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.

(j) "$C_{sat}$" means the concentration in soil at which the solubility limits of the soil pore water, the vapor phase limits of the soil pore air, and the absorptive limits of the soil particles have been reached. As used in these rules, $C_{sat}$ is a theoretical threshold above which a free-phase liquid (non-aqueous phase liquid) hazardous substance may exist.

(k) "Direct contact" means exposure to hazardous substances through ingestion or dermal contact.

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

(m) "Groundwater" means water below the land surface in a zone of saturation.

(n) "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.

(o) "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.

(p) "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.

(q) "Institutional control" means a measure which is approved by the department, which takes a form other than a restrictive covenant, and which limits or prohibits certain activities that may interfere with the integrity or effectiveness of a remedial action or result in exposure to hazardous substances at a facility, or which provides notice about the presence of a hazardous substance at a facility in concentrations that exceed only an aesthetic-based cleanup criterion.

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

History: 2013 AACS.

**R 299.2 Definitions; L to V.**

Rule 2. As used in this part:

(a) "Land or resource use restrictions" means the provisions of any of the following measures that are used to limit or prohibit activities that may interfere with the integrity or effectiveness of a response activity, or to limit or prohibit activities that may result in exposure to hazardous substances at a facility, or to provide notice about the presence of a hazardous substance at a facility in concentrations that exceed only an aesthetic-based cleanup criterion:

(i) A restrictive covenant.

(ii) A notice of approved environmental remediation.

(iii) An institutional control, which may be a local ordinance or any form of preapproved institutional control, such as a notice of aesthetic impact.

(b) "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.

(c) "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.

(d) “Notice of aesthetic impact” means a document that describes conditions at a facility that result from the presence of hazardous substances at concentrations which exceed only cleanup criteria that are based on aesthetic impacts.

(e) "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.

(f) “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.

(g) “Relevant pathway” means an exposure pathway that is reasonable and relevant because there is a reasonable potential for exposure to a hazardous substance to occur to a human or nonhuman receptor. The components of an exposure pathway are a source or release of a hazardous substance, an exposure point, and, if the exposure point is not the source or point of release, a transport medium. The existence of a municipal water supply, exposure barrier, or other similar feature does not automatically make an exposure pathway irrelevant.

(h) "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.

(i) "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, 2012), 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.

(j) "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.

(k) "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.

(l) "Volatile" means any compound that exhibits a Henry's law constant equal to or greater than 0.00001 atmosphere-cubic meter per mole at standard temperature and pressure.

History: 2013 AACS.

**R 299.3 Response activities; protection of public health, safety, welfare, and environment required; rules applicable to interim response actions designed to meet cleanup criteria; degree of cleanup; modification of cleanup category; aquifers; unacceptability of response activity plan.**

Rule 3. (1) All response activities 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) and 20120b of the act and these rules reflect the department's 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 299.4(3), R 299.28, and R 299.34(2).

(2) The rules in this part apply to interim response activities that are designed to meet cleanup criteria. References in this part to response activity 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 sections 20120a(2) and 20120b 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 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 (10) 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.

History: 2013 AACS.

**R 299.4 General requirements for application of cleanup criteria.**

Rule 4. (1) All cleanup criteria used in response activity 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 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. The 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 response activity 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 response activity 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.

History: 2013 AACS.

**R 299.6 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 6. (1) Except as provided in subrules (9), (10) and (11) of this rule, generic groundwater cleanup criteria for the residential and nonresidential categories shall be the values shown in table 1 of R 299.44. If a generic groundwater cleanup criterion is higher than the flammability and explosivity screening level shown in table 1 of R 299.44, then the person proposing or implementing response activity shall document whether additional response activity is required to protect against the acute hazard.

(2) Except as provided in subrules (9), (10), and (11) of this rule, generic soil cleanup criteria for the residential category shall be the values shown in table 2 of R 299.46. If soil concentrations are greater than $C_{sat}$, then the person proposing or implementing response activity shall evaluate whether additional response activity is required to control free-phase liquids or to protect against risks associated with free-phase liquids that are not accounted for in development of the generic criteria.

(3) Except as provided in subrules (9), (10), and (11) of this rule, generic soil cleanup criteria for the nonresidential category shall be the values shown in table 3 of R 299.48.

(4) The generic cleanup criteria shown in R 299.44, R 299.46, and R 299.48 and identified under subrule (12) of this rule may be used and known as risk-based screening levels for corrective actions required under part 213 of the act.

(5) Generic cleanup criteria under R 299.44, R 299.46, and R 299.48 are based on the target detection limit or background concentration 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 299.44, R 299.46, or R 299.48.

(6) If a hazardous substance imparts adverse aesthetic characteristics to groundwater at a concentration less than the health-based criterion for that hazardous substance, then the aesthetic-based criterion derived under R 299.9 is shown as the drinking water criterion in the table of generic cleanup criteria in R 299.44 and designated with a footnote.

(7) Except as provided in section 20120a(9) of the act, R 299.49(1)(l), and R 299.49(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 299.10, R 299.14, R 299.20, R 299.22, R 299.24, and R 299.26 are shown in table 4 of R 299.50.

(8) Toxicological and chemical-physical data in table 4 of R 299.50, 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 subrules (9) or (10) of this rule, except as provided in section 20120a(9) of the act, R 299.49(1)(l), and R 299.49(1)(o).

(9) For a substance that is not listed in the cleanup criteria tables in R 299.44, R 299.46, or R 299.48, 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.

(10) For a substance that is listed in the cleanup criteria tables in R 299.44, R 299.46, or R 299.48, 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 299.50 with a footnote "ID" or "NA," the department shall use best available information to calculate a cleanup criterion for the hazardous substance.

(11) 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, shall become the generic residential cleanup criterion under R 299.44, as provided in section 20120a(5) of the act.

(12) If a generic cleanup criterion is developed under subrule (9) or (10) of this rule, or modified under subrule (11) 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 required 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 administrative procedures act, 1969 PA 306, MCL 24.201 to 24.328.

History: 2013 AACS.

**R 299.8 Groundwater cleanup criteria generally.**

Rule 8. (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 299.9, R 299.10, or R 299.14, 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 299.9, R 299.10, or R 299.14 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.

History: 2013 AACS.

**R 299.9 Calculation of generic cleanup criteria for groundwater in aquifer based on adverse aesthetic impacts.**

Rule 9. (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.

History: 2013 AACS.

**R 299.10 Generic cleanup criteria for groundwater in aquifer based on ingestion of groundwater for drinking water.**

Rule 10. (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 299.9 and R 299.10 are not applicable if ingestion of the groundwater is, or as part of the response activity 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 299.34. 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 $(mg/kg\text{-}day)^{-1}$ |
| EF | (Exposure frequency) | = | 350 days/year (residential) |
| | | = | 245 days/year (nonresidential) |
| ED | (Exposure duration) | = | 30 years (residential) |
| | | = | 21 years (nonresidential) |
| $IR_{dw}$ | (Drinking water ingestion rate) | = | 2 liters/day (residential) |
| | | = | 1 liter/day (nonresidential) |

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)<br>7,665 days (21 years x 365 days/year - nonresidential) |
| 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)<br>245 days/year (nonresidential) |
| ED | (Exposure duration) | = | 30 years (residential)<br>21 years (nonresidential) |
| $IR_{dw}$ | (Drinking water ingestion rate) | = | 2 liters/day (residential)<br>1 liter/day (nonresidential) |

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

History: 2013 AACS.

**R 299.14 Generic cleanup criteria for groundwater based on hazardous substance vapors emanating from groundwater to indoor air.**

Rule 14. (1) Inhalation of hazardous substance vapors volatilizing from groundwater to indoor air shall be considered a reasonable and relevant exposure pathway for hazardous substances in groundwater that have a Henry's law constant greater than or equal to 0.00001 atm-$m^3$/mole.

(2) Except as provided in subrule (1) of this rule, if any of the following conditions exist, the generic criteria developed pursuant to this rule shall not apply and a site-specific evaluation of indoor inhalation risks shall be conducted:

(a) There is a structure present or planned to be constructed at the facility which does not have a concrete block or poured concrete floor and walls.

(b) The highest water table elevation of a contaminated saturated zone at the facility, considering seasonal variation, is within 3 meters of the ground surface.

(c) There is a sump present that is not completely isolated from the surrounding soil by its materials of construction, or there is other direct entry of contaminated groundwater into the basement.

(3) Groundwater cleanup criteria based on inhalation of hazardous substance vapors volatilizing from groundwater to indoor air shall be called groundwater volatilization indoor air inhalation criteria ("GVIIC"). The GVIIC is determined by the following series of calculations, except as provided in R 299.34(3):

EQUATION FOR CARCINOGENIC EFFECTS:

$$GVIIC = \frac{TR \times AT \times AIR}{IURF \times EF \times ED \times CR_{building}}$$

where,

| | | |
|---|---|---|
| GVIIC | (Groundwater volatilization indoor air inhalation criteria) | = chemical-specific, ug/L |
| TR | (Target risk level) | = $10^{-5}$ |
| AT | (Averaging time) | = 25,550 days (70 x 365) |
| AIR | (Adjusted inhalation rate) | = 1 (residential)<br>= 2 (nonresidential) |
| IURF | (Inhalation unit risk factor) | = chemical-specific, $(ug/m^3)^{-1}$ |
| EF | (Exposure frequency) | = 350 days/year (residential)<br>= 245 days/year (nonresidential) |
| ED | (Exposure duration) | = 30 years (residential)<br>= 21 years (nonresidential) |
| $CR_{building}$ | (Ratio of indoor air concentration to groundwater concentration) | = chemical-specific, $(ug/m^3)/(ug/L)$ |

EQUATION FOR NONCARCINOGENIC EFFECTS:

$$GVIIC = \frac{THQ \times AT}{(1/ITSL) \times EF \times ED \times CR_{building}}$$

where,

| | | |
|---|---|---|
| GVIIC | (Groundwater volatilization indoor air inhalation criteria) | = chemical-specific, ug/L |
| THQ | (Target hazard quotient) | = 1 |
| AT | (Averaging time) | = 10,950 days (residential)<br>= 7,665 days (nonresidential) |
| EF | (Exposure frequency) | = 350 days/year (residential)<br>= 245 days/year (nonresidential) |
| ED | (Exposure duration) | = 30 years (residential)<br>= 21 years (nonresidential) |
| ITSL | (Initial threshold screening level) | = chemical-specific, ug/$m^3$ |
| $CR_{building}$ | (Ratio of indoor air concentration to groundwater concentration) | = chemical-specific, (ug/$m^3$)/(ug/L) |

The ratio of the indoor air concentration to the groundwater concentration is calculated as:

$$CR_{building} = CR_{source}^{gw} \times \alpha$$

where,

| | | |
|---|---|---|
| $CR_{building}$ | (Ratio of indoor air concentration to groundwater concentration) | = chemical-specific, (ug/$m^3$)/(ug/L) |
| $\alpha$ | (Attenuation coefficient) | = chemical-specific, unitless |
| $CR_{source}^{gw}$ | (Ratio of soil vapor concentration to groundwater/source concentration) | = chemical-specific, (ug/$m^3$)/(ug/L) |

The soil vapor-phase concentration generated from a hazardous substance in groundwater is assumed to be in equilibrium with the aqueous phase concentration ($C_w$) of that substance as related by the dimensionless Henry's law constant (H') such that:

$$CR_{source}^{gw} = H' \text{ x } TAF \times C_w \times 10^3 \text{ L/m}^3$$

where,

| | | |
|---|---|---|
| $CR_{source}^{gw}$ | (Ratio of soil vapor concentration to groundwater/source concentration) | = chemical-specific, (ug/$m^3$)/(ug/L) |
| H' | (Dimensionless Henry's law constant, where H' = HLC x 41) | = chemical-specific, unitless |
| HLC | (Henry's law constant at 25 degrees | = chemical-specific, |

| | | |
|---|---|---|
| | Celsius) | (atm-$m^3$/mol) |
| TAF | (Temperature adjustment factor) | = 0.5, unitless |
| $C_w$ | (Uniform unit groundwater concentration) | = 1 ug/L |

The intrusion rate of hazardous substance vapors into buildings is predicted using an analytical solution which couples both diffusive and convective transport of vapors emanating from groundwater into enclosed spaces. An attenuation coefficient ($\alpha$) is calculated that is expressed as the ratio of building indoor air concentration to the vapor-phase concentration at the source. Values of $\alpha$ are calculated assuming infinite source conditions. For infinite source conditions $\alpha$ is written as follows:

$$\alpha = \frac{\left[\left[\frac{D_T^{eff} A_b}{Q_{building} L_T}\right] \times \exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right)\right]}{\left[\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right) + \left[\frac{D_T^{eff} A_b}{Q_{building} L_T}\right] + \left[\frac{D_T^{eff} A_b}{Q_{soil} L_T}\right]\left[\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right) - 1\right]\right]}$$

where,

| | | |
|---|---|---|
| $\alpha$ | (Attenuation coefficient) | = unitless |
| $D_T^{eff}$ | (Total effective diffusion coefficient) | = chemical-specific, $cm^2/s$ |
| $D^{crack}$ | (Effective diffusion coefficient through crack) | = $cm^2/s$, ($D^{crack} = D_v^{eff}$, see equation for $D_v^{eff}$ below) |
| $A_b$ | (Area of enclosed space below grade) | = 1.96E+6 $cm^2$ (residential)<br>= 3.83E+6 $cm^2$ (nonresidential) |
| $Q_{building}$ | (Building ventilation rate) | = 1.51E+5 $cm^3/s$ (residential)<br>= 5.04E+5 $cm^3/s$ (nonresidential) |
| $L_{crack}$ | (Building foundation thickness) | = 15 cm |
| $L_T$ | (Source-building separation distance) | = 115 cm (residential)<br>= 300 cm (nonresidential) |
| $Q_{soil}$ | (Volumetric flow rate of soil vapor into the building) | = 0.81 $cm^3/s$ (residential)<br>= 2.10 $cm^3/s$ (nonresidential) |
| $A_{crack}$ | (Total area of cracks below grade) | = 196 $cm^2$ (residential)<br>= 383 $cm^2$ (nonresidential) |
| exp(p) | (The base of the natural logarithm raised to power p) | = $e^p$ |

To characterize contaminant diffusion from groundwater into buildings a total effective diffusion coefficient ($D_T^{eff}$) is calculated to account for both liquid phase diffusion of the contaminant through the capillary fringe, ($D_{cf}^{eff}$), and vapor phase diffusion through the vadose zone, ($D_v^{eff}$). The calculation is as follows:

$$D_T^{eff} = \frac{L_T}{\left[\left(h_v + L_{crack}\right)/D_v^{eff}\right] + \left(h_{cf}/D_{cf}^{eff}\right)}$$

where,

| | | |
|---|---|---|
| $D_T^{eff}$ | (Total effective diffusion coefficient) | = chemical-specific, $cm^2/s$ |
| $L_T$ | (Source-building separation distance) | = 115 cm (residential)<br>= 300 cm (nonresidential) |
| $h_v$ | (Thickness of vadose zone below enclosed space floor) | = 75 cm (residential)<br>= 260 cm (nonresidential) |
| $L_{crack}$ | (Building foundation thickness) | = 15 cm |
| $D_v^{eff}$ | (Effective diffusion coefficient through vadose zone) | = chemical-specific, $cm^2/s$ |
| $h_{cf}$ | (Thickness of capillary fringe) | = 25 cm |
| $D_{cf}^{eff}$ | (Effective diffusion coefficient through capillary fringe) | = chemical-specific, $cm^2/s$ |

The effective diffusion coefficient calculation for the vadose zone ($D_v^{eff}$) is written as:

$$D_v^{eff} = \left[D_a\left(\theta_a^{3.33}/n^2\right)\right] + \left[\frac{D_w}{H' \times TAF}\left(\theta_w^{3.33}/n^2\right)\right]$$

where,

| | | |
|---|---|---|
| $D_v^{eff}$ | (Effective diffusion coefficient through vadose zone) | = chemical-specific, $cm^2/s$ |
| $D_a$ | (Diffusivity in air) | = chemical-specific, $cm^2/s$ |
| $\theta_a$ | (Soil air-filled porosity) | = 0.13 $cm^3/cm^3$ |
| N | (Total soil porosity) | = 0.43 $cm^3/cm^3$ |
| $D_w$ | (Diffusivity in water) | = chemical-specific, $cm^2/s$ |
| H’ | (Dimensionless Henry’s law constant, where H’ = HLC x 41) | = chemical-specific, unitless |
| HLC | (Henry’s law constant | = chemical-specific, (atm-$m^3$/mol) |
| TAF | (Temperature adjustment factor) | = 0.5 |
| $\theta_w$ | (Soil water-filled porosity) | = 0.3 $cm^3/cm^3$ |

The effective diffusion coefficient calculation for the capillary fringe ($D_{cf}^{eff}$) is written as:

$$D_{cf}^{eff} = \left[D_a\left(\theta_{a,cf}^{3.33}/n^2\right)\right] + \left[\frac{D_w}{H' \times TAF}\left(\theta_{w,cf}^{3.33}/n^2\right)\right]$$

where,

| | | |
|---|---|---|
| $D_{cf}^{eff}$ | (Effective diffusion coefficient through capillary fringe) | = chemical-specific, $cm^2/s$ |
| $D_a$ | (Diffusivity in air) | = chemical-specific, $cm^2/s$ |
| $\theta_{a,cf}$ | (Soil air-filled porosity in capillary fringe) | = 0.078 $cm^3/cm^3$ |
| $D_w$ | (Diffusivity in water) | = chemical-specific, $cm^2/s$ |
| H' | (Dimensionless Henry's law constant, where H' = HLC x 41) | = chemical-specific, unitless |
| HLC | (Henry's law constant) | = chemical-specific, ($atm\text{-}m^3/mol$) |
| TAF | (Temperature adjustment factor) | = 0.5 |
| $\theta_{w,cf}$ | (Soil water-filled porosity in capillary fringe) | = 0.352 $cm^3/cm^3$ |
| N | (Total soil porosity) | = 0.43 $cm^3/cm^3$ |

(4) Facility-specific measurements of the following parameters may be substituted individually for the generic assumptions and still allow the facility to satisfy the generic categorical criteria under section 20120a(1)(a) to (e) of the act:

(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.

(f) Vertical thickness of capillary fringe.

Facility-specific measurements shall be based on representative characterization. Documentation of all facility specific values shall be provided in the response activity plan, no further action report, or other response activity documentation.

(5) The department may approve methods to demonstrate compliance with criteria for the exposure pathway if those methods are more representative of in-situ conditions at the facility. Methods acceptable to the department may include, but are not limited to, use of representative soil gas concentrations.

History: 2013 AACS.

**R 299.18 Cleanup criteria for soil generally.**

Rule 18. (1) The generic cleanup criteria for soil at a facility shall be the most restrictive of the applicable criteria developed under R 299.20 to R 299.28, considering those pathways that are reasonable and relevant at the facility and the category being proposed or implemented.

(2) If a generic soil cleanup criterion developed under R 299.20 to R 299.26 is greater than the $C_{sat}$ concentration for that hazardous substance, then the generic criteria may not apply. A site specific risk evaluation may be conducted for each relevant exposure pathway where free-phase liquids or non-aqueous phase liquids (NAPL) are present.

History: 2013 AACS.

**R 299.20 Generic cleanup criteria for soil based on direct contact.**

Rule 20. (1) Cleanup criteria for soil based on direct contact shall be calculated for the generic residential category according to the following algorithms, except as provided in R 299.34(3):

EQUATION FOR CARCINOGENS:

$$DCC = \frac{TR \times AT \times CF}{SF \times [(EF_i \times IF \times AE_i) + (EF_d \times DF \times AE_d)]}$$

where,

| | | | |
|---|---|---|---|
| DCC | (Direct contact criterion) | = | chemical-specific, ug/kg or ppb |
| TR | (Target risk level) | = | $10^{-5}$ |
| AT | (Averaging time) | = | 25,550 days (70 years x 365 days/year) |
| CF | (Conversion factor) | = | 1E+9 ug/kg |
| SF | (Oral cancer slope factor) | = | chemical-specific $(mg/kg\text{-}day)^{-1}$ |
| $EF_i$ | (Ingestion exposure frequency) | = | 350 days/year |
| IF | (Age-adjusted soil ingestion factor) | = | 114 mg-year/kg-day* |
| $AE_i$ | (Ingestion absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |
| $EF_d$ | (Dermal exposure frequency) | = | 245 days/year |
| DF | (Age-adjusted soil dermal factor) | = | 353 mg-year/kg-day** |
| $AE_d$ | (Dermal absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |

EQUATIONS FOR NONCARCINOGENS:

$$DCC = \frac{THQ \times RfD \times AT \times CF \times RSC}{[(EF_i \times IF \times AE_i) + (EF_d \times DF \times AE_d)]}$$

where,

| | | | |
|---|---|---|---|
| DCC | (Direct contact criterion) | = | chemical-specific (ug/kg or ppb) |
| THQ | (Target hazard quotient) | = | 1 |
| RfD | (Oral reference dose) | = | chemical-specific mg/kg-/day |
| AT | (Averaging time) | = | 10,950 days (30 years x 365 days/year) |
| CF | (Conversion factor) | = | 1E+9 ug/kg |
| RSC | (Relative source contribution) | = | 1 |
| $EF_i$ | (Ingestion exposure frequency) | = | 350 days/year |
| IF | (Age-adjusted soil ingestion factor) | = | 114 mg-year/kg-day* |
| $AE_i$ | (Ingestion absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |
| $EF_d$ | (Dermal exposure frequency) | = | 245 days/year |
| DF | (Age-adjusted soil dermal factor) | = | 353 mg-year/kg-day** |
| $AE_d$ | (Dermal absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |

and,

$$*IF = \left(\frac{IR_{age\ 1-6} \times ED_{age\ 1-6}}{BW_{age\ 1-6}}\right) + \left(\frac{IR_{adult} \times ED_{adult}}{BW_{adult}}\right)$$

where,

| | | | |
|---|---|---|---|
| $IR_{soil/age\ 1-6}$ | (Soil ingestion rate) | = | 200 mg/day |
| $ED_{age\ 1-6}$ | (Exposure duration) | = | 6 years |
| $BW_{age\ 1-6}$ | (Body weight) | = | 15 kg |
| $IR_{adult}$ | (Soil ingestion rate) | = | 100 mg/day |
| $ED_{adult}$ | (Exposure duration) | = | 24 years |
| $BW_{adult}$ | (Body weight) | = | 70 kg |

and,

$$**DF = \left(\frac{SA_{age\ 1-6} \times EV \times AF_{age\ 1-6} \times ED_{age\ 1-6}}{BW_{age\ 1-6}}\right) + \left(\frac{SA_{adult} \times EV \times AF_{adult} \times ED_{adult}}{BW_{adult}}\right)$$

where,

| | | | |
|---|---|---|---|
| $SA_{age\ 1-6}$ | (Skin surface area) | = | 2,670 $cm^2$/dayevent |
| EV | (Event frequency) | = | 1 event/day |
| $AF_{age\ 1-6}$ | (Soil adherence factor) | = | 0.2 $mg/cm^2$ |
| $ED_{age\ 1-6}$ | (Exposure duration) | = | 6 years |
| $BW_{age\ 1-6}$ | (Body weight) | = | 15 kg |
| $SA_{adult}$ | (Skin surface area) | = | 5,800 $cm^2$/dayevent |
| $AF_{adult}$ | (Soil adherence factor) | = | 0.07 $mg/cm^2$ |
| $ED_{adult}$ | (Exposure duration) | = | 24 years |
| $BW_{adult}$ | (Body weight) | = | 70 kg |

(2) Cleanup criteria for soil based on direct contact shall be calculated for the generic nonresidential category according to the following algorithms, except as provided in R 299.34(3):

EQUATION FOR CARCINOGENS:

$$DCC = \frac{TR \times BW \times AT \times CF}{SF \times ED \times [(EF_i \times IR_s \times AE_i) + (EF_d \times SA \times EV \times AF \times AE_d)]}$$

where,

| | | | |
|---|---|---|---|
| DCC | (Direct contact criterion) | = | chemical-specific, ug/kg or ppb |
| TR | (Target risk level) | = | $10^{-5}$ |
| BW | (Body weight) | = | 70 kg |
| AT | (Averaging time) | = | 25,550 days (70 years x 365 days/year) |
| CF | (Conversion factor) | = | 1E+9 ug/kg |
| SF | (Oral cancer slope factor) | = | chemical-specific $(mg/kg\text{-}day)^{-1}$ |
| ED | (Exposure duration) | = | 21 years |
| $EF_i$ | (Ingestion exposure frequency) | = | 245 days/year |
| $IR_s$ | (Soil ingestion rate) | = | 100 mg/day (residential) |
| $AE_i$ | (Ingestion absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |
| $EF_d$ | (Dermal exposure frequency) | = | 160 days/year |
| SA | (Skin surface area) | = | 3,300 $cm^2$/day event |
| EV | (Event frequency) | = | 1 event/day |
| AF | (Soil adherence factor) | = | 0.2 $mg/cm^2$ (nonresidential) |
| $AE_d$ | (Dermal absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |

EQUATION FOR NONCARCINOGENS:

$$DCC = \frac{THQ \times RfD \times BW \times AT \times CF \times RSC}{ED \times [(EF_i \times IR_s \times AE_i) + (EF_d \times SA \times EV \times AF \times AE_d)]}$$

where,

| | | | |
|---|---|---|---|
| DCC | (Direct contact criterion) | = | chemical-specific, ug/kg or ppb |
| THQ | (Target hazard quotient) | = | 1 |
| RfD | (Oral reference dose) | = | chemical-specific, mg/kg-/day |
| BW | (Body weight) | = | 70 kg |
| AT | (Averaging time) | = | 7,665 days (21 years x 365 days/year) |
| CF | (Conversion factor) | = | 1E+9 ug/kg |
| RSC | (Relative source contribution) | = | 1 |
| ED | (Exposure duration) | = | 21 years |
| $EF_i$ | (Ingestion exposure frequency) | = | 245 days/year |
| $IR_s$ | (Soil ingestion rate) | = | 100 mg/day |
| $AE_i$ | (Ingestion absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |
| $EF_d$ | (Dermal exposure frequency) | = | 160 days/year |
| SA | (Skin surface area) | = | 3,300 $cm^2$/day event |
| EV | (Event frequency) | = | 1 event/day |
| AF | (Soil adherence factor) | = | 0.2 $mg/cm^2$ (nonresidential) |
| $AE_d$ | (Dermal absorption efficiency) | = | chemical-specific or default specified at R 299.20(3) |

(3) Absorption efficiencies used to calculate generic direct contact criteria are as follows:

(a) Chemical-specific data may be submitted to the department to support development of a new generic criterion under R 299.6(9) or (10) and shall be used in this rule if determined by the department to be the best available information.

(b) If chemical-specific data are not available, then the following default absorption efficiencies shall be used:

(i) $AE_i$ shall be 50% for organic hazardous substances which exhibit a log octanol water partitioning coefficient greater than 5 and a molecular weight greater than 200 grams per mole or which are not ionizing organic compounds, and 100% for all other organic hazardous substances.

(ii) $AE_i$ shall be 50% for inorganic hazardous substances.

(iii) $AE_d$ shall be assumed to be 10% for organic hazardous substances.

(iv) $AE_d$ shall be assumed to be 1% for inorganic hazardous substances.

(4) To demonstrate compliance with generic direct contact criteria, the criteria shall be applied without regard to the depth of contaminated soil.

History: 2013 AACS.

**R 299.22 Generic cleanup criteria for soil based on leaching of hazardous substances into groundwater.**

Rule 22. (1) To assure that soils do not pose a threat of aquifer contamination, the concentration of the hazardous substance in soil shall be below that which produces a concentration in leachate that is equal to the least restrictive of the applicable

groundwater criteria specified in subdivisions (a) to (c) of this subrule, or below a criterion based on the soil-water partitioning characteristics of a hazardous substance as provided in subrule (4) of this rule, whichever is higher. The selection of the following least restrictive value, and comparison to the soil-water partitioning value, shall be done separately for each pathway that is relevant at the facility:

(a) The groundwater criteria developed under R 299.8 to 299.14.

(b) The leachate concentration generated by background soil.

(c) The groundwater concentration allowed by target detection limit, if it is higher than a risk-based criterion that would otherwise be the most restrictive.

(2) Leachate testing is not required to demonstrate compliance with subrule (1) of this rule if the total concentration of a hazardous substance in soil does not exceed 20 times the lowest groundwater cleanup criterion that is applicable at the facility or does not exceed the soil-water partitioning value established under subrule (4) of this rule, whichever is higher.

(3) Leachate concentrations shall be determined by a method that best represents in-situ conditions. For the purposes of this rule, the following test methods are acceptable:

(a) The United States environmental protection agency's toxicity characteristic leaching procedure (TCLP) (revised as of July 1992) or the synthetic precipitation leachate procedure (SPLP) (revised as of September 1994) as set forth in SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, (revised to include Update III, June 13, 1997), published by the United States Environmental Protection Agency, which are adopted by reference in these rules and which are 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 $239.00 from the National Technical Information Service, United States Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161 (publication number PB97-156111GEI), or from the Department of Environmental Quality, Remediation and Redevelopment Division, 525 West Allegan, Lansing, Michigan 48909, at cost.

(b) Other methods accepted by the department to more accurately simulate conditions at the site than the test methods specified in subdivision (a) of this subrule.

(4) The department may, if adequate data are available, establish acceptable soil concentrations based on soil-water partitioning characteristics of a hazardous substance.

History: 2013 AACS.

## R 299.24 Generic cleanup criteria for soil based on indoor inhalation of hazardous substance vapors volatilized from soil.

Rule 24. (1) Indoor inhalation of hazardous substance vapors volatilizing to indoor air from soil shall be considered a reasonable and relevant exposure pathway only for hazardous substances that have a Henry's law constant greater than or equal to 0.00001 atm-$m^3$/mole.

(2) Except as provided in subrule (1) of this rule, if any of the following conditions exist, the generic criteria developed pursuant to this rule shall not apply and a site-specific evaluation of indoor inhalation risks shall be conducted:

(a) There is a structure present or planned to be constructed at the facility which does not have a concrete block or poured concrete floor and walls.

(b) There is a sump present that is not completely isolated from the surrounding soil by its materials of construction.

(3) Soil cleanup criteria based on indoor inhalation of volatile emissions from hazardous substances in soil shall be called soil volatilization indoor air inhalation criteria ("SVIIC"). The SVIIC is determined by the following series of calculations, except as provided in R 299.34(3):

EQUATION FOR CARCINOGENIC EFFECTS:

$$SVIIC = \frac{TR \times AT \text{ X } AIR}{IURF \times EF \times ED \times CR_{building}}$$

where,

| | | |
|---|---|---|
| SVIIC | (Soil volatilization indoor air inhalation criterion) | = chemical-specific, ug/kg |
| TR | (Target risk level) | = $10^{-5}$ |
| AT | (Averaging time) | = 25,550 days (70 years x 365 days/year) |
| AIR | (Adjusted inhalation rate) | = 1 (residential)<br>= 2 (nonresidential) |
| IURF | (Inhalation unit risk factor) | = chemical-specific, $(ug/m^3)^{-1}$ |
| EF | (Exposure frequency) | = 350 days/year (residential)<br>= 245 days/year (nonresidential) |
| ED | (Exposure duration) | = 30 years (residential)<br>= 21 years (nonresidential) |
| $CR_{building}$ | (Ratio of indoor air concentration to soil concentration) | = chemical-specific, $(ug/m^3)/(ug/kg)$ |

EQUATION FOR NONCARCINOGENIC EFFECTS:

$$SVIIC = \frac{THQ \times AT}{(1/ITSL) \times EF \times ED \times CR_{building}}$$

where,

| | | |
|---|---|---|
| SVIIC | (Soil volatilization indoor air inhalation criterion) | = chemical-specific, ug/kg |
| THQ | (Target hazard quotient) | = 1 |
| AT | (Averaging time) | = 10,950 days (residential)<br>= 7,665 days (nonresidential) |
| EF | (Exposure frequency) | = 350 days/year (residential)<br>= 245 days/year (nonresidential) |
| ED | (Exposure duration) | = 30 years (residential)<br>= 21 years (nonresidential) |
| ITSL | (Initial threshold screening level) | = chemical-specific, ug/$m^3$ |
| $CR_{building}$ | (Ratio of indoor air concentration to soil concentration) | = chemical-specific, (ug/$m^3$)/(ug/kg) |

The contaminant vapor concentration in the building indoor air is written as:

$$CR_{building} = CR_{source}^{soil} \times \alpha$$

where,

| | | |
|---|---|---|
| $CR_{building}$ | (Ratio of indoor air concentration to soil concentration) | = chemical-specific, (ug/$m^3$)/(ug/kg) |
| $\alpha$ | (Attenuation coefficient) | = chemical-specific, Unitless |
| $CR_{source}^{soil}$ | (Ratio of soil vapor concentration to soil/source concentration) | = chemical-specific, (ug/$m^3$)/(ug/kg) |

The vapor-phase contaminant concentration at the source for soil is written as:

$$CR_{source}^{soil} = \frac{H' \times TAF \times C_s \times \rho_b \times 10^{-3}\ kg/g \times 10^6\ cm^3/m^3}{\theta_w + (k_d \times \rho_b) + (H' \times TAF \times \theta_a)}$$

where,

| | | |
|---|---|---|
| $CR^{soil}_{source}$ | (Ratio of soil vapor concentration to soil/source concentration) | = chemical-specific, $(ug/m^3)/(ug/kg)$ |
| H' | (Dimensionless Henry's law constant, where H' = HLC x 41) | = chemical-specific, unitless |
| HLC | (Henry's law constant at 25 degrees Celsius) | = chemical-specific, $(atm\text{-}m^3/mol)$ |
| TAF | (Temperature adjustment factor) | = 0.5, unitless |
| $C_s$ | (Uniform concentration in soil) | = 1 ug/kg |
| $\rho_b$ | (Dry soil bulk density) | = 1.5 $g/cm^3$ |
| $\theta_w$ | (Soil water-filled porosity) | = 0.3 $cm^3/cm^3$ |
| $k_d$ | (Soil-water partition coefficient) | = chemical-specific, $cm^3/g$ (equivalent to L/kg) |
| | For organic compounds | = $K_{oc}$ $(cm^3/g)$ x $f_{oc}$ (g/g) |
| | For inorganic compounds | = chemical-specific, $cm^3/g$ |
| $K_{oc}$ | (Soil organic carbon partition coefficient) | = chemical-specific, $cm^3/g$ |
| $f_{oc}$ | (Fraction of organic carbon content of soil) | = 0.002 g/g (0.2%) |
| $\theta_a$ | (Soil air-filled porosity) | = 0.13 $cm^3/cm^3$ |

The intrusion rate of hazardous substance vapors into buildings is predicted using an analytical solution which couples both diffusive and convective transport of vapors emanating from subsurface soil into enclosed spaces. An attenuation coefficient ($\alpha$) is calculated that is expressed as the ratio of building indoor air concentration to the vapor-phase concentration at the source. Values of $\alpha$ are calculated assuming infinite source conditions. For infinite source conditions $\alpha$ is written as follows:

$$\alpha = \frac{\left[\left[\frac{D_v^{eff} A_b}{Q_{building} L_T}\right] \times \exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right)\right]}{\left[\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right) + \left[\frac{D_v^{eff} A_b}{Q_{building} L_T}\right] + \left[\frac{D_v^{eff} A_b}{Q_{soil} L_T}\right]\left[\exp\left(\frac{Q_{soil} L_{crack}}{D^{crack} A_{crack}}\right) - 1\right]\right]}$$

where,

| | | |
|---|---|---|
| $\alpha$ | (Attenuation coefficient) | = unitless |
| $D_v^{eff}$ | (Effective diffusion coefficient through vadose zone) | = chemical-specific, $cm^2/s$ |
| $D^{crack}$ | (Effective diffusion coefficient through crack) | = $cm^2/s$, ($D^{crack} = D_v^{eff}$, see equation for $D_v^{eff}$ below) |
| $A_b$ | (Area of enclosed space below grade) | = 1.96E+6 $cm^2$ (residential)<br>= 3.83E+6 $cm^2$ (nonresidential) |
| $Q_{building}$ | (Building ventilation rate) | = 1.51E+5 $cm^3/s$ (residential)<br>= 5.04E+5 $cm^3/s$ (nonresidential) |
| $L_{crack}$ | (Building foundation thickness) | = 15 cm |
| $L_T$ | (Source-building separation distance) | = 15 cm (All land use categories) |
| $Q_{soil}$ | (Volumetric flow rate of soil vapor into the building) | = 0.81 $cm^3/s$ (residential)<br>= 2.10 $cm^3/s$ (nonresidential) |
| $A_{crack}$ | (Total area of cracks below grade) | = 196 $cm^2$ (residential)<br>= 383 $cm^2$ (nonresidential) |
| exp(p) | (The base of the natural logarithm raised to power p) | = $e^p$ |

The effective diffusion coefficient calculation for the vadose zone ($D_v^{eff}$) is written as:

$$D_v^{eff} = \left[D_a\left(\theta_a^{3.33}/n^2\right)\right] + \left[\frac{D_w}{H' \times TAF}\left(\theta_w^{3.33}/n^2\right)\right]$$

where,

| | | |
|---|---|---|
| $D_v^{eff}$ | (Effective diffusion coefficient through vadose zone) | = chemical-specific, $cm^2/s$ |
| $D_a$ | (Diffusivity in air) | = chemical-specific, $cm^2/s$ |
| $\theta_a$ | (Soil air-filled porosity) | = 0.13 $cm^3/cm^3$ |
| n | (Total soil porosity) | = 0.43 $cm^3/cm^3$ |
| $D_w$ | (Diffusivity in water) | = chemical-specific, $cm^2/s$ |
| H' | (Dimensionless Henry's law constant, where H' = HLC x 41) | = chemical-specific, unitless |
| HLC | (Henry's law constant | = chemical-specific, (atm-$m^3$/mol) |
| $\theta_w$ | (Soil water-filled porosity) | = 0.3 $cm^3/cm^3$ |

(4) 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 the act:

(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.

Facility-specific measurements shall be based on representative characterization. Documentation of all facility specific values shall be provided in the response activity plan or no further action report.

(5) The department may approve methods to demonstrate compliance with criteria for this exposure pathway if those methods are more representative of in-situ conditions at the facility. Methods acceptable to the department may include, but are not limited to, evaluation of representative soil gas concentrations.

History: 2013 AACS.

**R 299.26 Generic cleanup criteria for soil based on inhalation of hazardous substances in ambient air.**

Rule 26. (1) Inhalation of hazardous substance emissions in ambient air from soil shall be considered a reasonable and relevant pathway for all facilities.

(2) Generic cleanup criteria for soil based on inhalation of volatile hazardous substance emission to ambient air shall be called volatile soil inhalation criteria (VSIC). Generic cleanup criteria for soil based on inhalation of particulate hazardous substance emission to ambient air shall be called particulate soil inhalation criteria (PSIC). The generic residential VSIC and PSIC are calculated as follows, except as provided in R 299.34(3):

EQUATIONS FOR CARCINOGENS:

$$VSIC = \frac{TR \times AT}{IURF \times EF \times ED \times (1/VF)}$$

where,

| | | | |
|---|---|---|---|
| VSIC | (Volatile soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| TR | (Target risk level) | = | $10^{-5}$ |
| AT | (Averaging time) | = | 25,550 days (70 years x 365 days/year) |
| IURF | (Inhalation unit risk factor) | = | chemical-specific $(ug/m^3)^{-1}$ |
| EF | (Exposure frequency) | = | 350 days/year |
| ED | (Exposure duration) | = | 30 years |
| VF | (Volatilization factor) | = | chemical-specific, $m^3/kg$ |

and,

$$PSIC = \frac{TR \times AT}{IURF \times EF \times ED \times (1/PEF)}$$

where,

| | | | |
|---|---|---|---|
| PSIC | (Particulate soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| TR | (Target risk level) | = | $10^{-5}$ |
| AT | (Averaging time) | = | 25,550 days (70 years x 365 days/year) |
| IURF | (Inhalation unit risk factor) | = | chemical-specific $(ug/m^3)^{-1}$ |
| EF | (Exposure frequency) | = | 350 days/year |
| ED | (Exposure duration) | = | 30 years |
| PEF | (Particulate emission factor) | = | chemical-specific, $m^3/kg$ |

EQUATIONS FOR NONCARCINOGENS:

$$VSIC = \frac{THQ \times AT}{EF \times ED \times (1/ITSL \times 1/VF)}$$

where,

| | | | |
|---|---|---|---|
| VSIC | (Volatile soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| THQ | (Target hazard quotient) | = | 1 |
| AT | (Averaging time) | = | 10,950 days (30 years x 365 days/year) |
| EF | (Exposure frequency) | = | 350 days/year |
| ED | (Exposure duration) | = | 30 years |
| ITSL | (Initial threshold screening level) | = | chemical-specific, $ug/m^3$ |
| VF | (Volatilization factor) | = | chemical-specific, $m^3/kg$ |

and,

$$PSIC = \frac{THQ \times AT}{EF \times ED \times (1/ITSL \times 1/PEF)}$$

where,

| | | | |
|---|---|---|---|
| PSIC | (Particulate soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| THQ | (Target hazard quotient) | = | 1 |
| AT | (Averaging time) | = | 10,950 days (30 years x 365 days/year) |
| EF | (Exposure frequency) | = | 350 days/year |
| ED | (Exposure duration) | = | 30 years |
| ITSL | (Initial threshold screening level) | = | chemical-specific, $ug/m^3$ |
| PEF | (Particulate emission factor) | = | chemical-specific, $m^3/kg$ |

(3) The soil to air volatilization factor (VF) relates the concentration of a contaminant in the soil to the concentration of volatilized contaminant in the ambient air. If the vertical extent of the contaminant source has not been characterized, then the VF shall be calculated based on the infinite equation presented in subdivision (a) of this subrule. If the vertical extent of the contaminant source has been adequately characterized throughout the facility, then the VF shall be calculated either by the finite source equation presented in subdivision (b) of this subrule or the mass balance equation presented in subdivision (c) of this subrule, whichever yields the highest VSIC.

(a) $$VF = (Q/C) \times (1/J_s^{ave})$$

$J_s^{ave}$, using the infinite source model shall be calculated as follows:

$$J_s^{ave} = \rho_b (4D_A/\pi t)^{1/2} \times 10^4 \, cm^2/m^2$$

and $D_A$ shall be calculated as:

$$D_A = \frac{[(\theta_a^{3.33} D_a (H' \times TAF) + \theta_w^{3.33} D_w)/n^2]}{\rho_b K_d + \theta_w + \theta_a (H' \times TAF)}$$

where,

| | | | |
|---|---|---|---|
| VF | (Volatilization factor) | = | chemical-specific, $m^3/kg$ |
| $J_s^{ave}$ | (Normalized average flux from soil) | = | chemical-specific, $g/m^2$-second |
| $D_A$ | (Apparent diffusivity) | = | chemical-specific, $cm^2$/second |
| Q/C | (Dispersion factor for 1/2 acre) | = | 82.33, $g/m^2$-second per $kg/m^3$ |
| T | (Exposure time) | = | seconds (ED x 3.1536E+7 seconds/yr) |
| $\theta_a$ | (Soil air-filled porosity) | = | 0.28 $L_{air}/L_{soil}$ |
| N | (Total soil porosity) | = | 0.43 $L_{pore}/L_{soil}$ |
| $\theta_w$ | (Soil water-filled porosity) | = | 0.15 $L_{water}/L_{soil}$ |
| $\rho_b$ | (Dry soil bulk density) | = | 1.5 $g/cm^3$ |
| $D_a$ | (Diffusivity in air) | = | chemical-specific, $cm^2$/second |
| $D_w$ | (Diffusivity in water) | = | chemical-specific, $cm^2$/second |
| H′ | (Dimensionless Henry's law constant, where H′ = HLC x 41) | = | chemical-specific, unitless |
| HLC | (Henry's law constant at $25^0$ C) | = | chemical-specific, atm-$m^3$/mol |
| TAF | (Temperature adjustment factor) | = | 0.5 |
| $K_d$ | (Soil-water partition coefficient) | = | chemical-specific, $cm^3/g$ |
| | For organic compounds | = | $K_{oc}$ ($cm^3/g$) x $f_{oc}$ (g/g) |
| | For inorganic compounds | = | chemical-specific, $cm^3/g$ |

| | | | |
|---|---|---|---|
| $K_{oc}$ | (Soil organic carbon partition coefficient) | = | chemical-specific, $cm^3/g$ |
| $f_{oc}$ | (Organic carbon content of soil) | = | 0.006 g/g (0.6%) |

(b) The simplified finite source model equation for VF shall be calculated as follows:

$$VF = (Q/C) \times (C_0 / \rho_b) \times (1 / J_s^{ave})$$

and,

$$J_s = C_o (D_A / \pi t)^{1/2} \left[1 - \exp\left(- d_s^2 / 4 D_A t\right)\right]$$

where,

| | | | |
|---|---|---|---|
| VF | (Volatilization factor) | = | chemical-specific, $m^3/kg$ |
| Q/C | (Dispersion factor for 1/2 acre) | = | 82.33, $g/m^2$-second per $kg/m^3$ |
| $C_0$ | (Uniform contaminant concentration at t=0) | = | 1.5 E-6 $g/cm^3$ |
| $\rho_b$ | (Dry soil bulk density) | = | 1.5 $g/cm^3$ |
| $J_s^{ave}$ | (Normalized average flux from soil) | = | chemical-specific, $g/m^2$-second |
| $J_s$ | (Instantaneous flux from soil at time t) | = | chemical-specific, $g/m^2$-second |
| $D_A$ | (Apparent diffusivity - see equation above) | = | chemical-specific, $cm^2$/second |
| T | (Time) | = | seconds |
| $d_s$ | (Thickness of source) | = | site-specific, meters |
| exp(p) | (The base of the natural logarithm raised to power (p)) | = | $e^p$ |

(c) Mass balance VF shall be calculated as follows:

$$VF = (Q/C) \times \frac{AT \times (3.15 \times 10^{-7} \text{ seconds/year})}{\rho_b \times d_s \times 10^6 \text{ g/Mg}}$$

where,

| | | | |
|---|---|---|---|
| VF | (Volatilization factor) | = | chemical-specific, $m^3/kg$ |
| Q/C | (Dispersion factor for 1/2 acre) | = | 82.33, $g/m^2$-second per $kg/m^3$ |
| AT | (Exposure period) | = | scenario-specific, years |
| $\rho_b$ | (Dry soil bulk density) | = | 1.5 $mg/m^3$ |
| $d_s$ | (Average source depth) | = | site-specific, meters |

(4) The particulate emission factor shall be calculated as follows:

$$PEF = (Q/C) \times 1/[(Ew \times (1 - V)) + Ev]$$

where,

| | | | |
|---|---|---|---|
| PEF | (Particulate emission factor) | = | chemical-specific, $m^3/kg$ |
| Q/C | (Dispersion factor for 1/2 acre) | = | 82.33, $g/m^2$-second per $kg/m^3$ |
| Ew | (Emission due to wind) | = | $g/m^2$ per second |
| Ev | (Emission due to vehicle traffic) | = | $g/m^2$ per second |
| V | (Vegetative cover) | = | 0.5 (50%), unitless |

(5) VSIC and PSIC for nonresidential facilities shall be calculated as follows, except as provided in R 299.34(3):

EQUATIONS FOR CARCINOGENS:

$$VSIC = \frac{TR \times AT \times AIR}{IURF \times EF \times ED \times (1/VF)}$$

where,

| | | | |
|---|---|---|---|
| VSIC | (Volatile soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| TR | (Target risk level) | = | $10^{-5}$ |
| AT | (Averaging time) | = | 25,550 days (70 years x 365 days/year) |
| AIR | (Adjusted inhalation rate) | = | (20 $m^3$/day)/(10 $m^3$/day) |
| IURF | (Inhalation unit risk factor) | = | chemical-specific $(ug/m^3)^{-1}$ |
| EF | (Exposure frequency) | = | 245 days/year |
| ED | (Exposure duration) | = | 21 years |
| VF | (Volatilization factor) | = | chemical-specific, $m^3/kg$ |

and,

$$PSIC = \frac{TR \times AT \times AIR}{IURF \times EF \times ED \times (1/PEF)}$$

where,

| | | | |
|---|---|---|---|
| PSIC | (Particulate soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| TR | (Target risk level) | = | $10^{-5}$ |
| AT | (Averaging time) | = | 25,550 days (70 years x 365 days/year) |
| AIR | (Adjusted inhalation rate) | = | (20 $m^3$/day)/(10 $m^3$/day) |
| IURF | (Inhalation unit risk factor) | = | chemical-specific $(ug/m^3)^{-1}$ |
| EF | (Exposure frequency) | = | 245 days/year |
| ED | (Exposure duration) | = | 21 years |
| PEF | (Particulate emission factor) | = | chemical-specific, $m^3$/kg |

EQUATIONS FOR NONCARCINOGENS:

$$VSIC = \frac{THQ \times AT}{EF \times ED \times (1/ITSL \times 1/VF)}$$

where,

| | | | |
|---|---|---|---|
| VSIC | (Volatile soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| THQ | (Target hazard quotient) | = | 1 |
| AT | (Averaging time) | = | 7,665 days (21 years x 365 days/year) |
| EF | (Exposure frequency) | = | 245 days/year |
| ED | (Exposure duration) | = | 21 years |
| ITSL | (Initial threshold screening level) | = | chemical-specific, ug/$m^3$ |
| VF | (Volatilization factor) | = | chemical-specific, $m^3$/kg |

and,

$$PSIC = \frac{THQ \times AT}{EF \times ED \times (1/ITSL \times 1/PEF)}$$

where,

| | | | |
|---|---|---|---|
| PSIC | (Particulate soil inhalation criterion) | = | chemical-specific, ug/kg or ppb |
| THQ | (Target hazard quotient) | = | 1 |
| AT | (Averaging time) | = | 7,665 days (21 years x 365 days/year) |
| EF | (Exposure frequency) | = | 245 days/year |
| ED | (Exposure duration) | = | 21 years |
| ITSL | (Initial threshold screening level) | = | chemical-specific, ug/$m^3$ |
| PEF | (Particulate emission factor) | = | chemical-specific, $m^3$/kg |

(6) The generic SIC are calculated for a source area size of 1/2 acre. The generic SIC shall be adjusted for other source area sizes by multiplying the generic SIC by the modifiers given in the following table. Where the actual source area size falls between the sizes given in this subrule, generic SIC shall be multiplied by the modifier for the next largest source size.

| **Modifiers** | | |
|---|---|---|
| Source Size ($ft^2$ or acres) | Q/C ($g/m^2$-s per $kg/m^3$) | Modifier |
| 400 $ft^2$ | 261.26 | 3.17 |
| 1000 $ft^2$ | 180.76 | 2.2 |
| 2000 $ft^2$ | 144.91 | 1.76 |
| ¼ acre | 94.56 | 1.15 |
| ½ acre | 82.33 | 1 |
| 1 acre | 71.74 | 0.87 |
| 2 acres | 63.51 | 0.77 |
| 5 acres | 54.62 | 0.66 |
| 10 acres | 49.13 | 0.6 |
| 32 acres | 41.55 | 0.5 |
| 100 acres | 35.66 | 0.43 |

(7) Facility-specific measurements of the following parameters may be substituted for the generic assumptions and still allow the facility to satisfy the categorical criteria in section 20120a(1)(a) to (e) of the act:

(a) Dry soil bulk density ($\rho_b$).

(b) Soil water-filled porosity ($\theta_w$).

(c) Soil air-filled porosity ($\theta_a$).

(d) Fraction of organic carbon in soil ($f_{oc}$).

(e) Emission due to wind (Ew).

(f) Dispersion factor (Q/C).

Facility-specific measurements shall be based on representative characterization. Documentation of all facility-specific values shall be provided in the response activity plan, no further action report, or other response activity documentation.

(8) A person who is implementing response activity may demonstrate compliance with the generic criteria developed under this rule through the collection and analysis of ambient air samples within the facility boundaries, if the hazardous substance concentration in surficial soil is representative of facility conditions.

History: 2013 AACS.

**R 299.28 Cleanup criteria for contaminated environmental media based on other injury which requires consideration.**

Rule 28. (1) To assure that hazardous substances in contaminated environmental media do not pose unacceptable risks not accounted for by other rules in this part, the concentration of a hazardous substance in a given environmental medium shall meet cleanup criteria based on sound scientific principles and determined by the department to be necessary to protect the public health, safety, and welfare and the environment from any of the following:

(a) Food chain contamination.

(b) Damage to soil or biota in the soil that impairs the use of such soil for agricultural purposes.

(c) Phytotoxicity.

(d) Physical hazards.

(e) Nonsystemic or acute toxicity.

(f) Injury that may result from the direct transport or runoff of hazardous substances in soil into surface water.

(g) Injury to the groundwater resource which may impair its use for other purposes that are determined by the department to be reasonable and relevant considerations at a facility.

(h) Other injury that requires consideration.

(2) The basis for and information used by the department to develop cleanup criteria under this rule shall be made available to the public upon request.

History: 2013 AACS.

**R 299.30 Surface water and surface water sediments; cleanup criteria.**

Rule 30. (1) Any response activity plan that addresses surface water or sediments associated with waters of the state shall include site-specific cleanup criteria established by the department on the basis of sound scientific principles and evaluation of bulk sediment chemistry, sediment toxicity, and benthic community populations. Criteria shall be established considering the need to eliminate or mitigate the following use impairments, as appropriate to the facility in question:

(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 or taste or odor problems.
(j) Beach closings.
(k) Degradation of aesthetics.
(l) Added costs to agriculture, 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.
(2) The basis for, and information used by the department to develop, cleanup criteria under this rule shall be made available to the public upon request.

History: 2013 AACS.

**R 299.34 Risk assessment and development of cleanup criteria for certain substances; special considerations.**

Rule 34. (1) All polychlorinated and polybrominated dibenzodioxins and dibenzofurans shall be considered as 1 hazardous substance, expressed as an equivalent concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin, based upon the relative potency and concentration of the congeners present at the facility.
(2) If 2 or more hazardous substances are present and known to result in toxicological interaction, then the interactive effects shall be considered in establishing levels that are protective of the public health, safety, and welfare and the environment.
(3) The department may calculate generic cleanup criteria for certain hazardous substances using exposure assumptions other than those shown in the algorithms in these rules if either of the following conditions is satisfied:
(a) A hazardous substance causes an adverse effect in a sensitive subpopulation that is not adequately protected or represented by the generic exposure assumptions.
(b) The toxicokinetics of a hazardous substance are not best represented by the average daily dose, when accounting for the most sensitive effect.

History: 2013 AACS.

**R 299.36 Calculation of criteria based on noncarcinogenic endpoints; minimum toxicity data.**

Rule 36. (1) The minimum data required to calculate a cleanup criterion for a noncarcinogen when the route of exposure is ingestion or dermal absorption shall be the reference dose that is determined on the basis of the best available information and considering the weight of evidence.
(2) The minimum data required to calculate a cleanup criterion for a noncarcinogen when the route of exposure is inhalation shall be the minimum data required for

calculation of an initial threshold screening level developed under part 55 of the act, and rules promulgated under part 55.

History: 2013 AACS.

**R 299.38 Determination of cancer slope factors for use in calculation of criteria based on carcinogenic endpoints.**

Rule 38. (1) A non-threshold mechanism of carcinogenesis shall be assumed unless biological data adequately demonstrate the existence of a threshold on a hazardous substance-specific basis.

(2) All appropriate human epidemiologic data, animal cancer bioassay data, and all other pertinent data shall be considered and a cancer slope factor developed if the weight of evidence for carcinogenicity is sufficient. Preferred data are those from studies which use the same route of exposure addressed by the criteria. However, in the absence of such data, route-to-route extrapolations may be conducted where appropriate, considering whether the critical effect is systemic and thus possible for each different route of exposure. The risk-associated dose shall be set at a level corresponding to an increased cancer risk of 1 in 100,000. If acceptable human epidemiologic data are available for a hazardous substance, then those data shall be used to derive the risk-associated dose. If acceptable human epidemiologic data are not available, then the risk-associated dose shall be derived from available animal bioassay data. Data from a species that is considered most biologically relevant to humans, that is, responds most like humans, is preferred where all other considerations regarding quality of data are equal. In the absence of data to distinguish the most relevant species, data from the most sensitive species tested, that is the species showing a carcinogenic effect at the lowest administered dose, shall generally be used.

(3) If animal bioassay data are used and a non-threshold mechanism of carcinogenicity is assumed, then the data shall be fitted to a linearized multistage model, for example, a Global ‘86 or equivalent computer model. Global ‘86 is the linearized multistage model that was derived by Howe, Crump, and Van Landingham (1986), which was prepared for the United States environmental protection agency under subcontract 2-251u-2745 to Research Triangle Institute, contract 68-01-6826, and which the United States environmental protection agency uses to determine cancer potencies. The upper-bound 95% confidence limit on risk, or the lower 95% confidence limit on dose, at the 1 in 100,000 risk level shall be used to calculate a risk-associated dose for individual hazardous substances. Other models, including modifications or variations of the linearized multistage model that are more appropriate to the available data, may be used where scientifically justified.

(4) If the duration of the study is significantly less than the natural lifespan of the test animal, then the slope factor may be adjusted on a case-by-case basis to compensate for latent tumors that were not expressed. The lifespan of a rat is assumed to be 104 weeks and the lifespan of a mouse is assumed to be 90 weeks. If the test animal is a rat and the study duration is less than 90 weeks, or if the test animal is a mouse and the study duration is less than 78 weeks, then the slope factor shall be multiplied by the following factor: the expected lifespan (L) divided by the study duration ($L_e$ ) raised to the third power, $[(L/L_e)^3]$.

(5) A species scaling factor shall be used to account for differences between test species and humans. It shall be assumed that scaling daily administered doses by body mass raised to the 3/4 power achieves equivalence in lifetime carcinogenic risk in different mammalian species. To derive a human slope factor from animal data, the default procedure shall be to multiply the animal slope factor by the ratio of human to animal body weights raised to the 1/4 power. However, if adequate pharmacokinetic and metabolism studies are available, then these data may be factored into the adjustment for species differences on a case-by-case basis.

(6) Additional adjustments shall be made to the data as appropriate. For some cancer data sets, it may be appropriate to combine incidences of multiple tumor types or combine benign and malignant tumors of the same histogenic origin. All doses shall be adjusted to give an average daily dose over the study duration. Adjustments shall be made to the tumor incidence for early mortality. Animals dying before the appearance of the first tumor within their dose group shall be removed from the data set. Before quantification of the dose response, a goodness-of-fit evaluation of the data shall be conducted.

(7) If human epidemiologic data, animal bioassay data, or other biological data indicate that a chemical causes cancer via a threshold mechanism, then the risk-associated dose may, on a case-by-case basis, be calculated using a method that assumes a threshold mechanism is operative.

(8) Inhalation unit risk factors shall be calculated in the same manner as cancer risk screening levels for inhalation risk under part 55 of the act.

History: 2013 AACS.

**R 299.40 Availability of information used by department to establish cleanup criteria; public review and comment on revised criteria.**

Rule 40. (1) The department shall make available to the public the detailed basis for calculation of any cleanup criterion established under these rules, including the references for original studies, papers, or other sources of information that were used or considered. Requests for information under this rule shall specify the hazardous substance and exposure pathways for which information is desired.

(2) Any proposed change to a criterion shall be published by the department and subject to review and comment as part of the rule-making process.

History: 2013 AACS.

## CLEANUP CRITERIA REQUIREMENTS FOR RESPONSE ACTIVITY

**R 299.44 Generic groundwater cleanup criteria.**

Rule 44. The generic groundwater cleanup criteria for all categories are shown in table 1.

# TABLE 1. GROUNDWATER: RESIDENTIAL AND NONRESIDENTIAL
# PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per liter (ug/L). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based or solubility value, whichever is lower.

| Hazardous Substance | Chemical Abstract Service Number | Residential Drinking Water Criteria | Nonresidential Drinking Water Criteria | Groundwater Surface Water Interface Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria | Water Solubility | Flammability and Explosivity Screening Level |
|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 83329 | 1,300 | 3,800 | 38 | 4,200 (S) | 4,200 (S) | 4,240 | ID |
| Acenaphthylene | 208968 | 52 | 150 | ID | 3,900 (S) | 3,900 (S) | 3,930 | ID |
| Acetaldehyde (I) | 75070 | 950 | 2,700 | 130 | 1.1E+6 | 2.3E+6 | 1.00E+9 | 8.9E+6 |
| Acetate | 71501 | 4,200 | 12,000 | (G) | ID | ID | ID | ID |
| Acetic acid | 64197 | 4,200 | 12,000 | (G) | NLV | NLV | 6.00E+9 | 1.0E+9 (D) |
| Acetone (I) | 67641 | 730 | 2,100 | 1,700 | 1.0E+9 (D,S) | 1.0E+9 (D,S) | 1.00E+9 | 1.5E+7 |
| Acetonitrile | 75058 | 140 | 400 | NA | 2.4E+7 | 4.5E+7 | 2.00E+8 | 2.1E+7 |
| Acetophenone | 98862 | 1,500 | 4,400 | ID | 6.1E+6 (S) | 6.1E+6 (S) | 6.10E+6 | ID |
| Acrolein (I) | 107028 | 120 | 330 | NA | 2,100 | 4,200 | 2.10E+8 | 6.7E+6 |
| Acrylamide | 79061 | 0.5 (A) | 0.5 (A) | 10 (X) | NLV | NLV | 2.20E+9 | NA |
| Acrylic acid | 79107 | 3,900 | 11,000 | NA | 1.2E+7 | 2.8E+7 | 1.00E+9 | 1.0E+9 (D) |
| Acrylonitrile (I) | 107131 | 2.6 | 11 | 2.0 (M); 1.2 | 34,000 | 1.9E+5 | 7.50E+7 | 6.4E+6 |
| Alachlor | 15972608 | 2.0 (A) | 2.0 (A) | 11 (X) | NLV | NLV | 1.83E+5 | ID |
| Aldicarb | 116063 | 3.0 (A) | 3.0 (A) | NA | NLV | NLV | 6.00E+6 | ID |
| Aldicarb sulfone | 1646884 | 2.0 (A) | 2.0 (A) | NA | NLV | NLV | 7.80E+6 | ID |
| Aldicarb sulfoxide | 1646873 | 4.0 (A) | 4.0 (A) | NA | NLV | NLV | 2.80E+7 | ID |
| Aldrin | 309002 | 0.098 | 0.4 | 0.01 (M); 8.7E-6 | 180 (S) | 180 (S) | 180 | ID |
| Aluminum (B) | 7429905 | 50 (V) | 50 (V) | NA | NLV | NLV | NA | ID |
| Ammonia | 7664417 | 10,000 (N) | 10,000 (N) | (CC) | 3.2E+6 | 7.1E+6 | 5.30E+8 | ID |
| t-Amyl methyl ether (TAME) | 994058 | 190 (E) | 190 (E) | NA | 2.6E+5 | 5.7E+5 | 2.64E+6 | NA |
| Aniline | 62533 | 53 | 220 | 4 | NLV | NLV | 3.60E+7 | NA |
| Anthracene | 120127 | 43 (S) | 43 (S) | ID | 43 (S) | 43 (S) | 43.4 | ID |
| Antimony | 7440360 | 6.0 (A) | 6.0 (A) | 130 (X) | NLV | NLV | NA | ID |
| Arsenic | 7440382 | 10 (A) | 10 (A) | 10 | NLV | NLV | NA | ID |
| Asbestos (BB) | 1332214 | 7.0E MFL (A) | 7.0E MFL (A) | NA | NLV | NLV | NA | NA |
| Atrazine | 1912249 | 3.0 (A) | 3.0 (A) | 7.3 | NLV | NLV | 70,000 | ID |
| Azobenzene | 103333 | 23 | 94 | ID | 6,400 (S) | 6,400 (S) | 6,400 | ID |
| Barium (B) | 7440393 | 2,000 (A) | 2,000 (A) | (G) | NLV | NLV | NA | ID |

# TABLE 1. GROUNDWATER: RESIDENTIAL AND NONRESIDENTIAL PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per liter (ug/L). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based or solubility value, whichever is lower.

| Hazardous Substance | Chemical Abstract Service Number | Residential Drinking Water Criteria | Nonresidential Drinking Water Criteria | Groundwater Surface Water Interface Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria | Water Solubility | Flammability and Explosivity Screening Level |
|---|---|---|---|---|---|---|---|---|
| Benzene (I) | 71432 | 5.0 (A) | 5.0 (A) | 200 (X) | 5,600 | 35,000 | 1.75E+6 | 68,000 |
| Benzidine | 92875 | 0.3 (M); 0.0037 | 0.3 (M); 0.015 | 0.3 (M); 0.073 | NLV | NLV | 5.20E+5 | ID |
| Benzo(a)anthracene (Q) | 56553 | 2.1 | 8.5 | ID | NLV | NLV | 9.4 | ID |
| Benzo(b)fluoranthene (Q) | 205992 | 1.5 (S,AA) | 1.5 (S,AA) | ID | ID | ID | 1.5 | ID |
| Benzo(k)fluoranthene (Q) | 207089 | 1.0 (M); 0.8 (S) | 1.0 (M); 0.8 (S) | NA | NLV | NLV | 0.8 | ID |
| Benzo(g,h,i)perylene | 191242 | 1.0 (M); 0.26 (S) | 1.0 (M); 0.26 (S) | ID | NLV | NLV | 0.26 | ID |
| Benzo(a)pyrene (Q) | 50328 | 5.0 (A) | 5.0 (A) | ID | NLV | NLV | 1.62 | ID |
| Benzoic acid | 65850 | 32,000 | 92,000 | NA | NLV | NLV | 3.50E+6 | ID |
| Benzyl alcohol | 100516 | 10,000 | 29,000 | NA | NLV | NLV | 4.40E+7 | ID |
| Benzyl chloride | 100447 | 7.7 | 32 | NA | 12,000 | 77,000 | 4.90E+5 | NA |
| Beryllium | 7440417 | 4.0 (A) | 4.0 (A) | (G) | NLV | NLV | NA | ID |
| bis(2-Chloroethoxy)ethane | 112265 | ID | ID | ID | NLV | NLV | 1.89E+7 | ID |
| bis(2-Chloroethyl)ether (I) | 111444 | 2 | 8.3 | 1.0 (M); 0.79 | 38,000 | 2.1E+5 | 1.72E+7 | 1.7E+7 (S) |
| bis(2-Ethylhexyl)phthalate | 117817 | 6.0 (A) | 6.0 (A) | 25 | NLV | NLV | 340 | NA |
| Boron (B) | 7440428 | 500 (F) | 500 (F) | 7,200 (X) | NLV | NLV | NA | ID |
| Bromate | 15541454 | 10 (A) | 10 (A) | 40 (X) | NLV | NLV | 38,000 | ID |
| Bromobenzene (I) | 108861 | 18 | 50 | NA | 1.8E+5 | 3.9E+5 | 4.13E+5 | ID |
| Bromodichloromethane | 75274 | 80 (A,W) | 80 (A,W) | ID | 4,800 | 37,000 | 6.74E+6 | ID |
| Bromoform | 75252 | 80 (A,W) | 80 (A,W) | ID | 4.7E+5 | 3.1E+6 (S) | 3.10E+6 | ID |
| Bromomethane | 74839 | 10 | 29 | 35 | 4,000 | 9,000 | 1.45E+7 | ID |
| n-Butanol (I) | 71363 | 950 | 2,700 | 9,800 (X) | NLV | NLV | 7.40E+7 | 4.7E+7 |
| 2-Butanone (MEK) (I) | 78933 | 13,000 | 38,000 | 2,200 | 2.4E+8 (S) | 2.4E+8 (S) | 2.40E+8 | ID |
| n-Butyl acetate | 123864 | 550 | 1,600 | NA | 6.7E+6 (S) | 6.7E+6 (S) | 6.70E+6 | 2.5E+6 |
| t-Butyl alcohol | 75650 | 3,900 | 11,000 | NA | 1.0E+9 (D,S) | 1.0E+9 (D,S) | 1.00E+9 | 6.1E+7 |
| Butyl benzyl phthalate | 85687 | 1,200 | 2,700 (S) | 67 (X) | NLV | NLV | 2,690 | ID |
| n-Butylbenzene | 104518 | 80 | 230 | ID | ID | ID | NA | ID |
| sec-Butylbenzene | 135988 | 80 | 230 | ID | ID | ID | NA | ID |
| t-Butylbenzene (I) | 98066 | 80 | 230 | ID | ID | ID | NA | ID |

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|---|---|---|---|---|---|---|---|---|
| Cadmium (B) | 7440439 | 5.0 (A) | 5.0 (A) | (G,X) | NLV | NLV | NA | ID |
| Camphene (I) | 79925 | ID | ID | NA | 440 | 1,000 | 33,400 | ID |
| Caprolactam | 105602 | 5,800 | 17,000 | NA | NLV | NLV | 5.25E+9 | NA |
| Carbaryl | 63252 | 700 | 2,000 | NA | ID | ID | 1.26E+5 | ID |
| Carbazole | 86748 | 85 | 350 | 10 (M); 4.0 | NLV | NLV | 7,480 | ID |
| Carbofuran | 1563662 | 40 (A) | 40 (A) | NA | NLV | NLV | 7.00E+5 | ID |
| Carbon disulfide (I,R) | 75150 | 800 | 2,300 | ID | 2.5E+5 | 5.5E+5 | 1.19E+6 | 13,000 |
| Carbon tetrachloride | 56235 | 5.0 (A) | 5.0 (A) | 45 (X) | 370 | 2,400 | 7.93E+5 | ID |
| Chlordane (J) | 57749 | 2.0 (A) | 2.0 (A) | 2.0 (M); 0.00025 | 56 (S) | 56 (S) | 56 | ID |
| Chloride | 16887006 | 2.5E+5 (E) | 2.5E+5 (E) | (FF) | NLV | NLV | NA | ID |
| Chlorobenzene (I) | 108907 | 100 (A) | 100 (A) | 25 | 2.1E+5 | 4.7E+5 (S) | 4.72E+5 | 1.6E+5 |
| p-Chlorobenzene sulfonic acid | 98668 | 7,300 | 21,000 | ID | ID | ID | NA | ID |
| 1-Chloro-1,1-difluoroethane | 75683 | 15,000 | 44,000 | NA | 3.9E+6 (S) | 3.9E+6 (S) | 3.90E+6 | NA |
| Chloroethane | 75003 | 430 | 1,700 | 1,100 (X) | 5.7E+6 (S) | 5.7E+6 (S) | 5.74E+6 | 1.1E+5 |
| 2-Chloroethyl vinyl ether | 110758 | ID | ID | NA | ID | ID | 1.50E+7 | ID |
| Chloroform | 67663 | 80 (A,W) | 80 (A,W) | 350 | 28,000 | 1.8E+5 | 7.92E+6 | ID |
| Chloromethane (I) | 74873 | 260 | 1,100 | ID | 8,600 | 45,000 | 6.34E+6 | 36,000 |
| 4-Chloro-3-methylphenol | 59507 | 150 | 420 | 7.4 | NLV | NLV | 3.90E+6 | ID |
| beta-Chloronaphthalene | 91587 | 1,800 | 5,200 | NA | ID | ID | 6,740 | ID |
| 2-Chlorophenol | 95578 | 45 | 130 | 18 | 4.9E+5 | 1.1E+6 | 2.20E+7 | ID |
| o-Chlorotoluene (I) | 95498 | 150 | 420 | ID | 2.2E+5 | 3.7E+5 (S) | 3.73E+5 | ID |
| Chlorpyrifos | 2921882 | 22 | 63 | 2.0 (M); 0.002 | 2.9 | 6.6 | 1,120 | ID |
| Chromium (III) (B,H) | 16065831 | 100 (A) | 100 (A) | (G,X) | NLV | NLV | NA | ID |
| Chromium (VI) | 18540299 | 100 (A) | 100 (A) | 11 | NLV | NLV | NA | ID |
| Chrysene (Q) | 218019 | 1.6 (S) | 1.6 (S) | ID | ID | ID | 1.6 | ID |
| Cobalt | 7440484 | 40 | 100 | 100 | NLV | NLV | NA | ID |
| Copper (B) | 7440508 | 1,000 (E) | 1,000 (E) | (G) | NLV | NLV | NA | ID |
| Cyanazine | 21725462 | 2.3 | 9.4 | 56 (X) | NLV | NLV | 1.70E+5 | ID |

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|---|---|---|---|---|---|---|---|---|
| Cyanide (P,R) | 57125 | 200 (A) | 200 (A) | 5.2 | NLV | NLV | NA | ID |
| Cyclohexanone | 108941 | 33,000 | 94,000 | NA | 1,500 | 3,300 | 2.30E+7 | NA |
| Dacthal | 1861321 | 73 | 210 | NA | NLV | NLV | 500 | ID |
| Dalapon | 75990 | 200 (A) | 200 (A) | NA | NLV | NLV | 5.02E+8 | ID |
| 4-4'-DDD | 72548 | 9.1 | 37 | NA | NLV | NLV | 90 | ID |
| 4-4'-DDE | 72559 | 4.3 | 15 | NA | NLV | NLV | 120 | ID |
| 4-4'-DDT | 50293 | 3.6 | 10 | 0.02 (M); 1.1E-5 | NLV | NLV | 25 | NA |
| Decabromodiphenyl ether | 1163195 | 30 (S) | 30 (S) | NA | 30 (S) | 30 (S) | 30 | ID |
| Di-n-butyl phthalate | 84742 | 880 | 2,500 | 9.7 | NLV | NLV | 11,200 | NA |
| Di(2-ethylhexyl) adipate | 103231 | 400 (A) | 400 (A) | ID | NLV | NLV | 471 | ID |
| Di-n-octyl phthalate | 117840 | 130 | 380 | ID | NLV | NLV | 3,000 | ID |
| Diacetone alcohol (I) | 123422 | ID | ID | NA | NLV | NLV | 1.00E+9 | 1.0E+9 (S) |
| Diazinon | 333415 | 1.3 | 3.8 | 1.0 (M); 0.004 | NLV | NLV | 68,800 | NA |
| Dibenzo(a,h)anthracene (Q) | 53703 | 2.0 (M); 0.21 | 2.0 (M); 0.85 | ID | NLV | NLV | 2.49 | ID |
| Dibenzofuran | 132649 | ID | ID | 4 | 10,000 (S) | 10,000 (S) | 10,000 | ID |
| Dibromochloromethane | 124481 | 80 (A,W) | 80 (A,W) | ID | 14,000 | 1.1E+5 | 2.60E+6 | ID |
| Dibromochloropropane | 96128 | 0.2 (A) | 0.2 (A) | ID | 220 | 1,200 (S) | 1,230 | NA |
| Dibromomethane | 74953 | 80 | 230 | NA | ID | ID | 1.10E+7 | ID |
| Dicamba | 1918009 | 220 | 630 | NA | NLV | NLV | 4.50E+6 | ID |
| 1,2-Dichlorobenzene | 95501 | 600 (A) | 600 (A) | 13 | 1.6E+5 (S) | 1.6E+5 (S) | 1.56E+5 | NA |
| 1,3-Dichlorobenzene | 541731 | 6.6 | 19 | 28 | 18,000 | 41,000 | 1.11E+5 | ID |
| 1,4-Dichlorobenzene | 106467 | 75 (A) | 75 (A) | 17 | 16,000 | 74,000 (S) | 73,800 | NA |
| 3,3'-Dichlorobenzidine | 91941 | 1.1 | 4.3 | 0.3 (M); 0.2 | NLV | NLV | 3,110 | ID |
| Dichlorodifluoromethane | 75718 | 1,700 | 4,800 | ID | 2.2E+5 | 3.0E+5 (S) | 3.00E+5 | ID |
| 1,1-Dichloroethane | 75343 | 880 | 2,500 | 740 | 1.0E+6 | 2.3E+6 | 5.06E+6 | 3.8E+5 |
| 1,2-Dichloroethane (I) | 107062 | 5.0 (A) | 5.0 (A) | 360 (X) | 9,600 | 59,000 | 8.52E+6 | 2.5E+6 |
| 1,1-Dichloroethylene (I) | 75354 | 7.0 (A) | 7.0 (A) | 130 | 200 | 1,300 | 2.25E+6 | 97,000 |
| cis-1,2-Dichloroethylene | 156592 | 70 (A) | 70 (A) | 620 | 93,000 | 2.1E+5 | 3.50E+6 | 5.3E+5 |

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|---|---|---|---|---|---|---|---|---|
| trans-1,2-Dichloroethylene | 156605 | 100 (A) | 100 (A) | 1,500 (X) | 85,000 | 2.0E+5 | 6.30E+6 | 2.3E+5 |
| 2,6-Dichloro-4-nitroaniline | 99309 | 2,200 | 6,300 | NA | NLV | NLV | 7,000 | ID |
| 2,4-Dichlorophenol | 120832 | 73 | 210 | 11 | NLV | NLV | 4.50E+6 | ID |
| 2,4-Dichlorophenoxyacetic acid | 94757 | 70 (A) | 70 (A) | 220 | NLV | NLV | 6.80E+5 | ID |
| 1,2-Dichloropropane (I) | 78875 | 5.0 (A) | 5.0 (A) | 230 (X) | 16,000 | 36,000 | 2.80E+6 | 5.5E+5 |
| 1,3-Dichloropropene | 542756 | 8.5 | 35 | 9.0 (X) | 3,900 | 26,000 | 2.80E+6 | 1.3E+5 |
| Dichlorovos | 62737 | 1.6 | 6.7 | NA | NLV | NLV | 1.60E+7 | NA |
| Dicyclohexyl phthalate | 84617 | ID | ID | NA | ID | ID | 4,000 | ID |
| Dieldrin | 60571 | 0.11 | 0.43 | 0.02 (M); 6.5E-6 | 200 (S) | 200 (S) | 195 | ID |
| Diethyl ether | 60297 | 10 (E) | 10 (E) | ID | 6.1E+7 (S) | 6.1E+7 (S) | 6.10E+7 | 6.5E+5 |
| Diethyl phthalate | 84662 | 5,500 | 16,000 | 110 | NLV | NLV | 1.08E+6 | NA |
| Diethylene glycol monobutyl ether | 112345 | 88 | 250 | NA | NLV | NLV | 1.00E+9 | ID |
| Diisopropyl ether | 108203 | 30 | 86 | ID | 8,000 (S) | 8,000 (S) | 8,041 | 8,000 (S) |
| Diisopropylamine (I) | 108189 | 5.6 | 16 | NA | 2.1E+7 | 3.7E+7 (S) | 3.69E+7 | 4.6E+6 |
| Dimethyl phthalate | 131113 | 73,000 | 2.10E+05 | NA | NLV | NLV | 4.19E+6 | NA |
| N,N-Dimethylacetamide | 127195 | 180 | 520 | 4,100 (X) | NLV | NLV | 1.00E+9 | NA |
| N,N-Dimethylaniline | 121697 | 16 | 46 | NA | 2.4E+5 | 1.3E+6 (S) | 1.27E+6 | NA |
| Dimethylformamide (I) | 68122 | 700 | 2,000 | NA | NLV | NLV | 1.00E+9 | ID |
| 2,4-Dimethylphenol | 105679 | 370 | 1,000 | 380 | NLV | NLV | 7.87E+6 | ID |
| 2,6-Dimethylphenol | 576261 | 4.4 | 13 | NA | NLV | NLV | 6.14E+6 | ID |
| 3,4-Dimethylphenol | 95658 | 10 | 29 | 25 | NLV | NLV | 4.93E+6 | ID |
| Dimethylsulfoxide | 67685 | 2.2E+5 | 6.3E+5 | 1.9E+5 | NLV | NLV | 1.66E+8 | ID |
| 2,4-Dinitrotoluene | 121142 | 7.7 | 32 | NA | NLV | NLV | 2.70E+5 | ID |
| Dinoseb | 88857 | 7.0 (A) | 7.0 (A) | 1.0 (M); 0.48 | NLV | NLV | 52,000 | ID |
| 1,4-Dioxane (I) | 123911 | 7.2 (II) | 350 | 2,800 (X) | NLV | NLV | 9.00E+8 | 1.4E+8 |
| Diquat | 85007 | 20 (A) | 20 (A) | 20 (M); 6.0 | NLV | NLV | 7.00E+5 | ID |
| Dissolved oxygen (DO) | NA | ID | ID | (EE) | ID | ID | NA | NA |
| Diuron | 330541 | 31 | 90 | NA | NLV | NLV | 37,300 | ID |

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|---|---|---|---|---|---|---|---|---|
| Endosulfan (J) | 115297 | 44 | 130 | 0.03 (M); 0.029 | ID | ID | 510 | ID |
| Endothall | 145733 | 100 (A) | 100 (A) | NA | NLV | NLV | 1.00E+8 | ID |
| Endrin | 72208 | 2.0 (A) | 2.0 (A) | ID | NLV | NLV | 250 | ID |
| Epichlorohydrin (I) | 106898 | 5.0 (M); 2.0 (A) | 5.0 (M); 2.0 (A) | NA | 3.2E+5 | 6.3E+5 | 6.60E+7 | 4.7E+7 |
| Ethanol (I) | 64175 | 1.9E+6 | 3.8E+6 | ID | NLV | NLV | 1.00E+9 | 9.7E+7 |
| Ethyl acetate (I) | 141786 | 6,600 | 19,000 | NA | 6.4E+7 (S) | 6.4E+7 (S) | 6.40E+7 | 4.2E+6 |
| Ethyl-tert-butyl ether (ETBE) | 637923 | 49 (E) | 49 (E) | ID | 2.9E+6 | 5.6E+6 (S) | 5.63E+6 | ID |
| Ethylbenzene (I) | 100414 | 74 (E) | 74 (E) | 18 | 1.1E+5 | 1.7E+5 (S) | 1.69E+5 | 43,000 |
| Ethylene dibromide | 106934 | 0.05 (A) | 0.05 (A) | 5.7 (X) | 2,400 | 15,000 | 4.20E+6 | ID |
| Ethylene glycol | 107211 | 15,000 | 42,000 | 1.9E+5 (X) | NLV | NLV | 1.00E+9 | NA |
| Ethylene glycol monobutyl ether | 111762 | 3,700 | 10,000 | NA | 2.9E+6 | 6.5E+6 | 2.24E+8 | NA |
| Fluoranthene | 206440 | 210 (S) | 210 (S) | 1.6 | 210 (S) | 210 (S) | 206 | ID |
| Fluorene | 86737 | 880 | 2,000 (S) | 12 | 2,000 (S) | 2,000 (S) | 1,980 | ID |
| Fluorine (soluble fluoride) (B) | 7782414 | 2,000 (E) | 2,000 (E) | ID | NLV | NLV | NA | ID |
| Formaldehyde | 50000 | 1,300 | 3,800 | 120 | 63,000 | 3.6E+5 | 5.50E+8 | ID |
| Formic acid (I,U) | 64186 | 10,000 | 29,000 | ID | 7.7E+6 | 1.5E+7 | 1.00E+9 | 1.0E+9 (D) |
| 1-Formylpiperidine | 2591868 | 80 | 230 | NA | ID | ID | NA | ID |
| Gentian violet | 548629 | 15 | 63 | NA | NLV | NLV | 1.00E+6 | ID |
| Glyphosate | 1071836 | 700 (A) | 700 (A) | NA | NLV | NLV | 1.16E+7 | ID |
| Heptachlor | 76448 | 0.4 (A) | 0.4 (A) | 0.01 (M); 0.0018 | 180 (S) | 180 (S) | 180 | ID |
| Heptachlor epoxide | 1024573 | 0.2 (A) | 0.2 (A) | ID | NLV | NLV | 200 | ID |
| n-Heptane | 142825 | 2,700 (S) | 2,700 (S) | NA | 2,700 (S) | 2,700 (S) | 2,690 | 200 |
| Hexabromobenzene | 87821 | 0.17 (S); 20 | 0.17 (S); 58 | ID | ID | ID | 0.17 | ID |
| Hexachlorobenzene (C-66) | 118741 | 1.0 (A) | 1.0 (A) | 0.2 (M); 0.0003 | 440 | 3,000 | 6,200 | ID |
| Hexachlorobutadiene (C-46) | 87683 | 15 | 42 | 0.053 | 1,600 | 3,200 (S) | 3,230 | ID |
| alpha-Hexachlorocyclohexane | 319846 | 0.43 | 1.7 | ID | 2,000 (S) | 2,000 (S) | 2,000 | ID |
| beta-Hexachlorocyclohexane | 319857 | 0.88 | 3.6 | ID | NLV | NLV | 240 | ID |
| Hexachlorocyclopentadiene (C-56) | 77474 | 50 (A) | 50 (A) | ID | 130 | 420 | 1,800 | ID |

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|---|---|---|---|---|---|---|---|---|
| Hexachloroethane | 67721 | 7.3 | 21 | 6.7 (X) | 27,000 | 50,000 (S) | 50,000 | ID |
| n-Hexane | 110543 | 3,000 | 8,600 | NA | 12,000 (S) | 12,000 (S) | 12,000 | 12,000 (S) |
| 2-Hexanone | 591786 | 1,000 | 2,900 | ID | 4.2E+6 | 8.7E+6 | 1.60E+7 | NA |
| Indeno(1,2,3-cd)pyrene (Q) | 193395 | 2.0 (M); 0.022 (S) | 2.0 (M); 0.022 (S) | ID | NLV | NLV | 0.022 | ID |
| Iron (B) | 7439896 | 300 (E) | 300 (E) | NA | NLV | NLV | NA | ID |
| Isobutyl alcohol (I) | 78831 | 2,300 | 6,700 | NA | 7.6E+7 (S) | 7.6E+7 (S) | 7.60E+7 | ID |
| Isophorone | 78591 | 770 | 3,100 | 1,300 (X) | NLV | NLV | 1.20E+7 | ID |
| Isopropyl alcohol (I) | 67630 | 470 | 1,300 | 57,000 (X) | NLV | NLV | 1.00E+9 | 6.0E+7 |
| Isopropyl benzene | 98828 | 800 | 2,300 | 28 | 56,000 (S) | 56,000 (S) | 56,000 | 29,000 |
| Lead (B) | 7439921 | 4.0 (L) | 4.0 (L) | (G,X) | NLV | NLV | NA | ID |
| Lindane | 58899 | 0.2 (A) | 0.2 (A) | 0.03 (M); 0.026 | ID | ID | 6,800 | ID |
| Lithium (B) | 7439932 | 170 | 350 | 440 | NLV | NLV | NA | ID |
| Magnesium (B) | 7439954 | 4.0E+5 | 1.1E+6 | NA | NLV | NLV | NA | ID |
| Manganese (B) | 7439965 | 50 (E) | 50 (E) | (G,X) | NLV | NLV | NA | ID |
| Mercury (Total) (B,Z) | Varies | 2.0 (A) | 2.0 (A) | 0.0013 | 56 (S) | 56 (S) | 56 | ID |
| Methane | 74828 | ID | ID | NA | (K) | (K) | NA | (AA) |
| Methanol | 67561 | 3,700 | 10,000 | 5.9E+5 (X) | 2.9E+7 (S) | 2.9E+7 (S) | 2.90E+7 | 4.5E+6 |
| Methoxychlor | 72435 | 40 (A) | 40 (A) | NA | ID | ID | 45 | ID |
| 2-Methoxyethanol (I) | 109864 | 7.3 | 21 | NA | NLV | NLV | 1.00E+9 | ID |
| 2-Methyl-4-chlorophenoxyacetic acid | 94746 | 7.3 | 21 | NA | NLV | NLV | 9.24E+5 | ID |
| 2-Methyl-4,6-dinitrophenol | 534521 | 20 (M); 2.6 | 20 (M); 7.3 | NA | NLV | NLV | 2.00E+5 | ID |
| N-Methyl-morpholine (I) | 109024 | 20 | 56 | NA | NLV | NLV | 1.00E+9 | ID |
| Methyl parathion | 298000 | 1.8 | 5.2 | NA | NLV | NLV | 50,000 | ID |
| 4-Methyl-2-pentanone (MIBK) (I) | 108101 | 1,800 | 5,200 | ID | 2.0E+7 (S) | 2.0E+7 (S) | 2.00E+7 | ID |
| Methyl-tert-butyl ether (MTBE) | 1634044 | 40 (E) | 40 (E) | 7,100 (X) | 4.7E+7 (S) | 4.7E+7 (S) | 4.68E+7 | ID |
| Methylcyclopentane (I) | 96377 | ID | ID | NA | 22,000 | 49,000 | 73,890 | ID |
| 4,4'-Methylene-bis-2- chloroaniline | 101144 | 1.1 | 4.5 | NA | NLV | NLV | 14,000 | ID |
| Methylene chloride | 75092 | 5.0 (A) | 5.0 (A) | 1,500 (X) | 2.2E+5 | 1.4E+6 | 1.70E+7 | ID |

# TABLE 1. GROUNDWATER: RESIDENTIAL AND NONRESIDENTIAL PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;

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| Hazardous Substance | Chemical Abstract Service Number | Residential Drinking Water Criteria | Nonresidential Drinking Water Criteria | Groundwater Surface Water Interface Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria | Water Solubility | Flammability and Explosivity Screening Level |
|---|---|---|---|---|---|---|---|---|
| 2-Methylnaphthalene | 91576 | 260 | 750 | 19 | 25,000 (S) | 25,000 (S) | 24,600 | ID |
| Methylphenols (J) | 1319773 | 370 | 1,000 | 30 (M); 25 | NLV | NLV | 2.80E+7 | NA |
| Metolachlor | 51218452 | 240 | 990 | 15 | NLV | NLV | 5.30E+5 | ID |
| Metribuzin | 21087649 | 180 | 520 | NA | ID | ID | 1.20E+6 | ID |
| Mirex | 2385855 | 0.02 (M); 6.8E-6 (S) | 0.02 (M); 6.8E-6 (S) | 0.02 (M); 6.8E-6 (S) | ID | ID | 6.80E-6 | NA |
| Molybdenum (B) | 7439987 | 73 | 210 | 3,200 (X) | NLV | NLV | NA | ID |
| Naphthalene | 91203 | 520 | 1,500 | 11 | 31,000 (S) | 31,000 (S) | 31,000 | NA |
| Nickel (B) | 7440020 | 100 (A) | 100 (A) | (G) | NLV | NLV | NA | ID |
| Nitrate (B,N) | 14797558 | 10,000 (A,N) | 10,000 (A,N) | ID | NLV | NLV | NA | ID |
| Nitrite (B,N) | 14797650 | 1,000 (A,N) | 1,000 (A,N) | NA | NLV | NLV | NA | ID |
| Nitrobenzene (I) | 98953 | 3.4 | 9.6 | 180 (X) | 2.8E+5 | 5.5E+5 | 2.09E+6 | NA |
| 2-Nitrophenol | 88755 | 20 | 58 | ID | NLV | NLV | 2.50E+6 | ID |
| n-Nitroso-di-n-propylamine | 621647 | 5.0 (M); 0.19 | 5.0 (M); 0.77 | NA | NLV | NLV | 9.89E+6 | ID |
| N-Nitrosodiphenylamine | 86306 | 270 | 1,100 | NA | NLV | NLV | 35,100 | ID |
| Oxamyl | 23135220 | 200 (A) | 200 (A) | NA | NLV | NLV | 2.80E+8 | ID |
| Oxo-hexyl acetate | 88230357 | 73 | 210 | NA | ID | ID | NA | ID |
| Pendimethalin | 40487421 | 280 (S) | 280 (S) | NA | NLV | NLV | 275 | ID |
| Pentachlorobenzene | 608935 | 6.1 | 17 | 5.0 (M); 0.019 | ID | ID | 650 | ID |
| Pentachloronitrobenzene | 82688 | 32 (S) | 32 (S) | NA | 32 (S) | 32 (S) | 32 | ID |
| Pentachlorophenol | 87865 | 1.0 (A) | 1.0 (A) | (G,X) | NLV | NLV | 1.85E+6 | ID |
| Pentane | 109660 | ID | ID | NA | 38,000 (S) | 38,000 (S) | 38,200 | 340 |
| 2-Pentene (I) | 109682 | ID | ID | NA | ID | ID | 2.03E+5 | ID |
| pH | NA | 6.5 to 8.5 (E) | 6.5 to 8.5 (E) | 6.5 to 9.0 | ID | ID | NA | NA |
| Phenanthrene | 85018 | 52 | 150 | 2.0 (M); 1.4 | 1,000 (S) | 1,000 (S) | 1,000 | ID |
| Phenol | 108952 | 4,400 | 13,000 | 450 | NLV | NLV | 8.28E+7 | NA |
| Phenytoin | 57410 | 17 | 68 | 89 (X) | NLV | NLV | 32,000 | ID |
| Phosphorus (Total) | 7723140 | 63,000 | 2.40E+05 | (EE) | NLV | NLV | NA | ID |
| Phthalic acid | 88993 | 14,000 | 40,000 | NA | NLV | NLV | 1.42E+7 | ID |

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| Hazardous Substance | Chemical Abstract Service Number | Residential Drinking Water Criteria | Nonresidential Drinking Water Criteria | Groundwater Surface Water Interface Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria | Water Solubility | Flammability and Explosivity Screening Level |
|---|---|---|---|---|---|---|---|---|
| Phthalic anhydride | 85449 | 15,000 | 44,000 | NA | NLV | NLV | 6.20E+6 | NA |
| Picloram | 1918021 | 500 (A) | 500 (A) | 46 | NLV | NLV | 4.30E+5 | ID |
| Piperidine | 110894 | 3.2 | 9.2 | NA | NLV | NLV | 1.00E+9 | ID |
| Polybrominated biphenyls (J) | 67774327 | 0.03 | 0.09 | ID | NLV | NLV | 1.66E+7 | ID |
| Polychlorinated biphenyls (PCBs) (J,T) | 1336363 | 0.5 (A) | 0.5 (A) | 0.2 (M); 2.6E-5 | 45 (S) | 45 (S) | 44.7 | ID |
| Prometon | 1610180 | 160 | 460 | NA | NLV | NLV | 7.50E+5 | ID |
| Propachlor | 1918167 | 95 | 270 | NA | NLV | NLV | 6.55E+5 | ID |
| Propazine | 139402 | 200 | 560 | NA | NLV | NLV | 8,600 | ID |
| Propionic acid | 79094 | 12,000 | 35,000 | ID | NLV | NLV | 1.00E+9 | 1.0E+9 (D) |
| Propyl alcohol (I) | 71238 | 1,400 | 4,000 | NA | NLV | NLV | 1.00E+9 | 7.1E+7 |
| n-Propylbenzene (I) | 103651 | 80 | 230 | ID | ID | ID | NA | ID |
| Propylene glycol | 57556 | 1.5E+5 | 4.2E+5 | 2.9E+5 | NLV | NLV | 1.00E+9 | ID |
| Pyrene | 129000 | 140 (S) | 140 (S) | ID | 140 (S) | 140 (S) | 135 | ID |
| Pyridine (I) | 110861 | 20 (M); 7.3 | 21 | NA | 5,500 | 12,000 | 3.00E+5 | 81,000 |
| Selenium (B) | 7782492 | 50 (A) | 50 (A) | 5 | NLV | NLV | NA | ID |
| Silver (B) | 7440224 | 34 | 98 | 0.2 (M); 0.06 | NLV | NLV | NA | ID |
| Silvex (2,4,5-TP) | 93721 | 50 (A) | 50 (A) | 30 | NLV | NLV | 1.40E+5 | ID |
| Simazine | 122349 | 4.0 (A) | 4.0 (A) | 17 | NLV | NLV | 4,470 | ID |
| Sodium | 17341252 | 2.3E+S(HH) | 3.5E+5 | NA | NLV | NLV | NA | ID |
| Sodium azide | 26628228 | 88 | 250 | 50 (M); 7.3 | ID | ID | NA | ID |
| Strontium (B) | 7440246 | 4,600 | 13,000 | 21,000 | NLV | NLV | NA | ID |
| Styrene | 100425 | 100 (A) | 100 (A) | 80 (X) | 1.7E+5 | 3.1E+5 (S) | 3.10E+5 | 1.4E+5 |
| Sulfate | 14808798 | 2.5E+5 (E) | 2.5E+5 (E) | NA | NLV | NLV | NA | ID |
| Tebuthiuron | 34014181 | 510 | 1,500 | NA | NLV | NLV | 2.50E+6 | ID |
| 2,3,7,8-Tetrabromodibenzo-p-dioxin (O) | 50585416 | (O) | (O) | (O) | NLV | NLV | 0.00996 | ID |
| 1,2,4,5-Tetrachlorobenzene | 95943 | 1,300 (S) | 1,300 (S) | 2.9 (X) | 1,300 (S) | 1,300 (S) | 1,300 | ID |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (O) | 1746016 | 3.0E-5 (A) | 3.0E-5 (A) | 1.0E-5 (M); 3.1E-9 | NLV | NLV | 0.019 | ID |
| 1,1,1,2-Tetrachloroethane | 630206 | 77 | 320 | ID | 15,000 | 96,000 | 1.10E+6 | ID |

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| Hazardous Substance | Chemical Abstract Service Number | Residential Drinking Water Criteria | Nonresidential Drinking Water Criteria | Groundwater Surface Water Interface Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria | Water Solubility | Flammability and Explosivity Screening Level |
|---|---|---|---|---|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | 79345 | 8.5 | 35 | 78 (X) | 12,000 | 77,000 | 2.97E+6 | ID |
| Tetrachloroethylene | 127184 | 5.0 (A) | 5.0 (A) | 60 (X) | 25,000 | 1.7E+5 | 2.00E+5 | ID |
| Tetrahydrofuran | 109999 | 95 | 270 | 11,000 (X) | 6.9E+6 | 1.6E+7 | 1.00E+9 | 60,000 |
| Tetranitromethane | 509148 | ID | ID | NA | 580 | 3,200 | 85,000 | ID |
| Thallium (B) | 7440280 | 2.0 (A) | 2.0 (A) | 3.7 (X) | NLV | NLV | NA | ID |
| Toluene (I) | 108883 | 790 (E) | 790 (E) | 270 | 5.3E+5 (S) | 5.3E+5 (S) | 5.26E+5 | 61,000 |
| p-Toluidine | 106490 | 15 | 62 | NA | NLV | NLV | 7.60E+6 | NA |
| Total dissolved solids (TDS) | NA | 5.0E+5 (E) | 5.0E+5 (E) | (EE) | ID | ID | NA | NA |
| Toxaphene | 8001352 | 3.0 (A) | 3.0 (A) | 1.0 (M); 6.8E-5 | NLV | NLV | 740 | ID |
| Triallate | 2303175 | 95 | 270 | NA | ID | ID | 4,000 | ID |
| Tributylamine | 102829 | 10 | 29 | ID | 14,000 | 32,000 | 75,400 | ID |
| 1,2,4-Trichlorobenzene | 120821 | 70 (A) | 70 (A) | 99 (X) | 3.0E+5 (S) | 3.0E+5 (S) | 3.00E+5 | NA |
| 1,1,1-Trichloroethane | 71556 | 200 (A) | 200 (A) | 89 | 6.6E+5 | 1.3E+6 (S) | 1.33E+6 | ID |
| 1,1,2-Trichloroethane | 79005 | 5.0 (A) | 5.0 (A) | 330 (X) | 17,000 | 1.1E+5 | 4.42E+6 | NA |
| Trichloroethylene | 79016 | 5.0 (A) | 5.0 (A) | 200 (X) | 2,200 | 4,900 | 1.10E+6 | ID |
| Trichlorofluoromethane | 75694 | 2,600 | 7,300 | NA | 1.1E+6 (S) | 1.1E+6 (S) | 1.10E+6 | ID |
| 2,4,5-Trichlorophenol | 95954 | 730 | 2,100 | NA | NLV | NLV | 1.20E+6 | ID |
| 2,4,6-Trichlorophenol | 88062 | 120 | 470 | 5 | NLV | NLV | 8.00E+5 | ID |
| 1,2,3-Trichloropropane | 96184 | 42 | 120 | NA | 8,300 | 18,000 | 1.90E+6 | NA |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 76131 | 1.7E+5 (S) | 1.7E+5 (S) | 32 | 1.7E+5 (S) | 1.7E+5 (S) | 1.70E+5 | ID |
| Triethanolamine | 102716 | 3,700 | 10,000 | NA | NLV | NLV | 1.00E+9 | ID |
| Triethylene glycol | 112276 | 4,300 | 12,000 | NA | NLV | NLV | 1.00E+6 | ID |
| 3-Trifluoromethyl-4-nitrophenol | 88302 | 4,500 | 13,000 | NA | NLV | NLV | 5.00E+6 | ID |
| Trifluralin | 1582098 | 37 | 110 | NA | ID | ID | 8,100 | ID |
| 2,2,4-Trimethyl pentane | 540841 | ID | ID | NA | 2,300 (S) | 2,300 (S) | 2,330 | 160 |
| 2,4,4-Trimethyl-2-pentene (I) | 107404 | ID | ID | NA | ID | ID | 11,900 | ID |
| 1,2,4-Trimethylbenzene (I) | 95636 | 63 (E) | 63 (E) | 17 | 56,000 (S) | 56,000 (S) | 55,890 | 56,000 (S) |
| 1,3,5-Trimethylbenzene (I) | 108678 | 72 (E) | 72 (E) | 45 | 61,000 (S) | 61,000 (S) | 61,150 | ID |

# TABLE 1. GROUNDWATER: RESIDENTIAL AND NONRESIDENTIAL
# PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;

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|---|---|---|---|---|---|---|---|---|
| Triphenyl phosphate | 115866 | 1,200 | 1,400 (S) | NA | NLV | NLV | 1,430 | ID |
| tris(2,3-Dibromopropyl)phosphate | 126727 | 10 (M); 0.71 | 10 (M); 2.9 | ID | 4,700 (S) | 4,700 (S) | 4,700 | ID |
| Urea | 57136 | ID | ID | NA | NLV | NLV | NA | ID |
| Vanadium | 7440622 | 4.5 | 62 | 27 | NLV | NLV | NA | ID |
| Vinyl acetate (I) | 108054 | 640 | 1,800 | NA | 4.1E+6 | 8.9E+6 | 2.00E+7 | 1.8E+6 |
| Vinyl chloride | 75014 | 2.0 (A) | 2.0 (A) | 13 (X) | 1,100 | 13,000 | 2.76E+6 | 33,000 |
| White phosphorus (R) | 12185103 | 0.11 | 0.31 | NA | NLV | NLV | NA | ID |
| Xylenes (I) | 1330207 | 280 (E) | 280 (E) | 41 | 1.9E+5 (S) | 1.9E+5 (S) | 1.86E+5 | 70,000 |
| Zinc (B) | 7440666 | 2,400 | 5,000 (E) | (G) | NLV | NLV | NA | ID |

History: 2013 AACS; 2017 AACS.

**R 299.46 Generic soil cleanup criteria for residential catergory.**

Rule 46 The generic soil cleanup criteria for residential category shall be as shown in table 2.

**TABLE 2. SOIL: RESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS**

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| | | | Groundwater Protection | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Level | Residential Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Soil Volatilization to Indoor Air Inhalation Criteria | Infinite Source Volatile Soil Inhalation Criteria (VSIC) | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria | Direct Contact Criteria | Soil Saturation Concentration Screening Levels |
| Acenaphthene | 83329 | NA | 3.0E+5 | 8,700 | 1.9E+8 | 8.1E+7 | 8.1E+7 | 8.1E+7 | 1.4E+10 | 4.1E+7 | NA |
| Acenaphthylene | 208968 | NA | 5,900 | ID | 1.6E+6 | 2.2E+6 | 2.2E+6 | 2.2E+6 | 2.3E+9 | 1.6E+6 | NA |
| Acetaldehyde (I) | 75070 | NA | 19,000 | 2,600 | 2.2E+5 | 1.7E+5 | 1.7E+5 | 2.8E+5 | 6.0E+8 | 2.9E+7 | 1.1E+8 |
| Acetate | 71501 | NA | ID | (G) | ID | ID | ID | ID | ID | ID | ID |
| Acetic acid | 64197 | NA | 84,000 | (G) | NLV | NLV | NLV | NLV | 1.7E+10 | 1.3E+8 | 6.5E+8 |
| Acetone (I) | 67641 | NA | 15,000 | 34,000 | 2.9E+8 (C) | 1.3E+8 | 1.3E+8 | 1.9E+8 | 3.9E+11 | 2.3E+7 | 1.1E+8 |
| Acetonitrile | 75058 | NA | 2,800 | NA | 4.8E+6 | 1.6E+6 | 1.6E+6 | 2.1E+6 | 4.0E+9 | 4.3E+6 | 2.2E+7 |
| Acetophenone | 98862 | NA | 30,000 | ID | 1.2E+8 (C) | 4.4E+7 | 4.4E+7 | 4.4E+7 | 3.3E+10 | 4.7E+7 (C) | 1.1E+6 |
| Acrolein (I) | 107028 | NA | 2,400 | NA | 410 | 310 | 310 | 610 | 1.3E+6 | 3.6E+6 | 2.3E+7 |
| Acrylamide | 79061 | NA | 10 | 200 (X) | NLV | NLV | NLV | NLV | 2.4E+6 | 1,900 | NA |
| Acrylic acid | 79107 | NA | 78,000 | NA | 2.4E+6 | 1.9E+5 | 2.3E+5 | 2.3E+5 | 6.7E+7 | 3.5E+7 (DD) | 1.1E+8 |
| Acrylonitrile (I) | 107131 | NA | 100 (M); 52 | 100 (M); 40 | 6,600 | 5,000 | 5,100 | 10,000 | 4.6E+7 | 16,000 | 8.3E+6 |
| Alachlor | 15972608 | NA | 52 | 290 (X) | NLV | NLV | NLV | NLV | ID | 93,000 | NA |
| Aldicarb | 116063 | NA | 60 | NA | NLV | NLV | NLV | NLV | ID | 2.3E+5 | NA |
| Aldicarb sulfone | 1646884 | NA | 200 (M); 40 | NA | NLV | NLV | NLV | NLV | ID | 2.5E+5 | NA |
| Aldicarb sulfoxide | 1646873 | NA | 200(M); 80 | NA | NLV | NLV | NLV | NLV | ID | 2.9E+5 | NA |
| Aldrin | 309002 | NA | NLL | NLL | 1.3E+6 | 58,000 | 58,000 | 58,000 | 6.4E+5 | 1,000 | NA |
| Aluminum (B) | 7429905 | 6.9E+6 | 1,000 | NA | NLV | NLV | NLV | NLV | ID | 5.0E+7 (DD) | NA |
| Ammonia | 7664417 | NA | ID | (CC) | ID | ID | ID | ID | 6.7E+9 | ID | 1.0E+7 |
| t-Amyl methyl ether (TAME) | 994058 | NA | 3,900 | NA | 58,000 | 3.4E+5 | 7.6E+5 | 1.8E+6 | 4.1E+9 | 2.9E+7 (C) | 4.4E+5 |
| Aniline | 62533 | NA | 1,100 | 330 (M); 80 | NLV | NLV | NLV | NLV | 6.7E+7 | 3.3E+5 | 4.5E+6 |
| Anthracene | 120127 | NA | 41,000 | ID | 1.0E+9 (D) | 1.4E+9 | 1.4E+9 | 1.4E+9 | 6.7E+10 | 2.3E+8 | NA |
| Antimony | 744036 | NA | 4,300 | 94,000 (X) | NLV | NLV | NLV | NLV | 1.3E+7 | 1.8E+5 | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | | | | | |
| Arsenic | 7440382 | 5,800 | 4,600 | 4,600 | NLV | NLV | NLV | NLV | 7.2E+5 | 7,600 | NA |
| Asbestos (BB) | 1332214 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 1.0E+7 (M); 68,000 | ID | NA |
| Atrazine | 1912249 | NA | 60 | 150 | NLV | NLV | NLV | NLV | ID | 71,000 (DD) | NA |
| Azobenzene | 103333 | NA | 4,200 | ID | 6.1E+6 | 6.3E+5 | 6.3E+5 | 6.3E+5 | 1.0E+8 | 1.4E+5 | NA |

**TABLE 2. SOIL: RESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS**

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| | | | Groundwater Protection | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Level | Residential Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Soil Volatilization to Indoor Air Inhalation Criteria | Infinite Source Volatile Soil Inhalation Criteria (VSIC) | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria | Direct Contact Criteria | Soil Saturation Concentration Screening Levels |
| Barium (B) | 7440393 | 75,000 | 1.3E+6 | (G) | NLV | NLV | NLV | NLV | 3.3E+8 | 3.7E+7 | NA |
| Benzene (I) | 71432 | NA | 100 | 4,000 (X) | 1,600 | 13,000 | 34,000 | 79,000 | 3.8E+8 | 1.8E+5 | 4.0E+5 |
| Benzidine | 92875 | NA | 1,000 (M); 6.0 | 1,000 (M); 6.0 | NLV | NLV | NLV | NLV | 46,000 | 1,000 (M); 23 | NA |
| Benzo(a)anthracene (Q) | 56553 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 20,000 | NA |
| Benzo(b)fluoranthene (Q) | 205992 | NA | NLL | NLL | ID | ID | ID | ID | ID | 20,000 | NA |
| Benzo(k)fluoranthene (Q) | 207089 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 2.0E+5 | NA |
| Benzo(g,h,i)perylene | 191242 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 8.0E+8 | 2.5E+6 | NA |
| Benzo(a)pyrene (Q) | 50328 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 1.5E+6 | 2,000 | NA |
| Benzoic acid | 65850 | NA | 6.4E+5 | NA | NLV | NLV | NLV | NLV | ID | 9.9E+8 | NA |
| Benzyl alcohol | 100516 | NA | 2.0E+5 | NA | NLV | NLV | NLV | NLV | 3.3E+11 | 3.2E+8 (C) | 5.8E+6 |
| Benzyl chloride | 100447 | NA | 150 | NA | 6,300 | 14,000 | 14,000 | 17,000 | 6.2E+7 | 48,000 | 2.3E+5 |
| Beryllium | 7440417 | NA | 51,000 | (G) | NLV | NLV | NLV | NLV | 1.3E+6 | 4.1E+5 | NA |
| bis(2-Chloroethoxy)ethane | 112265 | NA | ID | ID | NLV | NLV | NLV | NLV | ID | ID | 2.7E+6 |
| bis(2-Chloroethyl)ether (I) | 111444 | NA | 100 | 100 (M); 20 | 8,300 | 3,800 | 3,800 | 3,800 | 9.4E+6 | 13,000 | 2.2E+6 |
| bis(2-Ethylhexyl)phthalate | 117817 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 7.0E+8 | 2.8E+6 | 1.0E+7 |
| Boron (B) | 7440428 | NA | 10,000 | 1.4E+5 (X) | NLV | NLV | NLV | NLV | ID | 4.8E+7 (DD) | NA |
| Bromate | 15541454 | NA | 200 | 800 (X) | NLV | NLV | NLV | NLV | ID | 17,000 | NA |
| Bromobenzene (I) | 108861 | NA | 550 | NA | 3.1E+5 | 4.5E+5 | 4.5E+5 | 4.5E+5 | 5.3E+8 | 5.4E+5 | 7.6E+5 |
| Bromodichloromethane | 75274 | NA | 1,600 (W) | ID | 1,200 | 9,100 | 9,700 | 19,000 | 8.4E+7 | 1.1E+5 | 1.5E+6 |
| Bromoform | 75252 | NA | 1,600 (W) | ID | 1.5E+5 | 9.0E+5 | 9.0E+5 | 9.0E+5 | 2.8E+9 | 8.2E+5 | 8.7E+5 |
| Bromomethane | 74839 | NA | 200 | 700 | 860 | 11,000 | 57,000 | 1.4E+5 | 3.3E+8 | 3.2E+5 | 2.2E+6 |
| n-Butanol (I) | 71363 | NA | 19,000 | 2.0E+5 | NLV | NLV | NLV | NLV | 2.3E+10 | 2.9E+7 (C) | 8.7E+6 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-Butanone (MEK) (I) | 78933 | NA | 2.6E+5 | 44,000 | 5.4E+7 (C) | 2.9E+7 | 2.9E+7 | 3.5E+7 | 6.7E+10 | 1.2E+8 (C, DD) | 2.7E+7 |
| n-Butyl acetate | 123864 | NA | 11,000 | NA | 5.6E+7 (C) | 1.1E+8 | 2.6E+8 | 3.2E+8 | 4.7E+11 | 1.7E+7 (C) | 1.1E+6 |
| t-Butyl alcohol | 75650 | NA | 78,000 | NA | 3.1E+8 (C) | 9.7E+7 | 2.0E+8 | 2.0E+8 | 1.3E+11 | 1.2E+8 (C) | 1.1E+8 |
| Butyl benzyl phthalate | 85687 | NA | 2.2E+6 (C) | 1.2E+5 (X) | NLV | NLV | NLV | NLV | 4.7E+10 | 3.6E+7 (C) | 3.1E+5 |
| n-Butylbenzene | 104518 | NA | 1,600 | ID | ID | ID | ID | ID | 2.0E+9 | 2.5E+6 | 1.0E+7 |

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| | | | Groundwater Protection | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
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| sec-Butylbenzene | 135988 | NA | 1,600 | ID | ID | ID | ID | ID | 4.0E+8 | 2.5E+6 | 1.0E+7 |
| t-Butylbenzene (I) | 98066 | NA | 1,600 | ID | ID | ID | ID | ID | 6.7E+8 | 2.5E+6 | 1.0E+7 |
| Cadmium (B) | 7440439 | 1,200 | 6,000 | (G,X) | NLV | NLV | NLV | NLV | 1.7E+6 | 5.5E+5 | NA |
| Camphene (I) | 79925 | NA | ID | NA | 3,700 | 1.5E+5 | 9.1E+5 | 2.2E+6 | 5.3E+9 | ID | NA |
| Caprolactam | 105602 | NA | 1.2E+5 | NA | NLV | NLV | NLV | NLV | 6.7E+8 | 5.3E+7 (DD) | NA |
| Carbaryl | 63252 | NA | 14,000 | NA | ID | ID | ID | ID | ID | 2.2E+7 | NA |
| Carbazole | 86748 | NA | 9,400 | 1,100 | NLV | NLV | NLV | NLV | 6.2E+7 | 5.3E+5 | NA |
| Carbofuran | 1563662 | NA | 800 | NA | NLV | NLV | NLV | NLV | ID | 1.1E+6 | NA |
| Carbon disulfide (I,R) | 75150 | NA | 16,000 | ID | 76,000 | 1.3E+6 | 7.9E+6 | 1.9E+7 | 4.7E+10 | 7.2E+6 (C, DD) | 2.8E+5 |
| Carbon tetrachloride | 56235 | NA | 100 | 900 (X) | 190 | 3,500 | 12,000 | 28,000 | 1.3E+8 | 96,000 | 3.9E+5 |
| Chlordane (J) | 57749 | NA | NLL | NLL | 1.1E+7 | 1.2E+6 | 1.2E+6 | 1.2E+6 | 3.1E+7 | 31,000 | NA |
| Chloride | 16887006 | NA | 5.0E+6 | (X) | NLV | NLV | NLV | NLV | ID | 5.0E+5 (F) | NA |
| Chlorobenzene (I) | 108907 | NA | 2,000 | 500 | 1.2E+5 | 7.7E+5 | 9.9E+5 | 2.1E+6 | 4.7E+9 | 4.3E+6 (C) | 2.6E+5 |
| p-Chlorobenzene sulfonic acid | 98668 | NA | 1.5E+5 | ID | ID | ID | ID | ID | ID | 2.3E+8 | ID |
| 1-Chloro-1,1-difluoroethane | 75683 | NA | 3.0E+5 | NA | 2.9E+6 (C) | 7.9E+7 | 5.6E+8 | 1.4E+9 | 3.3E+12 | 4.7E+8 (C) | 9.6E+5 |
| Chloroethane | 75003 | NA | 8,600 | 22,000 (X) | 2.9E+6 (C) | 3.00E+07 | 1.2E+8 | 2.8E+8 | 6.7E+11 | 2.6E+6 (C) | 9.5E+5 |
| 2-Chloroethyl vinyl ether | 110758 | NA | ID | NA | ID | ID | ID | ID | ID | ID | 1.9E+6 |
| Chloroform | 67663 | NA | 1,600 (W) | 7,000 | 7,200 | 45,000 | 1.2E+5 | 2.7E+5 | 1.3E+9 | 1.2E+6 | 1.5E+6 |
| Chloromethane (I) | 74873 | NA | 5,200 | ID | 2,300 | 40,000 | 4.1E+5 | 1.0E+6 | 4.9E+9 | 1.6E+6 (C) | 1.1E+6 |
| 4-Chloro-3-methylphenol | 59507 | NA | 5,800 | 280 | NLV | NLV | NLV | NLV | ID | 4.5E+6 | NA |
| beta-Chloronaphthalene | 91587 | NA | 6.2E+5 | NA | ID | ID | ID | ID | ID | 5.6E+7 | NA |
| 2-Chlorophenol | 95578 | NA | 900 | 360 | 4.3E+5 | 9.6E+5 | 9.6E+5 | 9.6E+5 | 1.2E+9 | 1.4E+6 | 1.9E+7 |
| o-Chlorotoluene | 95498 | NA | 3,300 | ID | 2.7E+5 | 1.2E+6 | 2.9E+6 | 6.3E+6 | 4.7E+9 | 4.5E+6 (C) | 5.0E+5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (I) | | | | | | | | | | | |
| Chlorpyrifos | 2921882 | NA | 17,000 | 1,500 | 130 | 4,600 | 23,000 | 55,000 | 1.3E+8 | 1.1E+7 | NA |
| Chromium (III) (B,H) | 16065831 | 18,000 (total) | 1.0E+9 (D) | (G,X) | NLV | NLV | NLV | NLV | 3.3E+8 | 7.9E+8 | NA |
| Chromium (VI) | 18540299 | NA | 30,000 | 3,300 | NLV | NLV | NLV | NLV | 2.6E+5 | 2.5E+6 | NA |
| Chrysene (Q) | 218019 | NA | NLL | NLL | ID | ID | ID | ID | ID | 2.0E+6 | NA |

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| Cobalt | 7440484 | 6,800 | 800 | 2,000 | NLV | NLV | NLV | NLV | 1.3E+7 | 2.6E+6 | NA |
| Copper (B) | 7440508 | 32,000 | 5.8E+6 | (G) | NLV | NLV | NLV | NLV | 1.3E+8 | 2.0E+7 | NA |
| Cyanazine | 21725462 | NA | 200 | 1,100 (X) | NLV | NLV | NLV | NLV | ID | 14,000 | NA |
| Cyanide (P,R) | 57125 | 390 (total) | 4,000 | 100 | NLV | NLV | NLV | NLV | 2.5E+5 | 12,000 | NA |
| Cyclohexanone | 108941 | NA | 5.2E+6 | NA | 17,000 | 1.0E+6 | 1.1E+7 | 2.7E+7 | 6.7E+10 | 1.0E+9 (C,D) | 2.2E+8 |
| Dacthal | 1861321 | NA | 50,000 | NA | NLV | NLV | NLV | NLV | ID | 2.3E+6 | NA |
| Dalapon | 75990 | NA | 4,000 | NA | NLV | NLV | NLV | NLV | ID | 1.9E+7 | 5.9E+7 |
| 4-4'-DDD | 72548 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 4.4E+7 | 95,000 | NA |
| 4-4'-DDE | 72559 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 3.2E+7 | 45,000 | NA |
| 4-4'-DDT | 50293 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 3.2E+7 | 57,000 | NA |
| Decabromodiphenyl ether | 1163195 | NA | 1.4E+5 | NA | 1.0E+9 (D) | 8.6E+7 | 8.6E+7 | 8.6E+7 | 2.3E+9 | 3.8E+6 | NA |
| Di-n-butyl phthalate | 84742 | NA | 9.6E+5 (C) | 11,000 | NLV | NLV | NLV | NLV | 3.3E+9 | 2.7E+7 (C) | 7.6E+5 |
| Di(2-ethylhexyl) adipate | 103231 | NA | 1.3E+7 (C) | ID | NLV | NLV | NLV | NLV | 9.2E+9 | 1.5E+7 (C, DD) | 9.6E+5 |
| Di-n-octyl phthalate | 117840 | NA | 1.0E+8 | ID | NLV | NLV | NLV | NLV | 3.1E+10 | 6.9E+6 | 1.4E+8 |
| Diacetone alcohol (I) | 123422 | NA | ID | NA | NLV | NLV | NLV | NLV | 1.6E+11 | ID | 1.1E+8 |
| Diazinon | 333415 | NA | 95 | 72 | NLV | NLV | NLV | NLV | ID | 12,000 (DD) | 3.1E+5 |
| Dibenzo(a,h)anthracene (Q) | 53703 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 2,000 | NA |
| Dibenzofuran | 132649 | NA | ID | 1,700 | 2.0E+6 | 1.3E+5 | 1.3E+5 | 1.3E+5 | 6.7E+6 | ID | NA |
| Dibromochloromethane | 124481 | NA | 1,600 (W) | ID | 3,900 | 24,000 | 24,000 | 33,000 | 1.3E+8 | 1.1E+5 | 6.1E+5 |
| Dibromochloropropane | 96128 | NA | 10 (M); 4.0 | ID | 220 | 260 | 260 | 260 | 5.6E+5 | 4,400 (C) | 1,200 |
| Dibromomethane | 74953 | NA | 1,600 | NA | ID | ID | ID | ID | ID | 2.5E+6 (C) | 2.0E+6 |
| Dicamba | 1918009 | NA | 4,400 | NA | NA | NLV | NLV | NLV | ID | 3.4E+6 | NA |
| 1,2-Dichlorobenzene | 95501 | NA | 14,000 | 280 | 1.1E+7 (C) | 3.9E+7 | 3.9E+7 | 5.2E+7 | 1.0E+11 | 1.9E+7 (C) | 2.1E+5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,3-Dichlorobenzene | 541731 | NA | 170 | 680 | 26,000 | 79,000 | 79,000 | 1.1E+5 | 2.0E+8 | 2.0E+5 (C) | 1.7E+5 |
| 1,4-Dichlorobenzene | 106467 | NA | 1,700 | 360 | 19,000 | 77,000 | 77,000 | 1.1E+5 | 4.5E+8 | 4.0E+5 | NA |
| 3,3'-Dichlorobenzidine | 91941 | NA | 2,000 (M); 28 | 2,000 (M); 7.4 | NLV | NLV | NLV | NLV | 6.5E+6 | 6,600 | NA |
| Dichlorodifluoromethane | 75718 | NA | 95,000 | ID | 9.0E+5 | 5.3E+7 | 5.5E+8 | 1.4E+9 | 3.3E+12 | 5.2E+7 (C) | 1.0E+6 |

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| 1,1-Dichloroethane | 75343 | NA | 18,000 | 15,000 | 2.3E+5 | 2.1E+6 | 5.9E+6 | 1.4E+7 | 3.3E+10 | 2.7E+7 (C) | 8.9E+5 |
| 1,2-Dichloroethane (I) | 107062 | NA | 100 | 7,200 (X) | 2,100 | 6,200 | 11,000 | 26,000 | 1.2E+8 | 91,000 | 1.2E+6 |
| 1,1-Dichloroethylene (I) | 75354 | NA | 140 | 2,600 | 62 | 1,100 | 5,300 | 13,000 | 6.2E+7 | 2.0E+5 | 5.7E+5 |
| cis-1,2-Dichloroethylene | 156592 | NA | 1,400 | 12,000 | 22,000 | 1.8E+5 | 4.2E+5 | 9.9E+5 | 2.3E+9 | 2.5E+6 (C) | 6.4E+5 |
| trans-1,2-Dichloroethylene | 156605 | NA | 2,000 | 30,000 (X) | 23,000 | 2.8E+5 | 8.3E+5 | 2.0E+6 | 4.7E+9 | 3.8E+6 (C) | 1.4E+6 |
| 2,6-Dichloro-4-nitroaniline | 99309 | NA | 44,000 | NA | NLV | NLV | NLV | NLV | ID | 6.8E+7 | NA |
| 2,4-Dichlorophenol | 120832 | NA | 1,500 | 330 (M); 220 | NLV | NLV | NLV | NLV | 5.1E+9 | 6.6E+5 (DD) | 1.8E+6 |
| 2,4-Dichlorophenoxy acetic acid | 94757 | NA | 1,400 | 4,400 | NLV | NLV | NLV | NLV | 6.7E+9 | 2.5E+6 | NA |
| 1,2-Dichloropropane (I) | 78875 | NA | 100 | 4,600 (X) | 4,000 | 25,000 | 50,000 | 1.1E+5 | 2.7E+8 | 1.4E+5 | 5.5E+5 |
| 1,3-Dichloropropene | 542756 | NA | 170 | 180 (X) | 1,000 | 18,000 | 68,000 | 1.6E+5 | 7.8E+8 | 10,000 | 6.2E+5 |
| Dichlorovos | 62737 | NA | 50 (M); 32 | NA | NLV | NLV | NLV | NLV | 3.3E+7 | 10,000 | 2.2E+6 |
| Dicyclohexyl phthalate | 84617 | NA | ID | NA | ID | ID | ID | ID | ID | ID | NA |
| Dieldrin | 60571 | NA | NLL | NLL | 1.4E+5 | 19,000 | 19,000 | 19,000 | 6.8E+5 | 1,100 | NA |
| Diethyl ether | 60297 | NA | 200 | ID | 2.8E+7 (C) | 8.5E+7 | 1.5E+8 | 3.4E+8 | 8.0E+11 | 1.1E+8 (C) | 7.4E+6 |
| Diethyl phthalate | 84662 | NA | 1.1E+5 | 2,200 | NLV | NLV | NLV | NLV | 3.3E+9 | 1.7E+8 (C) | 7.4E+5 |
| Diethylene glycol monobutyl ether | 112345 | NA | 1,800 | NA | NLV | NLV | NLV | NLV | 1.3E+9 | 2.7E+6 | 1.1E+8 |
| Diisopropyl ether | 108203 | NA | 600 | ID | 6.7E+5 (C) | 3.4E+5 | 7.6E+5 | 1.8E+6 | 4.1E+9 | 9.2E+5 (C) | 1,300 |
| Diisopropylamine (I) | 108189 | NA | 110 | NA | 5.5E+6 | 6.2E+6 | 6.2E+6 | 7.3E+6 | 1.3E+10 | 1.7E+5 | 6.7E+6 |
| Dimethyl phthalate | 131113 | NA | 1.5E+6 (C) | NA | NLV | NLV | NLV | NLV | 3.3E+9 | 1.0E+9 | 7.9E+5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | (C,D) | |
| N,N-Dimethylacetamide | 127195 | NA | 3,600 | 82,000 (X) | NLV | NLV | NLV | NLV | ID | 5.6E+6 | 1.1E+8 |
| N,N-Dimethylaniline | 121697 | NA | 320 | NA | 1.7E+5 | 1.5E+5 | 1.5E+5 | 1.5E+5 | 2.6E+8 | 5.0E+5 | 8.0E+5 |
| Dimethylformamide (I) | 68122 | NA | 14,000 | NA | NLV | NLV | NLV | NLV | 2.0E+9 | 2.2E+7 | 1.1E+8 |
| 2,4-Dimethylphenol | 105679 | NA | 7,400 | 7,600 | NLV | NLV | NLV | NLV | 4.7E+9 | 1.1E+7 | NA |
| 2,6-Dimethylphenol | 576261 | NA | 330 (M); 88 | NA | NLV | NLV | NLV | NLV | 1.3E+8 | 1.4E+5 | NA |
| 3,4-Dimethylphenol | 95658 | NA | 330 (M); 200 | 500 | NLV | NLV | NLV | NLV | 2.3E+8 | 3.2E+5 | NA |
| Dimethylsulfoxide | 67685 | NA | 4.4E+6 | 3.8E+6 | NLV | NLV | NLV | NLV | 1.3E+9 | 1.0E+9 (C,D) | 1.8E+7 |
| 2,4-Dinitrotoluene | 121142 | NA | 430 | NA | NLV | NLV | NLV | NLV | 1.6E+7 | 48,000 | NA |

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| Dinoseb | 88857 | NA | 300 | 200 (M); 43 | NLV | NLV | NLV | NLV | 2.7E+8 | 66,000 (DD) | 1.4E+5 |
| 1,4-Dioxane (I) | 123911 | NA | 1,700 | 56,000 (X) | NLV | NLV | NLV | NLV | 5.7E+8 | 5.3E+5 | 9.7E+7 |
| Diquat | 85007 | NA | 400 | 400 | NLV | NLV | NLV | NLV | ID | 5.0E+5 | NA |
| Diuron | 330541 | NA | 620 | NA | NLV | NLV | NLV | NLV | 4.7E+8 | 9.7E+5 | NA |
| Endosulfan (J) | 115297 | NA | NLL | NLL | ID | ID | ID | ID | ID | 1.4E+6 | NA |
| Endothall | 145733 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 2.3E+9 | 3.8E+6 | NA |
| Endrin | 72208 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 65,000 | NA |
| Epichlorohydrin (I) | 106898 | NA | 100 | NA | 64,000 | 31,000 | 31,000 | 35,000 | 6.7E+7 | 8,900 | 7.3E+6 |
| Ethanol (I) | 64175 | NA | 3.8E+7 | ID | NLV | NLV | NLV | NLV | 1.3E+12 | 1.0E+9 (C,D,DD) | 1.1E+8 |
| Ethyl acetate (I) | 141786 | NA | 1.3E+5 | NA | 3.8E+7 (C) | 4.9E+7 | 4.9E+7 | 9.8E+7 | 2.1E+11 | 2.0E+8 (C) | 7.5E+6 |
| Ethyl-tert-butyl ether (ETBE) | 637923 | NA | 980 | ID | 5.4E+5 | 1.9E+6 | 4.5E+6 | 1.1E+7 | 2.5E+10 | ID | 6.5E+5 |
| Ethylbenzene (I) | 100414 | NA | 1,500 | 360 | 87,000 | 7.2E+5 | 1.0E+6 | 2.2E+6 | 1.0E+10 | 2.2E+7 (C) | 1.4E+5 |
| Ethylene dibromide | 106934 | NA | 20 (M); 1.0 | 110 (X) | 670 | 1,700 | 1,700 | 3,300 | 1.4E+7 | 92 | 8.9E+5 |
| Ethylene glycol | 107211 | NA | 3.0E+5 | 3.8E+6 (X) | NLV | NLV | NLV | NLV | 6.7E+10 | 4.5E+8 (C) | 1.1E+8 |
| Ethylene glycol monobutyl ether | 111762 | NA | 74,000 | NA | 7.4E+5 | 1.8E+7 | 1.5E+8 | 3.6E+8 | 8.7E+11 | 1.1E+8 (C) | 4.1E+7 |
| Fluoranthene | 206440 | NA | 7.3E+5 | 5,500 | 1.0E+9 (D) | 7.4E+8 | 7.4E+8 | 7.4E+8 | 9.3E+9 | 4.6E+7 | NA |
| Fluorene | 86737 | NA | 3.9E+5 | 5,300 | 5.8E+8 | 1.3E+8 | 1.3E+8 | 1.3E+8 | 9.3E+9 | 2.7E+7 | NA |
| Fluorine (soluble fluoride) (B) | 7782414 | NA | 40,000 | ID | NLV | NLV | NLV | NLV | ID | 9.0E+6 (DD) | NA |
| Formaldehyde | 50000 | NA | 26,000 | 2,400 | 12,000 | 13,000 | 23,000 | 52,000 | 2.4E+8 | 4.1E+7 | 6.0E+7 |
| Formic acid (I,U) | 64186 | NA | 2.0E+5 | ID | 1.5E+6 | 2.1E+5 | 1.4E+5 | 1.4E+5 | 1.3E+8 | 3.2E+8 (C) | 1.1E+8 |
| 1-Formylpiperidine | 2591868 | NA | 1,600 | NA | ID | ID | ID | ID | ID | 2.5E+6 | 1.0E+7 |
| Gentian violet | 548629 | NA | 300 | NA | NLV | NLV | NLV | NLV | ID | 96,000 | NA |
| Glyphosate | 1071836 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 1.1E+7 (DD) | NA |
| Heptachlor | 76448 | NA | NLL | NLL | 3.5E+5 | 62,000 | 62,000 | 62,000 | 2.4E+6 | 5,600 | NA |
| Heptachlor epoxide | 1024573 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 1.2E+6 | 3,100 | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n-Heptane | 142825 | NA | 4.6E+7 (C) | NA | 1.5E+6 (C) | 2.1E+7 | 4.4E+7 | 1.0E+8 | 2.3E+11 | 9.9E+8 (C) | 2.4E+5 |
| Hexabromobenzene | 87821 | NA | 5,400 | ID | ID | ID | ID | ID | ID | 1.1E+6 | NA |

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| | | | Groundwater Protection | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|
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| Hexachlorobenzene (C-66) | 118741 | NA | 1,800 | 350 | 41,000 | 17,000 | 17,000 | 17,000 | 6.8E+6 | 8,900 | NA |
| Hexachlorobutadiene (C-46) | 87683 | NA | 26,000 | 91 | 1.3E+5 | 1.3E+5 | 1.3E+5 | 1.3E+5 | 1.4E+8 | 1.0E+5 | 3.5E+5 |
| alpha-Hexachlorocyclohexane | 319846 | NA | 18 | ID | 30,000 | 12,000 | 22,000 | 25,000 | 1.7E+6 | 2,600 | NA |
| beta-Hexachlorocyclohexane | 319857 | NA | 37 | ID | NLV | NLV | NLV | NLV | 5.9E+6 | 5,400 | NA |
| Hexachlorocyclopentadiene (C-56) | 77474 | NA | 3.2E+5 | ID | 30,000 | 50,000 | 50,000 | 50,000 | 1.3E+7 | 2.3E+6 (C) | 7.2E+5 |
| Hexachloroethane | 67721 | NA | 430 | 1,800 (X) | 40,000 | 5.5E+5 | 9.3E+5 | 9.3E+5 | 2.3E+8 | 2.3E+5 | NA |
| n-Hexane | 110543 | NA | 1.8E+5 (C) | NA | 5.1E+5 (C) | 3.0E+6 | 3.2E+6 | 6.2E+6 | 1.3E+10 | 9.2E+7 (C) | 44,000 |
| 2-Hexanone | 591786 | NA | 20,000 | ID | 9.9E+5 | 1.1E+6 | 1.1E+6 | 1.4E+6 | 2.7E+9 | 3.2E+7 (C) | 2.5E+6 |
| Indeno(1,2,3-cd) pyrene (Q) | 193395 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 20,000 | NA |
| Iron (B) | 7439896 | 1.2E+7 | 6,000 | NA | NLV | NLV | NLV | NLV | ID | 1.6E+8 | NA |
| Isobutyl alcohol (I) | 78831 | NA | 46,000 | NA | 2.3E+8 (C) | 7.9E+7 | 7.9E+7 | 7.9E+7 | 1.0E+11 | 7.2E+7 (C) | 8.9E+6 |
| Isophorone | 78591 | NA | 15,000 | 26,000 (X) | NLV | NLV | NLV | NLV | 1.2E+10 | 4.8E+6 (C) | 2.4E+6 |
| Isopropyl alcohol (I) | 67630 | NA | 9,400 | 1.1E+6 (X) | NLV | NLV | NLV | NLV | 1.5E+10 | 1.4E+7 | 1.1E+8 |
| Isopropyl benzene | 98828 | NA | 91,000 | 3,200 | 4.0E+5 (C) | 1.7E+6 | 1.7E+6 | 2.8E+6 | 5.8E+9 | 2.5E+7 (C) | 3.9E+5 |
| Lead (B) | 7439921 | 21,000 | 7.0E+5 | (G,X) | NLV | NLV | NLV | NLV | 1.0E+8 | 4.0E+5 | NA |
| Lindane | 58899 | NA | 20 (M); 7.0 | 20 (M); 1.1 | ID | ID | ID | ID | ID | 8,300 | NA |
| Lithium (B) | 7439932 | 9,800 | 3,400 | 8,800 | NLV | NLV | NLV | NLV | 2.3E+9 | 4.2E+6 (DD) | NA |
| Magnesium (B) | 7439954 | NA | 8.0E+6 | NA | NLV | NLV | NLV | NLV | 6.7E+9 | 1.0E+9 (D) | NA |
| Manganese (B) | 7439965 | 4.4E+5 | 1,000 | (G,X) | NLV | NLV | NLV | NLV | 3.3E+6 | 2.5E+7 | NA |
| Mercury (Total) (B,Z) | Varies | 130 | 1,700 | 50 (M); 1.2 | 48,000 | 52,000 | 52,000 | 52,000 | 2.0E+7 | 1.6E+5 | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Methane | 74828 | NA | ID | NA | 8.4E+6 ug/m3 (GG) | ID | ID | ID | ID | ID | ID |
| Methanol | 67561 | NA | 74,000 | 1.2E+7 (C) | 3.7E+7 (C) | 3.1E+7 | 4.4E+7 | 9.6E+7 | 2.2E+11 | 1.1E+8 (C) | 3.1E+6 |
| Methoxychlor | 72435 | NA | 16,000 | NA | ID | ID | ID | ID | ID | 1.9E+6 | NA |
| 2-Methoxyethanol (I) | 109864 | NA | 150 | NA | NLV | NLV | NLV | NLV | 1.3E+9 | 2.3E+5 | 1.1E+8 |
| 2-Methyl-4-chlorophenoxyacetic acid | 94746 | NA | 390 | NA | NLV | NLV | NLV | NLV | ID | 2.3E+5 | NA |
| 2-Methyl-4,6-dinitrophenol | 534521 | NA | 830 (M); 400 | NA | NLV | NLV | NLV | NLV | 1.3E+8 | 79,000 | NA |
| N-Methyl-morpholine (I) | 109024 | NA | 400 | NA | NLV | NLV | NLV | NLV | ID | 6.1E+5 | 1.1E+8 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
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| Methyl parathion | 298000 | NA | 46 | NA | NLV | NLV | NLV | NLV | ID | 56,000 | NA |
| 4-Methyl-2-pentanone (MIBK) (I) | 108101 | NA | 36,000 | ID | 3.7E+7 (C) | 4.5E+7 | 4.5E+7 | 6.7E+7 | 1.4E+11 | 5.6E+7 (C) | 2.7E+6 |
| Methyl-tert-butyl ether (MTBE) | 1634044 | NA | 800 | 1.4E+5 (X) | 9.9E+6 (C) | 2.5E+7 | 3.9E+7 | 8.7E+7 | 2.0E+11 | 1.5E+6 | 5.9E+6 |
| Methylcyclopentane (I) | 96377 | NA | ID | NA | 92,000 | 2.3E+6 | 8.2E+6 | 2.0E+7 | 4.7E+10 | ID | 3.5E+5 |
| 4,4'-Methylene-bis-2-chloroaniline (MBOCA) | 101144 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 8.4E+7 | 6,800 | NA |
| Methylene chloride | 75092 | NA | 100 | 30,000 (X) | 45,000 | 2.1E+5 | 5.9E+5 | 1.4E+6 | 6.6E+9 | 1.3E+6 | 2.3E+6 |
| 2-Methylnaphthalene | 91576 | NA | 57,000 | 4,200 | 2.7E+6 | 1.5E+6 | 1.5E+6 | 1.5E+6 | 6.7E+8 | 8.1E+6 | NA |
| Methylphenols (J) | 1319773 | NA | 7,400 | 1,000 (M); 600 | NLV | NLV | NLV | NLV | 6.7E+9 | 1.1E+7 | NA |
| Metolachlor | 51218452 | NA | 4,800 | 300 | NLV | NLV | NLV | NLV | ID | 1.5E+6 (C, DD) | 4.4E+5 |
| Metribuzin | 21087649 | NA | 3,600 | NA | ID | ID | ID | ID | ID | 9.6E+6 | NA |
| Mirex | 2385855 | NA | NLL | NLL | ID | ID | ID | ID | ID | 9,600 | NA |
| Molybdenum (B) | 7439987 | NA | 1,500 | 64,000 (X) | NLV | NLV | NLV | NLV | ID | 2.6E+6 | NA |
| Naphthalene | 91203 | NA | 35,000 | 730 | 2.5E+5 | 3.0E+5 | 3.0E+5 | 3.0E+5 | 2.0E+8 | 1.6E+7 | NA |
| Nickel (B) | 7440020 | 20,000 | 1.0E+5 | (G) | NLV | NLV | NLV | NLV | 1.3E+7 | 4.0E+7 | NA |
| Nitrate (B,N) | 14797558 | NA | 2.0E+5 (N) | ID | NLV | NLV | NLV | NLV | ID | ID | NA |
| Nitrite (B,N) | 14797650 | NA | 20,000 (N) | NA | NLV | NLV | NLV | NLV | ID | ID | NA |
| Nitrobenzene (I) | 98953 | NA | 330 (M); 68 | 3,600 (X) | 91,000 | 54,000 | 54,000 | 54,000 | 4.7E+7 | 1.0E+5 | 4.9E+5 |
| 2-Nitrophenol | 88755 | NA | 400 | ID | NLV | NLV | NLV | NLV | ID | 6.3E+5 | NA |
| n-Nitroso-di-n-propylamine | 621647 | NA | 330 (M); 100 | NA | NLV | NLV | NLV | NLV | 1.6E+6 | 1,200 | 1.5E+6 |
| N-Nitrosodiphenylamine | 86306 | NA | 5,400 | NA | NLV | NLV | NLV | NLV | 2.2E+9 | 1.7E+6 | NA |
| Oxamyl | 23135220 | NA | 4,000 | NA | NLV | NLV | NLV | NLV | ID | 8.6E+6 | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oxo-hexyl acetate | 88230357 | NA | 1,500 | NA | ID | ID | ID | ID | 5.4E+9 | 2.3E+6 | 1.0E+7 |
| Pendimethalin | 40487421 | NA | 1.1E+6 | NA | NLV | NLV | NLV | NLV | ID | 4.6E+7 | NA |
| Pentachlorobenzene | 608935 | NA | 29,000 | 9,500 | ID | ID | ID | ID | ID | 3.2E+5 (C) | 1.9E+5 |
| Pentachloronitrobenzene | 82688 | NA | 37,000 | NA | 1.2E+5 | 2.3E+5 | 2.3E+5 | 2.3E+5 | 3.3E+8 | 1.7E+6 | NA |
| Pentachlorophenol | 87865 | NA | 22 | (G,X) | NLV | NLV | NLV | NLV | 1.0E+8 | 90,000 | NA |
| Pentane | 109660 | NA | ID | NA | 9.7E+5 (C) | 3.7E+7 | 3.1E+8 | 5.8E+8 | 1.2E+12 | ID | 2.4E+5 |

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| 2-Pentene (I) | 109682 | NA | ID | NA | ID | ID | ID | ID | ID | ID | 2.2E+5 |
| Phenanthrene | 85018 | NA | 56,000 | 2,100 | 2.8E+6 | 1.6E+5 | 1.6E+5 | 1.6E+5 | 6.7E+6 | 1.6E+6 | NA |
| Phenol | 108952 | NA | 88,000 | 9,000 | NLV | NLV | NLV | NLV | 4.0E+10 | 4.0E+7 (C, DD) | 1.2E+7 |
| Phenytoin | 57410 | NA | 830 | 4300 (X) | NLV | NLV | NLV | NLV | 2.2E+8 | 1.0E+5 | NA |
| Phosphorus (Total) | 7723140 | NA | 1.3E+6 | (EE) | NLV | NLV | NLV | NLV | 6.7E+7 | 1.0E+9 (D) | NA |
| Phthalic acid | 88993 | NA | 2.8E+5 | NA | NLV | NLV | NLV | NLV | ID | 4.3E+8 (C) | 1.7E+6 |
| Phthalic anhydride | 85449 | NA | 3.0E+5 | NA | NLV | NLV | NLV | NLV | ID | 4.7E+8 (C) | 1.1E+6 |
| Picloram | 1918021 | NA | 10,000 | 920 | NLV | NLV | NLV | NLV | ID | 1.6E+7 | NA |
| Piperidine | 110894 | NA | 64 | NA | NLV | NLV | NLV | NLV | 9.3E+9 | 99,000 | 1.2E+8 |
| Polybrominated biphenyls (J) | 67774327 | NA | NLL | NLL | NLV | NLV | NLV | NLV | ID | 1,200 | NA |
| Polychlorinated biphenyls (PCBs) (J,T) | 1336363 | NA | NLL | NLL | 3.0E+6 | 2.4E+5 | 7.9E+6 | 7.9E+6 | 5.2E+6 | (T) | NA |
| Prometon | 1610180 | NA | 4,900 | NA | NLV | NLV | NLV | NLV | ID | 5.0E+6 | NA |
| Propachlor | 1918167 | NA | 1,900 | NA | NLV | NLV | NLV | NLV | ID | 2.9E+6 | NA |
| Propazine | 139402 | NA | 4,000 | NA | NLV | NLV | NLV | NLV | ID | 6.1E+6 | NA |
| Propionic acid | 79094 | NA | 2.4E+5 | ID | NLV | NLV | NLV | NLV | 2.0E+10 | 3.8E+8 (C) | 1.1E+8 |
| Propyl alcohol (I) | 71238 | NA | 28,000 | NA | NLV | NLV | NLV | NLV | 4.9E+10 | 1.3E+7 (DD) | 1.1E+8 |
| n-Propylbenzene (I) | 103651 | NA | 1,600 | ID | ID | ID | ID | ID | 1.3E+9 | 2.5E+6 | 1.0E+7 |
| Propylene glycol | 57556 | NA | 3.0E+6 | 5.8E+6 | NLV | NLV | NLV | NLV | 4.0E+11 | 1.0E+9 (C,D) | 1.1E+8 |
| Pyrene | 129000 | NA | 4.8E+5 | ID | 1.0E+9 (D) | 6.5E+8 | 6.5E+8 | 6.5E+8 | 6.7E+9 | 2.9E+7 | NA |
| Pyridine (I) | 110861 | NA | 400 | NA | 1,100 | 8,200 | 40,000 | 97,000 | 2.3E+8 | 2.3E+5 (C) | 37,000 |
| Selenium (B) | 7782492 | 410 | 4,000 | 400 | NLV | NLV | NLV | NLV | 1.3E+8 | 2.6E+6 | NA |
| Silver (B) | 7440224 | 1,000 | 4,500 | 100 (M); 27 | NLV | NLV | NLV | NLV | 6.7E+6 | 2.5E+6 | NA |
| Silvex (2,4,5-TP) | 93721 | NA | 3,600 | 2,200 | NLV | NLV | NLV | NLV | ID | 1.7E+6 | NA |
| Simazine | 122349 | NA | 80 | 340 | NLV | NLV | NLV | NLV | ID | 1.2E+6 | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sodium | 17341252 | NA | 4.6E+6 | NA | NLV | NLV | NLV | NLV | ID | 1.0E+9 (D) | NA |
| Sodium azide | 26628228 | NA | 1,800 | 1,000 | ID | ID | ID | ID | ID | 2.7E+6 | NA |
| Strontium (B) | 7440246 | NA | 92,000 | 4.2E+5 | NLV | NLV | NLV | NLV | ID | 3.3E+8 | NA |

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| Styrene | 100425 | NA | 2,700 | 2,100 (X) | 2.5E+5 | 9.7E+5 | 9.7E+5 | 1.4E+6 | 5.5E+9 | 4.0E+5 | 5.2E+5 |
| Sulfate | 14808798 | NA | 5.0E+6 | NA | NLV | NLV | NLV | NLV | ID | ID | NA |
| Tebuthiuron | 34014181 | NA | 10,000 | NA | NLV | NLV | NLV | NLV | ID | 4.6E+6 (DD) | NA |
| 2,3,7,8-Tetrabromodibenzo-p-dioxin (O) | 50585416 | NA | NLL | NLL | NLV | NLV | NLV | NLV | (O) | (O) | NA |
| 1,2,4,5-Tetrachlorobenzene | 95943 | NA | 1.5E+6 | 3,400 (X) | 5.8E+5 | 2.3E+5 | 2.3E+5 | 2.3E+5 | 6.7E+7 | 7.7E+7 | NA |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (O) | 1746016 | NA | NLL | NLL | NLV | NLV | NLV | NLV | 71 (O) | 0.09 (O) | NA |
| 1,1,1,2-Tetrachloroethane | 630206 | NA | 1,500 | ID | 6,200 | 36,000 | 54,000 | 1.0E+5 | 4.2E+8 | 4.8E+5 (C) | 4.4E+5 |
| 1,1,2,2-Tetrachloroethane | 79345 | NA | 170 | 1,600 (X) | 4,300 | 10,000 | 10,000 | 14,000 | 5.4E+7 | 53,000 | 8.7E+5 |
| Tetrachloroethylene | 127184 | NA | 100 | 1,200 (X) | 11,000 | 1.7E+5 | 4.8E+5 | 1.1E+6 | 2.7E+9 | 2.0E+5 (C) | 88,000 |
| Tetrahydrofuran | 109999 | NA | 1,900 | 2.2E+5 (X) | 1.3E+6 | 1.3E+7 | 6.7E+7 | 1.6E+8 | 3.9E+11 | 2.9E+6 | 1.2E+8 |
| Tetranitromethane | 509148 | NA | ID | NA | 500(M); 110 | 500 (M); 51 | ID | ID | 2.1E+5 | ID | ID |
| Thallium (B) | 7440280 | NA | 2,300 | 4,200 (X) | NLV | NLV | NLV | NLV | 1.3E+7 | 35,000 | NA |
| Toluene (I) | 108883 | NA | 16,000 | 5,400 | 3.3E+5 (C) | 2.8E+6 | 5.1E+6 | 1.2E+7 | 2.7E+10 | 5.0E+7 (C) | 2.5E+5 |
| p-Toluidine | 106490 | NA | 660 (M); 300 | NA | NLV | NLV | NLV | NLV | 1.0E+8 | 94,000 | 1.2E+6 |
| Toxaphene | 8001352 | NA | 24,000 | 8,200 | NLV | NLV | NLV | NLV | 9.7E+6 | 20,000 | NA |
| Triallate | 2303175 | NA | 95,000 | NA | ID | ID | ID | ID | ID | 2.9E+6 (C) | 2.5E+5 |
| Tributylamine | 102829 | NA | 7,800 | ID | 5.8E+5 | 6.0E+5 | 6.0E+5 | 6.0E+5 | 4.7E+8 | 7.9E+5 | 3.7E+6 |
| 1,2,4-Trichlorobenzene | 120821 | NA | 4,200 | 5,900 (X) | 9.6E+6 (C) | 2.8E+7 | 2.8E+7 | 2.8E+7 | 2.5E+10 | 9.9E+5 (DD) | 1.1E+6 |
| 1,1,1-Trichloroethane | 71556 | NA | 4,000 | 1,800 | 2.5E+5 | 3.8E+6 | 1.2E+7 | 2.8E+7 | 6.7E+10 | 5.0E+8 (C) | 4.6E+5 |
| 1,1,2-Trichloroethane | 79005 | NA | 100 | 6,600 (X) | 4,600 | 17,000 | 21,000 | 44,000 | 1.9E+8 | 1.8E+5 | 9.2E+5 |
| Trichloroethylene | 79016 | NA | 100 | 4,000 (X) | 1,000 | 11,000 | 25,000 | 57,000 | 1.3E+8 | 1.1E+5 (DD) | 5.0E+5 |
| Trichlorofluoromethane | 75694 | NA | 52,000 | NA | 2.8E+6 (C) | 9.2E+7 | 6.3E+8 | 1.5E+9 | 3.8E+12 | 7.9E+7 (C) | 5.6E+5 |
| 2,4,5-Trichlorophenol | 95954 | NA | 39,000 | NA | NLV | NLV | NLV | NLV | 2.3E+10 | 2.3E+7 | NA |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4,6-Trichlorophenol | 88062 | NA | 2,400 | 330 (M); 100 | NLV | NLV | NLV | NLV | 1.0E+9 | 7.1E+5 | NA |
| 1,2,3-Trichloropropane | 96184 | NA | 840 | NA | 4,000 | 9,200 | 9,200 | 11,000 | 2.0E+7 | 1.3E+6 (C) | 8.3E+5 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 76131 | NA | 9.0E+6 (C) | 1,700 | 5.1E+6 (C) | 1.8E+8 | 8.8E+8 | 2.1E+9 | 5.1E+12 | 1.0E+9 (C,D) | 5.5E+5 |
| Triethanolamine | 102716 | NA | 74,000 | NA | NLV | NLV | NLV | NLV | 3.3E+9 | 1.1E+8 | 1.1E+8 |

**TABLE 2. SOIL: RESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS**

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per kilogram (ug/kg). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value.

| | | | Groundwater Protection | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Level | Residential Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Soil Volatilization to Indoor Air Inhalation Criteria | Infinite Source Volatile Soil Inhalation Criteria (VSIC) | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria | Direct Contact Criteria | Soil Saturation Concentration Screening Levels |
| Triethylene glycol | 112276 | NA | 86,000 | NA | NLV | NLV | NLV | NLV | ID | 3.9E+7 (C,DD) | 1.1E+5 |
| 3-Trifluoromethyl-4-nitrophenol | 88302 | NA | 1.1E+5 | NA | NLV | NLV | NLV | NLV | ID | 4.1E+7 (DD) | NA |
| Trifluralin | 1582098 | NA | 1.9E+5 | NA | ID | ID | ID | ID | ID | 2.0E+6 | NA |
| 2,2,4-Trimethyl pentane | 540841 | NA | ID | NA | 1.1E+5 (C) | 5.2E+6 | 3.9E+7 | 9.6E+7 | 2.3E+11 | ID | 19,000 |
| 2,4,4-Trimethyl-2-pentene (I) | 107404 | NA | ID | NA | ID | ID | ID | ID | ID | ID | 56,000 |
| 1,2,4-Trimethylbenzene (I) | 95636 | NA | 2,100 | 570 | 4.3E+6 (C) | 2.1E+7 | 5.0E+8 | 5.0E+8 | 8.2E+10 | 3.2E+7 (C) | 1.1E+5 |
| 1,3,5-Trimethylbenzene (I) | 108678 | NA | 1,800 | 1,100 | 2.6E+6 (C) | 1.6E+7 | 3.8E+8 | 3.8E+8 | 8.2E+10 | 3.2E+7 (C) | 94,000 |
| Triphenyl phosphate | 115866 | NA | 1.5E+6 (C) | NA | NLV | NLV | NLV | NLV | ID | 3.6E+7 (C) | 1.1E+5 |
| tris(2,3-Dibromopropyl)phosphate | 126727 | NA | 930 | ID | 82,000 (C) | 18,000 | 18,000 | 18,000 | 5.9E+6 | 4,400 | 27,000 |
| Urea | 57136 | NA | ID | NA | NLV | NLV | NLV | NLV | ID | ID | NA |
| Vanadium | 7440622 | NA | 72,000 | 4.3E+5 | NLV | NLV | NLV | NLV | ID | 7.5E+5 (DD) | NA |
| Vinyl acetate (I) | 108054 | NA | 13,000 | NA | 7.9E+5 | 1.7E+6 | 2.6E+6 | 5.8E+6 | 1.3E+10 | 5.8E+6 (C,DD) | 2.4E+6 |
| Vinyl chloride | 75014 | NA | 40 | 260 (X) | 270 | 4,200 | 30,000 | 73,000 | 3.5E+8 | 3,800 | 4.9E+5 |
| White phosphorus (R) | 12185103 | NA | 2.2 | NA | NLV | NLV | NLV | NLV | ID | 2,300 (DD) | NA |
| Xylenes (I) | 1330207 | NA | 5,600 | 820 | 6.3E+6 (C) | 4.6E+7 | 6.1E+7 | 1.3E+8 | 2.9E+11 | 4.1E+8 (C) | 1.5E+5 |
| Zinc (B) | 7440666 | 47,000 | 2.4E+6 | (G) | NLV | NLV | NLV | NLV | ID | 1.7E+8 | NA |

History: 2013 AACS.

**R 299.48 Generic soil cleanup criteria for nonresidential category.**

Rule 48. Generic soil cleanup criteria for nonresidential category shall be as shown in table 3.

**TABLE 3. SOIL: NONRESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS**

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per kilogram (ug/kg). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value.

| | | | Groundwater Protection | | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Levels | Residential Drinking Water Protection Criteria | Nonresidential Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Soil Volatilization to Indoor Air Inhalation Criteria | Infinite Source Volatile Soil Inhalation Criteria (VSIC) | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria | Direct Contact Criteria | Soil Saturation Concentration Screening Levels |
| Acenaphthene | 83329 | NA | 3.0E+5 | 8.8E+5 | 8,700 | 3.5E+8 | 9.7E+7 | 9.7E+7 | 9.7E+7 | 6.2E+9 | 1.3E+8 | NA |
| Acenaphthylene | 208968 | NA | 5,900 | 17,000 | ID | 3.0E+6 | 2.7E+6 | 2.7E+6 | 2.7E+6 | 1.0E+9 | 5.2E+6 | NA |
| Acetaldehyde (I) | 75070 | NA | 19,000 | 54,000 | 2,600 | 4.0E+5 | 2.1E+5 | 2.1E+5 | 2.9E+5 | 2.6E+8 | 9.5E+7 | 1.1E+8 |
| Acetate | 71501 | NA | ID | ID | (G) | ID | ID | ID | ID | ID | ID | ID |
| Acetic acid | 64197 | NA | 84,000 | 2.4E+5 | (G) | NLV | NLV | NLV | NLV | 7.4E+9 | 4.2E+8 | 6.5E+8 |
| Acetone (I) | 67641 | NA | 15,000 | 42,000 | 34,000 | 5.4E+8 (C) | 1.6E+8 | 1.6E+8 | 2.0E+8 | 1.7E+11 | 7.3E+7 | 1.1E+8 |
| Acetonitrile | 75058 | NA | 2,800 | 8,000 | NA | 8.8E+6 | 1.9E+6 | 1.9E+6 | 2.2E+6 | 1.8E+9 | 1.4E+7 | 2.2E+7 |
| Acetophenone | 98862 | NA | 30,000 | 88,000 | ID | 2.1E+8 (C) | 5.2E+7 | 5.2E+7 | 5.2E+7 | 1.4E+10 | 1.5E+8 (C) | 1.1E+6 |
| Acrolein (I) | 107028 | NA | 2,400 | 6,600 | NA | 760 | 370 | 370 | 630 | 5.9E+5 | 1.2E+7 | 2.3E+7 |
| Acrylamide | 79061 | NA | 10 | 10 | 200 (X) | NLV | NLV | NLV | NLV | 3.0E+6 | 8,700 | NA |
| Acrylic acid | 79107 | NA | 78,000 | 2.2E+5 | NA | 5.5E+6 | 2.2E+5 | 2.7E+5 | 2.7E+5 | 2.9E+7 | 2.1E+8 (C,DD) | 1.1E+8 |
| Acrylonitrile (I) | 107131 | NA | 100 (M); 52 | 220 | 100 (M); 40 | 35,000 | 17,000 | 17,000 | 31,000 | 5.8E+7 | 74,000 | 8.3E+6 |
| Alachlor | 15972608 | NA | 52 | 52 | 290 (X) | NLV | NLV | NLV | NLV | ID | 3.9E+5 | NA |
| Aldicarb | 116063 | NA | 60 | 60 | NA | NLV | NLV | NLV | NLV | ID | 7.3E+5 | NA |
| Aldicarb sulfone | 1646884 | NA | 200 (M); 40 | 200 (M); 40 | NA | NLV | NLV | NLV | NLV | ID | 8.0E+5 | NA |
| Aldicarb sulfoxide | 1646873 | NA | 200(M); 80 | 200 (M); 80 | NA | NLV | NLV | NLV | NLV | ID | 9.5E+5 | NA |
| Aldrin | 309002 | NA | NLL | NLL | NLL | 7.1E+6 | 2.0E+5 | 2.0E+5 | 2.0E+5 | 8.0E+5 | 4,300 | NA |
| Aluminum (B) | 7429905 | 6.9E+6 | 1,000 | 1,000 | NA | NLV | NLV | NLV | NLV | ID | 3.7E+8 (DD) | NA |
| Ammonia | 7664417 | NA | ID | ID | (CC) | ID | ID | ID | ID | 2.9E+9 | ID | 1.0E+7 |
| t-Amyl methyl ether (TAME) | 994058 | NA | 3,900 | 3,900 | NA | 1.1E+5 | 4.0E+5 | 7.8E+5 | 1.8E+6 | 1.8E+9 | 9.5E+7 (C) | 4.4E+5 |
| Aniline | 62533 | NA | 1,100 | 4,400 | 330 (M); 80 | NLV | NLV | NLV | NLV | 2.9E+7 | 1.5E+6 | 4.5E+6 |
| Anthracene | 120127 | NA | 41,000 | 41,000 | ID | 1.0E+9 | 1.6E+9 | 1.6E+9 | 1.6E+9 | 2.9E+10 | 7.3E+8 | NA |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (D) | | | | | | |
| Antimony | 7440360 | NA | 4,300 | 4,300 | 94,000 (X) | NLV | NLV | NLV | NLV | 5.9E+6 | 6.7E+5 | NA |
| Arsenic | 7440382 | 5,800 | 4,600 | 4,600 | 4,600 | NLV | NLV | NLV | NLV | 9.1E+5 | 37,000 | NA |
| Asbestos (BB) | 1332214 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 1.0E+7 (M); 85,000 | ID | NA |
| Atrazine | 1912249 | NA | 60 | 60 | 150 | NLV | NLV | NLV | NLV | ID | 3.3E+5 (DD) | NA |
| Azobenzene | 103333 | NA | 4,200 | 17,000 | ID | 3.2E+7 | 2.1E+6 | 2.1E+6 | 2.1E+6 | 1.3E+8 | 6.6E+5 | NA |

**TABLE 3. SOIL: NONRESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;**

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per kilogram (ug/kg). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value.

| | | | Groundwater Protection | | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Levels | Residential Drinking Water Protection Criteria & RBSLs | Nonresidential Drinking Water Protection Criteria & RBSLs | Groundwater Surface Water Interface Protection Criteria & RBSLs | Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs | Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria & RBSLs | Direct Contact Criteria & RBSLs | Soil Saturation Concentration Screening Levels |
| Barium (B) | 7440393 | 75,000 | 1.3E+6 | 1.3E+6 | (G) | NLV | NLV | NLV | NLV | 1.5E+8 | 1.3E+8 | NA |
| Benzene (I) | 71432 | NA | 100 | 100 | 4,000 (X) | 8,400 | 45,000 | 99,000 | 2.3E+5 | 4.7E+8 | 8.4E+5 (C) | 4.0E+5 |
| Benzidine | 92875 | NA | 1,000 (M); 6.0 | 1,000 (M); 6.0 | 1,000 (M); 6.0 | NLV | NLV | NLV | NLV | 59,000 | 1,000 (M); 110 | NA |
| Benzo(a)anthracene (Q) | 56553 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 80,000 | NA |
| Benzo(b)fluoranthene (Q) | 205992 | NA | NLL | NLL | NLL | ID | ID | ID | ID | ID | 80,000 | NA |
| Benzo(k)fluoranthene (Q) | 207089 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 8.0E+5 | NA |
| Benzo(g,h,i)perylene | 191242 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 3.5E+8 | 7.0E+6 | NA |
| Benzo(a)pyrene (Q) | 50328 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 1.9E+6 | 8,000 | NA |
| Benzoic acid | 65850 | NA | 6.4E+5 | 1.8E+6 | NA | NLV | NLV | NLV | NLV | ID | 1.0E+9 (D) | NA |
| Benzyl alcohol | 100516 | NA | 2.0E+5 | 5.8E+5 | NA | NLV | NLV | NLV | NLV | 1.5E+11 | 1.0E+9 (C,D) | 5.8E+6 |
| Benzyl chloride | 100447 | NA | 150 | 640 | NA | 33,000 | 48,000 | 48,000 | 52,000 | 7.8E+7 | 2.2E+5 | 2.3E+5 |
| Beryllium | 7440417 | NA | 51,000 | 51,000 | (G) | NLV | NLV | NLV | NLV | 5.9E+5 | 1.6E+6 | NA |
| bis(2-Chloroethoxy)ethane | 112265 | NA | ID | ID | ID | NLV | NLV | NLV | NLV | ID | ID | 2.7E+6 |
| bis(2-Chloroethyl)ether (I) | 111444 | NA | 100 | 170 | 100 (M); 20 | 44,000 | 13,000 | 13,000 | 13,000 | 1.2E+7 | 58,000 | 2.2E+6 |
| bis(2-Ethylhexyl)phthalate | 117817 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 8.9E+8 | 1.2E+7 (C) | 1.0E+7 |
| Boron (B) | 7440428 | NA | 10,000 | 10,000 | 1.4E+5 (X) | NLV | NLV | NLV | NLV | ID | 3.5E+8 (DD) | NA |
| Bromate | 15541454 | NA | 200 | 200 | 800 (X) | NLV | NLV | NLV | NLV | ID | 91,000 | NA |
| Bromobenzene (I) | 108861 | NA | 550 | 1,500 | NA | 5.8E+5 | 5.4E+5 | 5.4E+5 | 5.4E+5 | 2.4E+8 | 1.7E+6 (C) | 7.6E+5 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bromodichlorometh ane | 75274 | NA | 1,600 (W) | 1,600 (W) | ID | 6,400 | 31,000 | 31,000 | 57,000 | 1.1E+8 | 4.9E+5 | 1.5E+6 |
| Bromoform | 75252 | NA | 1,600 (W) | 1,600 (W) | ID | 7.7E+5 | 3.1E+6 | 3.1E+6 | 3.1E+6 | 3.6E+9 | 3.8E+6 (C) | 8.7E+5 |
| Bromomethane | 74839 | NA | 200 | 580 | 700 | 1,600 | 13,000 | 57,000 | 1.4E+5 | 1.5E+8 | 1.0E+6 | 2.2E+6 |
| n-Butanol (I) | 71363 | NA | 19,000 | 54,000 | 2.00E+05 | NLV | NLV | NLV | NLV | 1.0E+10 | 9.5E+7 (C) | 8.7E+6 |
| 2-Butanone (MEK) (I) | 78933 | NA | 2.6E+5 | 7.6E+5 | 44,000 | 9.9E+7 (C) | 3.5E+7 | 3.5E+7 | 3.6E+7 | 2.9E+10 | 7.0E+8 (C,DD) | 2.7E+7 |
| n-Butyl acetate | 123864 | NA | 11,000 | 32,000 | NA | 1.0E+8 (C) | 1.4E+8 | 3.1E+8 | 3.5E+8 | 2.1E+11 | 5.5E+7 (C) | 1.1E+6 |
| t-Butyl alcohol | 75650 | NA | 78,000 | 2.2E+5 | NA | 5.8E+8 (C) | 1.2E+8 | 2.4E+8 | 2.4E+8 | 5.6E+10 | 3.9E+8 (C) | 1.1E+8 |
| Butyl benzyl phthalate | 85687 | NA | 2.2E+6 (C) | 5.0E+6 (C) | 1.2E+5 (X) | NLV | NLV | NLV | NLV | 2.1E+10 | 1.2E+8 (C) | 3.1E+5 |
| n-Butylbenzene | 104518 | NA | 1,600 | 4,600 | ID | ID | ID | ID | ID | 8.8E+8 | 8.0E+6 | 1.0E+7 |

**TABLE 3. SOIL: NONRESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;**

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to 1 microgram per kilogram (ug/kg). Criteria with 6 or more digits are expressed in scientific notation. For example, 200,000 is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (§324.20120a(10)). In these cases, 2 numbers are present in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value.

| | | | Groundwater Protection | | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Levels | Residential Drinking Water Protection Criteria & RBSLs | Nonresidential Drinking Water Protection Criteria & RBSLs | Groundwater Surface Water Interface Protection Criteria & RBSLs | Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs | Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria & RBSLs | Direct Contact Criteria & RBSLs | Soil Saturation Concentration Screening Levels |
| sec-Butylbenzene | 135988 | NA | 1,600 | 4,600 | ID | ID | ID | ID | ID | 1.8E+8 | 8.0E+6 | 1.0E+7 |
| t-Butylbenzene (I) | 98066 | NA | 1,600 | 4,600 | ID | ID | ID | ID | ID | 2.9E+8 | 8.0E+6 | 1.0E+7 |
| Cadmium (B) | 7440439 | 1,200 | 6,000 | 6,000 | (G,X) | NLV | NLV | NLV | NLV | 2.2E+6 | 2.1E+6 | NA |
| Camphene (I) | 79925 | NA | ID | ID | NA | 6,700 | 1.8E+5 | 9.1E+5 | 2.2E+6 | 2.4E+9 | ID | NA |
| Caprolactam | 105602 | NA | 1.2E+5 | 3.4E+5 | NA | NLV | NLV | NLV | NLV | 2.9E+8 | 3.1E+8 (DD) | NA |
| Carbaryl | 63252 | NA | 14,000 | 40,000 | NA | ID | ID | ID | ID | ID | 7.0E+7 | NA |
| Carbazole | 86748 | NA | 9,400 | 39,000 | 1,100 | NLV | NLV | NLV | NLV | 7.8E+7 | 2.4E+6 | NA |
| Carbofuran | 1563662 | NA | 800 | 800 | NA | NLV | NLV | NLV | NLV | ID | 3.6E+6 | NA |
| Carbon disulfide (I,R) | 75150 | NA | 16,000 | 46,000 | ID | 1.4E+5 | 1.6E+6 | 8.0E+6 | 1.9E+7 | 2.1E+10 | 4.3E+7 (C,DD) | 2.8E+5 |
| Carbon tetrachloride | 56235 | NA | 100 | 100 | 900 (X) | 990 | 12,000 | 34,000 | 79,000 | 1.7E+8 | 4.4E+5 (C) | 3.9E+5 |
| Chlordane (J) | 57749 | NA | NLL | NLL | NLL | 5.9E+7 | 4.2E+6 | 4.2E+6 | 4.2E+6 | 2.1E+7 | 1.5E+5 | NA |
| Chloride | 16887006 | NA | 5.0E+6 | 5.0E+6 | (X) | NLV | NLV | NLV | NLV | ID | 5.0E+5 (F) | NA |
| Chlorobenzene (I) | 108907 | NA | 2,000 | 2,000 | 500 | 2.2E+5 | 9.2E+5 | 1.1E+6 | 2.1E+6 | 2.1E+9 | 1.4E+7 (C) | 2.6E+5 |
| p-Chlorobenzene sulfonic acid | 98668 | NA | 1.5E+5 | 4.2E+5 | ID | ID | ID | ID | ID | ID | 7.3E+8 | ID |
| 1-Chloro-1,1-difluoroethane | 75683 | NA | 3.0E+5 | 8.8E+5 | NA | 5.4E+6 (C) | 9.4E+7 | 5.7E+8 | 1.4E+9 | 1.5E+12 | 1.0E+9 (C,D) | 9.6E+5 |
| Chloroethane | 75003 | NA | 8,600 | 34,000 | 22,000 (X) | 5.3E+6 (C) | 3.6E+7 | 1.2E+8 | 2.8E+8 | 2.9E+11 | 1.2E+7 (C) | 9.5E+5 |
| 2-Chloroethyl vinyl ether | 110758 | NA | ID | ID | NA | ID | ID | ID | ID | ID | ID | 1.9E+6 |
| Chloroform | 67663 | NA | 1,600 (W) | 1,600 (W) | 7,000 | 38,000 | 1.5E+5 | 3.4E+5 | 7.9E+5 | 1.6E+9 | 5.5E+6 (C) | 1.5E+6 |
| Chloromethane (I) | 74873 | NA | 5,200 | 22,000 | ID | 10,000 | 1.2E+5 | 1.0E+6 | 2.5E+6 | 2.6E+9 | 7.4E+6 (C) | 1.1E+6 |
| 4-Chloro-3-methylphenol | 59507 | NA | 5,800 | 16,000 | 280 | NLV | NLV | NLV | NLV | ID | 1.5E+7 | NA |
| beta- | 91587 | NA | 6.2E+5 | 1.8E+6 | NA | ID | ID | ID | ID | ID | 1.8E+8 | NA |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloronaphthalene | | | | | | | | | | | | |
| 2-Chlorophenol | 95578 | NA | 900 | 2,600 | 360 | 8.0E+5 | 1.1E+6 | 1.1E+6 | 1.1E+6 | 5.3E+8 | 4.5E+6 | 1.9E+7 |
| o-Chlorotoluene (I) | 95498 | NA | 3,300 | 9,300 | ID | 5.0E+5 | 1.5E+6 | 3.1E+6 | 6.4E+6 | 2.1E+9 | 1.5E+7 (C) | 5.0E+5 |
| Chlorpyrifos | 2921882 | NA | 17,000 | 48,000 | 1,500 | 240 | 5,500 | 23,000 | 56,000 | 5.9E+7 | 3.4E+7 | NA |
| Chromium (III) (B,H) | 16065831 | 18,000 (total) | 1.0E+9 (D) | 1.0E+9 (D) | (G,X) | NLV | NLV | NLV | NLV | 1.5E+8 | 1.0E+9 (D) | NA |
| Chromium (VI) | 18540299 | NA | 30,000 | 30,000 | 3,300 | NLV | NLV | NLV | NLV | 2.4E+5 | 9.2E+6 | NA |
| Chrysene (Q) | 218019 | NA | NLL | NLL | NLL | ID | ID | ID | ID | ID | 8.0E+6 | NA |

**TABLE 3. SOIL: NONRESIDENTIAL**
**PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;**

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| | | | Groundwater Protection | | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| Cobalt | 7440484 | 6,800 | 800 | 2,000 | 2,000 | NLV | NLV | NLV | NLV | 5.9E+6 | 9.0E+6 | NA |
| Copper (B) | 7440508 | 32,000 | 5.8E+6 | 5.8E+6 | (G) | NLV | NLV | NLV | NLV | 5.9E+7 | 7.3E+7 | NA |
| Cyanazine | 21725462 | NA | 200 | 200 | 1,100 (X) | NLV | NLV | NLV | NLV | ID | 66,000 | NA |
| Cyanide (P,R) | 57125 | 390 (total) | 4,000 | 4,000 | 100 | NLV | NLV | NLV | NLV | 2.5E+5 | 2.5E+5 | NA |
| Cyclohexanone | 108941 | NA | 5.2E+6 | 1.5E+7 | NA | 32,000 | 1.3E+6 | 1.1E+7 | 2.7E+7 | 2.9E+10 | 1.0E+9 (C,D) | 2.2E+8 |
| Dacthal | 1861321 | NA | 50,000 | 1.4E+5 | NA | NLV | NLV | NLV | NLV | ID | 7.3E+6 | NA |
| Dalapon | 75990 | NA | 4,000 | 4,000 | NA | NLV | NLV | NLV | NLV | ID | 6.2E+7 (C) | 5.9E+7 |
| 4-4'-DDD | 72548 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 5.6E+7 | 4.0E+5 | NA |
| 4-4'-DDE | 72559 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 4.0E+7 | 1.9E+5 | NA |
| 4-4'-DDT | 50293 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 4.0E+7 | 2.8E+5 | NA |
| Decabromodiphenyl ether | 1163195 | NA | 1.4E+5 | 1.4E+5 | NA | 1.0E+9 (D) | 1.0E+8 | 1.0E+8 | 1.0E+8 | 1.0E+9 | 1.1E+7 | NA |
| Di-n-butyl phthalate | 84742 | NA | 9.6E+5 (C) | 2.7E+6 (C) | 11,000 | NLV | NLV | NLV | NLV | 1.5E+9 | 8.7E+7 (C) | 7.6E+5 |
| Di(2-ethylhexyl) adipate | 103231 | NA | 1.3E+7 (C) | 1.3E+7 (C) | ID | NLV | NLV | NLV | NLV | 1.2E+10 | 6.3E+7 (C,DD) | 9.6E+5 |
| Di-n-octyl phthalate | 117840 | NA | 1.0E+8 | 2.9E+8 (C) | ID | NLV | NLV | NLV | NLV | 1.4E+10 | 2.0E+7 | 1.4E+8 |
| Diacetone alcohol (I) | 123422 | NA | ID | ID | NA | NLV | NLV | NLV | NLV | 7.1E+10 | ID | 1.1E+8 |
| Diazinon | 333415 | NA | 95 | 280 | 72 | NLV | NLV | NLV | NLV | ID | 70,000 (DD) | 3.1E+5 |
| Dibenzo(a,h)anthracene (Q) | 53703 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 8,000 | NA |
| Dibenzofuran | 132649 | NA | ID | ID | 1,700 | 3.6E+6 | 1.6E+5 | 1.6E+5 | 1.6E+5 | 2.9E+6 | ID | NA |
| Dibromochloromethane | 124481 | NA | 1,600 (W) | 1,600 (W) | ID | 21,000 | 80,000 | 80,000 | 98,000 | 1.6E+8 | 5.0E+5 | 6.1E+5 |
| Dibromochloropropane | 96128 | NA | 10 (M); 4.0 | 10 (M); 4.0 | ID | 1,200 | 900 | 900 | 900 | 7.0E+5 | 20,000 (C) | 1,200 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dibromomethane | 74953 | NA | 1,600 | 4,600 | NA | ID | ID | ID | ID | ID | 8.0E+6 (C) | 2.0E+6 |
| Dicamba | 1918009 | NA | 4,400 | 13,000 | NA | NLV | NLV | NLV | NLV | ID | 1.7E+7 | NA |
| 1,2-Dichlorobenzene | 95501 | NA | 14,000 | 14,000 | 280 | 2.0E+7 (C) | 4.6E+7 | 4.6E+7 | 5.5E+7 | 4.4E+10 | 6.3E+7 (C) | 2.1E+5 |
| 1,3-Dichlorobenzene | 541731 | NA | 170 | 480 | 680 | 48,000 | 94,000 | 94,000 | 1.1E+5 | 8.8E+7 | 6.6E+5 (C) | 1.7E+5 |
| 1,4-Dichlorobenzene | 106467 | NA | 1,700 | 1,700 | 360 | 1.0E+5 | 2.6E+5 | 2.6E+5 | 3.4E+5 | 5.7E+8 | 1.9E+6 | NA |
| 3,3'-Dichlorobenzidine | 91941 | NA | 2,000 (M); 28 | 2,000 (M); 110 | 2,000 (M); 7.4 | NLV | NLV | NLV | NLV | 8.2E+6 | 30,000 | NA |
| Dichlorodifluoromethane | 75718 | NA | 95,000 | 2.7E+5 | ID | 1.7E+6 | 6.3E+7 | 5.5E+8 | 1.4E+9 | 1.5E+12 | 1.7E+8 (C) | 1.0E+6 |

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| 1,1-Dichloroethane | 75343 | NA | 18,000 | 50,000 | 15,000 | 4.3E+5 | 2.5E+6 | 6.0E+6 | 1.4E+7 | 1.5E+10 | 8.7E+7 (C) | 8.9E+5 |
| 1,2-Dichloroethane (I) | 107062 | NA | 100 | 100 | 7,200 (X) | 11,000 | 21,000 | 33,000 | 74,000 | 1.5E+8 | 4.2E+5 | 1.2E+6 |
| 1,1-Dichloroethylene (I) | 75354 | NA | 140 | 140 | 2,600 | 330 | 3,700 | 15,000 | 37,000 | 7.8E+7 | 6.6E+5 (C) | 5.7E+5 |
| cis-1,2-Dichloroethylene | 156592 | NA | 1,400 | 1,400 | 12,000 | 41,000 | 2.1E+5 | 4.3E+5 | 1.0E+6 | 1.0E+9 | 8.0E+6 (C) | 6.4E+5 |
| trans-1,2-Dichloroethylene | 156605 | NA | 2,000 | 2,000 | 30,000 (X) | 43,000 | 3.3E+5 | 8.4E+5 | 2.0E+6 | 2.1E+9 | 1.2E+7 (C) | 1.4E+6 |
| 2,6-Dichloro-4-nitroaniline | 99309 | NA | 44,000 | 1.3E+5 | NA | NLV | NLV | NLV | NLV | ID | 2.2E+8 | NA |
| 2,4-Dichlorophenol | 120832 | NA | 1,500 | 4,200 | 330 (M); 220 | NLV | NLV | NLV | NLV | 2.3E+9 | 3.9E+6 (C,DD) | 1.8E+6 |
| 2,4-Dichlorophenoxyacetic acid | 94757 | NA | 1,400 | 1,400 | 4,400 | NLV | NLV | NLV | NLV | 2.9E+9 | 8.6E+6 | NA |
| 1,2-Dichloropropane (I) | 78875 | NA | 100 | 100 | 4,600 (X) | 7,400 | 30,000 | 51,000 | 1.2E+5 | 1.2E+8 | 6.6E+5 (C) | 5.5E+5 |
| 1,3-Dichloropropene | 542756 | NA | 170 | 700 | 180 (X) | 5,400 | 60,000 | 2.0E+5 | 4.7E+5 | 5.9E+8 | 2.4E+5 | 6.2E+5 |
| Dichlorovos | 62737 | NA | 50 (M); 32 | 130 | NA | NLV | NLV | NLV | NLV | 1.5E+7 | 47,000 | 2.2E+6 |
| Dicyclohexyl phthalate | 84617 | NA | ID | ID | NA | ID | ID | ID | ID | ID | ID | NA |
| Dieldrin | 60571 | NA | NLL | NLL | NLL | 7.2E+5 | 64,000 | 64,000 | 64,000 | 8.5E+5 | 4,700 | NA |
| Diethyl ether | 60297 | NA | 200 | 200 | ID | 5.2E+7 (C) | 1.0E+8 | 1.6E+8 | 3.5E+8 | 3.5E+11 | 3.6E+8 (C) | 7.4E+6 |
| Diethyl phthalate | 84662 | NA | 1.1E+5 | 3.2E+5 | 2,200 | NLV | NLV | NLV | NLV | 1.5E+9 | 5.5E+8 (C) | 7.4E+5 |
| Diethylene glycol monobutyl ether | 112345 | NA | 1,800 | 5,000 | NA | NLV | NLV | NLV | NLV | 5.9E+8 | 8.7E+6 | 1.1E+8 |
| Diisopropyl ether | 108203 | NA | 600 | 1,700 (C) | ID | 1.2E+6 (C) | 3.2E+6 | 4.8E+6 | 1.0E+7 | 1.1E+10 | 3.0E+6 (C) | 1,300 |
| Diisopropylamine | 108189 | NA | 110 | 320 | NA | 1.0E+7 (C) | 7.4E+6 | 7.4E+6 | 7.7E+6 | 5.9E+9 | 5.6E+5 | 6.7E+6 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (I) | | | | | | | | | | | | |
| Dimethyl phthalate | 131113 | NA | 1.5E+6 (C) | 4.2E+6 (C) | NA | NLV | NLV | NLV | NLV | 1.5E+9 | 1.0E+9 (C,D) | 7.9E+5 |
| N,N-Dimethylacetamide | 127195 | NA | 3,600 | 10,000 | 82,000 (X) | NLV | NLV | NLV | NLV | ID | 1.8E+7 | 1.1E+8 |
| N,N-Dimethylaniline | 121697 | NA | 320 | 920 | NA | 8.9E+5 (C) | 5.2E+5 | 5.2E+5 | 5.2E+5 | 3.3E+8 | 1.6E+6 (C) | 8.0E+5 |
| Dimethylformamide (I) | 68122 | NA | 14,000 | 40,000 | NA | NLV | NLV | NLV | NLV | 8.8E+8 | 7.0E+7 | 1.1E+8 |
| 2,4-Dimethylphenol | 105679 | NA | 7,400 | 20,000 | 7,600 | NLV | NLV | NLV | NLV | 2.1E+9 | 3.6E+7 | NA |
| 2,6-Dimethylphenol | 576261 | NA | 330 (M); 88 | 330 (M); 260 | NA | NLV | NLV | NLV | NLV | 5.9E+7 | 4.4E+5 | NA |
| 3,4-Dimethylphenol | 95658 | NA | 330 (M); 200 | 580 | 500 | NLV | NLV | NLV | NLV | 1.0E+8 | 1.0E+6 | NA |
| Dimethylsulfoxide | 67685 | NA | 4.4E+6 | 1.3E+7 | 3.8E+6 | NLV | NLV | NLV | NLV | 5.9E+8 | 1.0E+9 (C,D) | 1.8E+7 |
| 2,4-Dinitrotoluene | 121142 | NA | 430 | 640 | NA | NLV | NLV | NLV | NLV | 2.0E+7 | 2.2E+5 | NA |

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| Dinoseb | 88857 | NA | 300 | 300 | 200 (M); 43 | NLV | NLV | NLV | NLV | 1.2E+8 | 3.9E+5 (C,DD) | 1.4E+5 |
| 1,4-Dioxane (I) | 123911 | NA | 1,700 | 7,000 | 56,000 (X) | NLV | NLV | NLV | NLV | 7.1E+8 | 2.4E+6 | 9.7E+7 |
| Diquat | 85007 | NA | 400 | 400 | 400 | NLV | NLV | NLV | NLV | ID | 1.6E+6 | NA |
| Diuron | 330541 | NA | 620 | 1,800 | NA | NLV | NLV | NLV | NLV | 2.1E+8 | 3.1E+6 | NA |
| Endosulfan (J) | 115297 | NA | NLL | NLL | NLL | ID | ID | ID | ID | ID | 4.4E+6 | NA |
| Endothall | 145733 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 1.0E+9 | 1.2E+7 | NA |
| Endrin | 72208 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 1.9E+5 | NA |
| Epichlorohydrin (I) | 106898 | NA | 100 | 100 | NA | 1.2E+5 | 37,000 | 37,000 | 37,000 | 2.9E+7 | 41,000 | 7.3E+6 |
| Ethanol (I) | 64175 | NA | 3.8E+7 | 7.6E+7 | ID | NLV | NLV | NLV | NLV | 5.6E+11 | 1.0E+9 (C,D,DDD) | 1.1E+8 |
| Ethyl acetate (I) | 141786 | NA | 1.3E+5 | 3.8E+5 | NA | 7.0E+7 (C) | 5.9E+7 | 5.9E+7 | 1.0E+8 | 9.4E+10 | 6.6E+8 (C) | 7.5E+6 |
| Ethyl-tert-butyl ether (ETBE) | 637923 | NA | 980 | 980 | ID | 1.7E+6 (C) | 2.3E+6 | 4.6E+6 | 1.1E+7 | 1.1E+10 | ID | 6.5E+5 |
| Ethylbenzene (I) | 100414 | NA | 1,500 | 1,500 | 360 | 4.6E+5 (C) | 2.4E+6 | 3.1E+6 | 6.5E+6 | 1.3E+10 | 7.1E+7 (C) | 1.4E+5 |
| Ethylene dibromide | 106934 | NA | 20 (M); 1.0 | 20 (M); 1.0 | 110 (X) | 3,600 | 5,800 | 5,800 | 9,800 | 1.8E+7 | 430 | 8.9E+5 |
| Ethylene glycol | 107211 | NA | 3.0E+5 | 8.4E+5 | 3.8E+6 (X) | NLV | NLV | NLV | NLV | 2.9E+10 | 1.0E+9 (C,D) | 1.1E+8 |
| Ethylene glycol monobutyl ether | 111762 | NA | 74,000 | 2.0E+5 | NA | 1.4E+6 | 2.1E+7 | 1.5E+8 | 3.6E+8 | 3.8E+11 | 3.6E+8 (C) | 4.1E+7 |
| Fluoranthene | 206440 | NA | 7.3E+5 | 7.3E+5 | 5,500 | 1.0E+9 (D) | 8.9E+8 | 8.8E+8 | 8.8E+8 | 4.1E+9 | 1.3E+8 | NA |
| Fluorene | 86737 | NA | 3.9E+5 | 8.9E+5 | 5,300 | 1.0E+9 (D) | 1.5E+8 | 1.5E+8 | 1.5E+8 | 4.1E+9 | 8.7E+7 | NA |
| Fluorine (soluble fluoride) (B) | 7782414 | NA | 40,000 | 40,000 | ID | NLV | NLV | NLV | NLV | ID | 6.7E+7 (DD) | NA |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Formaldehyde | 50000 | NA | 26,000 | 76,000 | 2,400 | 65,000 | 43,000 | 69,000 | 1.5E+5 | 2.6E+8 | 1.3E+8 (C) | 6.0E+7 |
| Formic acid (I,U) | 64186 | NA | 2.0E+5 | 5.8E+5 | ID | 2.8E+6 | 2.6E+5 | 1.6E+5 | 1.6E+5 | 5.9E+7 | 1.0E+9 (C,D) | 1.1E+8 |
| 1-Formylpiperidine | 2591868 | NA | 1,600 | 4,600 | NA | ID | ID | ID | ID | ID | 8.0E+6 | 1.0E+7 |
| Gentian violet | 548629 | NA | 300 | 1,300 | NA | NLV | NLV | NLV | NLV | ID | 4.4E+5 | NA |
| Glyphosate | 1071836 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 5.7E+7 (DD) | NA |
| Heptachlor | 76448 | NA | NLL | NLL | NLL | 1.9E+6 | 2.1E+5 | 2.1E+5 | 2.1E+5 | 3.0E+6 | 23,000 | NA |
| Heptachlor epoxide | 1024573 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 1.5E+6 | 9,500 | NA |
| n-Heptane | 142825 | NA | 4.6E+7 (C) | 1.3E+8 (C) | NA | 2.7E+6 (C) | 2.5E+7 | 4.5E+7 | 1.0E+8 | 1.0E+11 | 1.0E+9 (C,D) | 2.4E+5 |

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| Hexabromobenzene | 87821 | NA | 5,400 | 5,400 | ID | ID | ID | ID | ID | ID | 3.1E+6 | NA |
| Hexachlorobenzene (C-66) | 118741 | NA | 1,800 | 1,800 | 350 | 2.2E+5 | 56,000 | 56,000 | 56,000 | 8.5E+6 | 37,000 | NA |
| Hexachlorobutadiene (C-46) | 87683 | NA | 26,000 | 72,000 | 91 | 7.1E+5 (C) | 4.6E+5 | 4.6E+5 | 4.6E+5 | 1.8E+8 | 4.7E+5 (C) | 3.5E+5 |
| alpha-Hexachlorocyclohexane | 319846 | NA | 18 | 71 | ID | 1.6E+5 | 41,000 | 86,000 | 86,000 | 2.1E+6 | 12,000 | NA |
| beta-Hexachlorocyclohexane | 319857 | NA | 37 | 150 | ID | NLV | NLV | NLV | NLV | 7.4E+6 | 25,000 | NA |
| Hexachlorocyclopentadiene (C-56) | 77474 | NA | 3.2E+5 | 3.2E+5 | ID | 56,000 | 60,000 | 60,000 | 60,000 | 5.9E+6 | 6.7E+6 (C) | 7.2E+5 |
| Hexachloroethane | 67721 | NA | 430 | 1,200 | 1,800 (X) | 79,000 | 6.6E+5 | 1.4E+6 | 1.4E+6 | 1.0E+8 | 7.3E+5 | NA |
| n-Hexane | 110543 | NA | 1.8E+5 (C) | 5.1E+5 (C) | NA | 9.5E+5 (C) | 3.5E+6 | 3.5E+6 | 6.4E+6 | 5.9E+9 | 3.0E+8 (C) | 44,000 |
| 2-Hexanone | 591786 | NA | 20,000 | 58,000 | ID | 1.8E+6 | 1.3E+6 | 1.3E+6 | 1.5E+6 | 1.2E+9 | 1.0E+8 (C) | 2.5E+6 |
| Indeno(1,2,3-cd)pyrene (Q) | 193395 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 80,000 | NA |
| Iron (B) | 7439896 | 1.2E+7 | 6,000 | 6,000 | NA | NLV | NLV | NLV | NLV | ID | 5.8E+8 | NA |
| Isobutyl alcohol (I) | 78831 | NA | 46,000 | 1.3E+5 | NA | 4.3E+8 (C) | 9.5E+7 | 9.5E+7 | 9.5E+7 | 4.4E+10 | 2.3E+8 (C) | 8.9E+6 |
| Isophorone | 78591 | NA | 15,000 | 62,000 | 26,000 (X) | NLV | NLV | NLV | NLV | 8.2E+9 | 2.2E+7 (C) | 2.4E+6 |
| Isopropyl alcohol (I) | 67630 | NA | 9,400 | 26,000 | 1.1E+6 (X) | NLV | NLV | NLV | NLV | 6.5E+9 | 4.7E+7 | 1.1E+8 |
| Isopropyl benzene | 98828 | NA | 91,000 | 2.6E+5 | 3,200 | 7.3E+5 (C) | 2.0E+6 | 2.0E+6 | 3.0E+6 | 2.6E+9 | 8.0E+7 (C) | 3.9E+5 |
| Lead (B) | 7439921 | 21,000 | 7.0E+5 | 7.0E+5 | (G,X) | NLV | NLV | NLV | NLV | 4.4E+7 | 9.0E+5 (DD) | NA |
| Lindane | 58899 | NA | 20 (M); 7.0 | 20 (M); 7.0 | 20 (M); 1.1 | ID | ID | ID | ID | ID | 42,000 | NA |
| Lithium (B) | 7439932 | 9,800 | 3,400 | 7,000 | 8,800 | NLV | NLV | NLV | NLV | 1.0E+9 | 3.1E+7 (DD) | NA |
| Magnesium (B) | 743995 | NA | 8.0E+6 | 2.2E+7 | NA | NLV | NLV | NLV | NLV | 2.9E+9 | 1.0E+9 | NA |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | | | | | | | | | | (D) | |
| Manganese (B) | 7439965 | 4.4E+5 | 1,000 | 1,000 | (G,X) | NLV | NLV | NLV | NLV | 1.5E+6 | 9.0E+7 | NA |
| Mercury (Total) (B,Z) | Varies | 130 | 1,700 | 1,700 | 50 (M); 1.2 | 89,000 | 62,000 | 62,000 | 62,000 | 8.8E+6 | 5.8E+5 | NA |
| Methane | 74828 | NA | ID | ID | NA | 8.4E+6 ug/$m^3$ (GG) | ID | ID | ID | ID | ID | ID |
| Methanol | 67561 | NA | 74,000 | 2.0E+5 | 1.2E+7 (C) | 6.7E+7 (C) | 3.7E+7 | 4.6E+7 | 9.7E+7 | 9.6E+10 | 3.6E+8 (C) | 3.1E+6 |
| Methoxychlor | 72435 | NA | 16,000 | 16,000 | NA | ID | ID | ID | ID | ID | 5.6E+6 | NA |
| 2-Methoxyethanol (I) | 109864 | NA | 150 | 420 | NA | NLV | NLV | NLV | NLV | 5.9E+8 | 7.3E+5 | 1.1E+8 |
| 2-Methyl-4-chlorophenoxyacetic acid | 94746 | NA | 390 | 1,100 | NA | NLV | NLV | NLV | NLV | ID | 7.3E+5 | NA |
| 2-Methyl-4,6-dinitrophenol | 534521 | NA | 830 (M); 400 | 830 (M); 400 | NA | NLV | NLV | NLV | NLV | 5.9E+7 | 2.6E+5 | NA |

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| | | | Groundwater Protection | | | Indoor Air | Ambient Air (Y) (C) | | | | Contact | Csat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous Substance | Chemical Abstract Service Number | Statewide Default Background Levels | Residential Drinking Water Protection Criteria & RBSLs | Nonresidential Drinking Water Protection Criteria & RBSLs | Groundwater Surface Water Interface Protection Criteria & RBSLs | Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs | Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs | Finite VSIC for 5 Meter Source Thickness | Finite VSIC for 2 Meter Source Thickness | Particulate Soil Inhalation Criteria & RBSLs | Direct Contact Criteria & RBSLs | Soil Saturation Concentration Screening Levels |
| N-Methyl-morpholine (I) | 109024 | NA | 400 | 1,100 | NA | NLV | NLV | NLV | NLV | ID | 2.0E+6 | 1.1E+8 |
| Methyl parathion | 298000 | NA | 46 | 130 | NA | NLV | NLV | NLV | NLV | ID | 1.8E+5 | NA |
| 4-Methyl-2-pentanone (MIBK) (I) | 108101 | NA | 36,000 | 1.0E+5 | ID | 6.9E+7 (C) | 5.3E+7 | 5.3E+7 | 7.0E+7 | 6.0E+10 | 1.8E+8 (C) | 2.7E+6 |
| Methyl-tert-butyl ether (MTBE) | 1634044 | NA | 800 | 800 | 1.4E+5 (X) | 1.8E+7 (C) | 3.0E+7 | 4.1E+7 | 8.9E+7 | 8.8E+10 | 7.1E+6 (C) | 5.9E+6 |
| Methylcyclopentane (I) | 96377 | NA | ID | ID | NA | 1.7E+5 | 2.8E+6 | 8.3E+6 | 2.0E+7 | 2.1E+10 | ID | 3.5E+5 |
| 4,4'-Methylene-bis-2-chloroaniline | 101144 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 1.1E+8 | 32,000 | NA |
| Methylene chloride | 75092 | NA | 100 | 100 | 30,000 (X) | 2.4E+5 | 7.0E+5 | 1.7E+6 | 4.0E+6 | 8.3E+9 | 5.8E+6 (C) | 2.3E+6 |
| 2-Methylnaphthalene | 91576 | NA | 57,000 | 1.7E+5 | 4,200 | 4.9E+6 | 1.8E+6 | 1.8E+6 | 1.8E+6 | 2.9E+8 | 2.6E+7 | NA |
| Methylphenols (J) | 1319773 | NA | 7,400 | 20,000 | 1,000 (M); 600 | NLV | NLV | NLV | NLV | 2.9E+9 | 3.6E+7 | NA |
| Metolachlor | 51218452 | NA | 4,800 | 20,000 | 300 | NLV | NLV | NLV | NLV | ID | 6.9E+6 (C,DD) | 4.4E+5 |
| Metribuzin | 21087649 | NA | 3,600 | 10,000 | NA | ID | ID | ID | ID | ID | 2.8E+7 | NA |
| Mirex | 2385855 | NA | NLL | NLL | NLL | ID | ID | ID | ID | ID | 40,000 | NA |
| Molybdenum (B) | 7439987 | NA | 1,500 | 4,200 | 64,000 (X) | NLV | NLV | NLV | NLV | ID | 9.6E+6 | NA |
| Naphthalene | 91203 | NA | 35,000 | 1.0E+5 | 730 | 4.7E+5 | 3.5E+5 | 3.5E+5 | 3.5E+5 | 8.8E+7 | 5.2E+7 | NA |
| Nickel (B) | 7440020 | 20,000 | 1.0E+5 | 1.0E+5 | (G) | NLV | NLV | NLV | NLV | 1.6E+7 | 1.5E+8 | NA |
| Nitrate (B,N) | 14797558 | NA | 2.0E+5 (N) | 2.0E+5 (N) | ID | NLV | NLV | NLV | NLV | ID | ID | NA |
| Nitrite (B,N) | 14797650 | NA | 20,000 (N) | 20,000 (N) | NA | NLV | NLV | NLV | NLV | ID | ID | NA |
| Nitrobenzene (I) | 98953 | NA | 330 (M); 68 | 330 (M); 190 | 3,600 (X) | 1.7E+5 | 64,000 | 64,000 | 64,000 | 2.1E+7 | 3.4E+5 | 4.9E+5 |
| 2-Nitrophenol | 88755 | NA | 400 | 1,200 | ID | NLV | NLV | NLV | NLV | ID | 2.0E+6 | NA |
| n-Nitroso-di-n-propylamine | 621647 | NA | 330 (M); 100 | 330 (M); 100 | NA | NLV | NLV | NLV | NLV | 2.0E+6 | 5,400 | 1.5E+6 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-Nitrosodiphenylamine | 86306 | NA | 5,400 | 22,000 | NA | NLV | NLV | NLV | NLV | 2.8E+9 | 7.8E+6 | NA |
| Oxamyl | 23135220 | NA | 4,000 | 4,000 | NA | NLV | NLV | NLV | NLV | ID | 2.8E+7 | NA |
| Oxo-hexyl acetate | 88230357 | NA | 1,500 | 4,200 | NA | ID | ID | ID | ID | 2.4E+9 | 7.3E+6 | 1.0E+7 |
| Pendimethalin | 40487421 | NA | 1.1E+6 | 1.1E+6 | NA | NLV | NLV | NLV | NLV | ID | 1.3E+8 | NA |
| Pentachlorobenzene | 608935 | NA | 29,000 | 81,000 | 9,500 | ID | ID | ID | ID | ID | 9.3E+5 (C) | 1.9E+5 |
| Pentachloronitrobenzene | 82688 | NA | 37,000 | 37,000 | NA | 2.2E+5 | 2.8E+5 | 2.8E+5 | 2.8E+5 | 1.5E+8 | 5.5E+6 | NA |

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| Pentachlorophenol | 87865 | NA | 22 | 22 | (G,X) | NLV | NLV | NLV | NLV | 1.3E+8 | 3.2E+5 | NA |
| Pentane | 109660 | NA | ID | ID | NA | 1.8E+5 | 4.4E+7 | 3.4E+8 | 6.0E+8 | 5.3E+11 | ID | 2.4E+5 |
| 2-Pentene (I) | 109682 | NA | ID | ID | NA | ID | ID | ID | ID | ID | ID | 2.2E+5 |
| Phenanthrene | 85018 | NA | 56,000 | 1.6E+5 | 2,100 | 5.1E+6 | 1.9E+5 | 1.9E+5 | 1.9E+5 | 2.9E+6 | 5.2E+6 | NA |
| Phenol | 108952 | NA | 88,000 | 2.6E+5 | 9,000 | NLV | NLV | NLV | NLV | 1.8E+10 | 2.3E+8 (C,DD) | 1.2E+7 |
| Phenytoin | 57410 | NA | 830 | 3300 | 4300 (X) | NLV | NLV | NLV | NLV | 2.8E+8 | 4.8E+5 | NA |
| Phosphorus (Total) | 7723140 | NA | 1.3E+6 | 4.8E+6 | (EE) | NLV | NLV | NLV | NLV | 2.9E+7 | 1.0E+9 (D) | NA |
| Phthalic acid | 88993 | NA | 2.8E+5 | 8.0E+5 | NA | NLV | NLV | NLV | NLV | ID | 1.0E+9 (C,D) | 1.7E+6 |
| Phthalic anhydride | 85449 | NA | 3.0E+5 | 8.8E+5 | NA | NLV | NLV | NLV | NLV | ID | 1.0E+9 (C,D) | 1.1E+6 |
| Picloram | 1918021 | NA | 10,000 | 10,000 | 920 | NLV | NLV | NLV | NLV | ID | 5.1E+7 | NA |
| Piperidine | 110894 | NA | 64 | 180 | NA | NLV | NLV | NLV | NLV | 4.1E+9 | 3.2E+5 | 1.2E+8 |
| Polybrominated biphenyls (J) | 67774327 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | ID | 4,800 | NA |
| Polychlorinated biphenyls (PCBs) (J,T) | 1336363 | NA | NLL | NLL | NLL | 1.6E+7 | 8.1E+5 | 2.8E+7 | 2.8E+7 | 6.5E+6 | (T) | NA |
| Prometon | 1610180 | NA | 4,900 | 14,000 | NA | NLV | NLV | NLV | NLV | ID | 1.6E+7 | NA |
| Propachlor | 1918167 | NA | 1,900 | 5,400 | NA | NLV | NLV | NLV | NLV | ID | 9.5E+6 | NA |
| Propazine | 139402 | NA | 4,000 | 11,000 | NA | NLV | NLV | NLV | NLV | ID | 2.0E+7 | NA |
| Propionic acid | 79094 | NA | 2.4E+5 | 7.0E+5 | ID | NLV | NLV | NLV | NLV | 8.8E+9 | 1.0E+9 (C,D) | 1.1E+8 |
| Propyl alcohol (I) | 71238 | NA | 28,000 | 80,000 | NA | NLV | NLV | NLV | NLV | 2.1E+10 | 7.4E+7 (DD) | 1.1E+8 |
| n-Propylbenzene (I) | 103651 | NA | 1,600 | 4,600 | ID | ID | ID | ID | ID | 5.9E+8 | 8.0E+6 | 1.0E+7 |
| Propylene glycol | 57556 | NA | 3.0E+6 | 8.4E+6 | 5.8E+6 | NLV | NLV | NLV | NLV | 1.8E+11 | 1.0E+9 (C,D) | 1.1E+8 |
| Pyrene | 129000 | NA | 4.8E+5 | 4.8E+5 | ID | 1.0E+9 (D) | 7.8E+8 | 7.8E+8 | 7.8E+8 | 2.9E+9 | 8.4E+7 | NA |
| Pyridine (I) | 110861 | NA | 400 | 420 | NA | 2,000 | 9,800 | 40,000 | 97,000 | 1.0E+8 | 7.3E+5 | 37,000 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | (C) | |
| Selenium (B) | 7782492 | 410 | 4,000 | 4,000 | 400 | NLV | NLV | NLV | NLV | 5.9E+7 | 9.6E+6 | NA |
| Silver (B) | 7440224 | 1,000 | 4,500 | 13,000 | 100 (M); 27 | NLV | NLV | NLV | NLV | 2.9E+6 | 9.0E+6 | NA |
| Silvex (2,4,5-TP) | 93721 | NA | 3,600 | 3,600 | 2,200 | NLV | NLV | NLV | NLV | ID | 5.5E+6 | NA |
| Simazine | 122349 | NA | 80 | 80 | 340 | NLV | NLV | NLV | NLV | ID | 3.8E+6 | NA |
| Sodium | 17341252 | NA | 4.6E+6 | 7.0E+6 | NA | NLV | NLV | NLV | NLV | ID | 1.0E+9 (D) | NA |

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| Sodium azide | 26628228 | NA | 1,800 | 5,000 | 1,000 | ID | ID | ID | ID | ID | 8.7E+6 | NA |
| Strontium (B) | 7440246 | NA | 92,000 | 2.6E+5 | 4.2E+5 | NLV | NLV | NLV | NLV | ID | 1.0E+9 (D) | NA |
| Styrene | 100425 | NA | 2,700 | 2,700 | 2,100 (X) | 1.3E+6 (C) | 3.3E+6 | 3.3E+6 | 4.2E+6 | 6.9E+9 | 1.9E+6 (C) | 5.2E+5 |
| Sulfate | 14808798 | NA | 5.0E+6 | 5.0E+6 | NA | NLV | NLV | NLV | NLV | ID | ID | NA |
| Tebuthiuron | 34014181 | NA | 10,000 | 30,000 | NA | NLV | NLV | NLV | NLV | ID | 2.7E+7 (DD) | NA |
| 2,3,7,8-Tetrabromodibenzo-p-dioxin (O) | 50585416 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | (O) | (O) | NA |
| 1,2,4,5-Tetrachlorobenzene | 95943 | NA | 1.5E+6 | 1.5E+6 | 3,400 (X) | 1.1E+6 | 2.7E+5 | 2.7E+5 | 2.7E+5 | 2.9E+7 | 2.5E+8 | NA |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (O) | 1746016 | NA | NLL | NLL | NLL | NLV | NLV | NLV | NLV | 59 (O) | 0.99 (O) | NA |
| 1,1,1,2-Tetrachloroethane | 630206 | NA | 1,500 | 6,400 | ID | 33,000 | 1.2E+5 | 2.1E+5 | 3.3E+5 | 5.3E+8 | 2.2E+6 (C) | 4.4E+5 |
| 1,1,2,2-Tetrachloroethane | 79345 | NA | 170 | 700 | 1,600 (X) | 23,000 | 34,000 | 34,000 | 34,000 | 6.8E+7 | 2.4E+5 | 8.7E+5 |
| Tetrachloroethylene | 127184 | NA | 100 | 100 | 1,200 (X) | 21,000 | 2.1E+5 | 4.9E+5 | 1.1E+6 | 1.2E+9 | 9.3E+5 (C) | 88,000 |
| Tetrahydrofuran | 109999 | NA | 1,900 | 5,400 | 2.2E+5 (X) | 2.4E+6 | 1.5E+7 | 6.7E+7 | 1.6E+8 | 1.7E+11 | 9.5E+6 | 1.2E+8 |
| Tetranitromethane | 509148 | NA | ID | ID | NA | 600 | 500 (M); 180 | ID | ID | 2.6E+5 | ID | ID |
| Thallium (B) | 7440280 | NA | 2,300 | 2,300 | 4,200 (X) | NLV | NLV | NLV | NLV | 5.9E+6 | 1.3E+5 | NA |
| Toluene (I) | 108883 | NA | 16,000 | 16,000 | 5,400 | 6.1E+5 (C) | 3.3E+6 | 3.6E+7 | 3.6E+7 | 1.2E+10 | 1.6E+8 (C) | 2.5E+5 |
| p-Toluidine | 106490 | NA | 660 (M); 300 | 1,200 | NA | NLV | NLV | NLV | NLV | 1.3E+8 | 4.3E+5 | 1.2E+6 |
| Toxaphene | 8001352 | NA | 24,000 | 24,000 | 8,200 | NLV | NLV | NLV | NLV | 1.2E+7 | 85,000 | NA |
| Triallate | 2303175 | NA | 95,000 | 2.7E+5 (C) | NA | ID | ID | ID | ID | ID | 9.5E+6 (C) | 2.5E+5 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tributylamine | 102829 | NA | 7,800 | 23,000 | ID | 1.1E+6 | 7.2E+5 | 7.2E+5 | 7.2E+5 | 2.1E+8 | 2.6E+6 | 3.7E+6 |
| 1,2,4-Trichlorobenzene | 120821 | NA | 4,200 | 4,200 | 5,900 (X) | 1.8E+7 (C) | 3.4E+7 | 3.4E+7 | 3.4E+7 | 1.1E+10 | 5.8E+6 (C,DD) | 1.1E+6 |
| 1,1,1-Trichloroethane | 71556 | NA | 4,000 | 4,000 | 1,800 | 4.6E+5 | 4.5E+6 | 1.5E+7 | 3.1E+7 | 2.9E+10 | 1.0E+9 (C,D) | 4.6E+5 |
| 1,1,2-Trichloroethane | 79005 | NA | 100 | 100 | 6,600 (X) | 24,000 | 57,000 | 57,000 | 1.2E+5 | 2.5E+8 | 8.4E+5 | 9.2E+5 |
| Trichloroethylene | 79016 | NA | 100 | 100 | 4,000 (X) | 1,900 | 14,000 | 25,000 | 58,000 | 5.9E+7 | 6.6E+5 (C,DD) | 5.0E+5 |
| Trichlorofluoromethane | 75694 | NA | 52,000 | 1.5E+5 | NA | 5.1E+6(C) | 1.1E+8 | 1.4E+11 | 1.4E+11 | 1.7E+12 | 2.6E+8 (C) | 5.6E+5 |
| 2,4,5-Trichlorophenol | 95954 | NA | 39,000 | 1.1E+5 | NA | NLV | NLV | NLV | NLV | 1.0E+10 | 7.3E+7 | NA |
| 2,4,6-Trichlorophenol | 88062 | NA | 2,400 | 9,400 | 330 (M); 100 | NLV | NLV | NLV | NLV | 1.3E+9 | 3.3E+6 | NA |

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| 1,2,3-Trichloropropane | 96184 | NA | 840 | 2,400 | NA | 7,500 | 11,000 | 11,000 | 12,000 | 8.8E+6 | 4.2E+6 (C) | 8.3E+5 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 76131 | NA | 9.0E+6 (C) | 9.0E+6 (C) | 1,700 | 9.3E+6 (C) | 2.1E+8 | 8.9E+8 | 2.1E+9 | 2.3E+12 | 1.0E+9 (C,D) | 5.5E+5 |
| Triethanolamine | 102716 | NA | 74,000 | 2.0E+5 | NA | NLV | NLV | NLV | NLV | 1.5E+9 | 3.6E+8 (C) | 1.1E+8 |
| Triethylene glycol | 112276 | NA | 86,000 | 2.4E+5 (C) | NA | NLV | NLV | NLV | NLV | ID | 2.3E+8 (C,DD) | 1.1E+5 |
| 3-Trifluoromethyl-4-nitrophenol | 88302 | NA | 1.1E+5 | 3.1E+5 | NA | NLV | NLV | NLV | NLV | ID | 2.4E+8 (DD) | NA |
| Trifluralin | 1582098 | NA | 1.9E+5 | 5.7E+5 | NA | ID | ID | ID | ID | ID | 5.7E+6 | NA |
| 2,2,4-Trimethyl pentane | 540841 | NA | ID | ID | NA | 2.0E+5 (C) | 6.3E+6 | 4.0E+7 | 9.6E+7 | 1.0E+11 | ID | 19,000 |
| 2,4,4-Trimethyl-2-pentene (I) | 107404 | NA | ID | ID | NA | ID | ID | ID | ID | ID | ID | 56,000 |
| 1,2,4-Trimethylbenzene (I) | 95636 | NA | 2,100 | 2,100 | 570 | 8.0E+6 (C) | 2.5E+7 | 6.0E+8 | 6.0E+8 | 3.6E+10 | 1.0E+8 (C) | 1.1E+5 |
| 1,3,5-Trimethylbenzene (I) | 108678 | NA | 1,800 | 1,800 | 1,100 | 4.8E+6 (C) | 1.9E+7 | 4.6E+8 | 4.6E+8 | 3.6E+10 | 1.0E+8 (C) | 94,000 |
| Triphenyl phosphate | 115866 | NA | 1.5E+6 (C) | 1.8E+6 (C) | NA | NLV | NLV | NLV | NLV | ID | 1.2E+8 (C) | 1.1E+5 |
| tris(2,3-Dibromopropyl)phosphate | 126727 | NA | 930 | 930 | ID | 4.3E+5 (C) | 60,000 | 60,000 | 60,000 | 7.4E+6 | 20,000 | 27,000 |
| Urea | 57136 | NA | ID | ID | NA | NLV | NLV | NLV | NLV | ID | ID | NA |
| Vanadium | 7440622 | NA | 72,000 | 9.9E+5 | 4.3E+5 | NLV | NLV | NLV | NLV | ID | 5.5E+6 (DD) | NA |
| Vinyl acetate (I) | 108054 | NA | 13,000 | 36,000 | NA | 1.5E+6 | 2.0E+6 | 2.7E+6 | 5.9E+6 | 5.9E+9 | 3.4E+7 (C,DD) | 2.4E+6 |
| Vinyl chloride | 75014 | NA | 40 | 40 | 260 (X) | 2,800 | 29,000 | 1.7E+5 | 4.2E+5 | 8.9E+8 | 34,000 | 4.9E+5 |
| White phosphorus (R) | 12185103 | NA | 2.2 | 6 | NA | NLV | NLV | NLV | NLV | ID | 17,000 (DD) | NA |
| Xylenes (I) | 1330207 | NA | 5,600 | 5,600 | 820 | 1.2E+7 (C) | 5.4E+7 | 6.5E+7 | 1.3E+8 | 1.3E+11 | 1.0E+9 | 1.5E+5 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | (C,D) | |
| Zinc (B) | 7440666 | 47,000 | 2.4E+6 | 5.0E+6 | (G) | NLV | NLV | NLV | NLV | ID | 6.3E+8 | NA |

History: 2013 AACS.

**R 299.49 Footnotes for generic cleanup criteria tables.**

Rule 49. (1) The footnotes that apply to the generic criteria tables in R 299.44, R 299.46, and R 299.48 are as follows:

(A) Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

(B) Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.

(C) The criterion developed under R 299.20 to R 299.26 exceeds the chemical-specific soil saturation screening level ($C_{sat}$). The person proposing or implementing response activity shall document whether additional response activity is required to control free-phase liquids or NAPL to protect against risks associated with free-phase liquids by using methods appropriate for the free-phase liquids present. Development of a site-specific $C_{sat}$ or methods presented in R 299.22, R 299.24(5), and R 299.26(8) may be conducted for the relevant exposure pathways.

(D) Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1.0E+9 parts per billion (ppb).

(E) Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, MCL 324.20120a(5), as amended (NREPA). A notice of aesthetic impact may be employed as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion, but do not exceed the applicable health-based drinking water value provided in the following table:

| Hazardous Substance | Chemical Abstract Service Number | Residential Health-Based Drinking Water Value | Non-Residential Health-Based Drinking Water Value |
|---|---|---|---|
| Aluminum | 7429905 | 300 | 4,100 |
| tertiary Amyl methyl ether | 994058 | 910 | 2,600 |
| Copper | 7440508 | 1,400 | 4,000 |
| Diethyl ether | 60297 | 3,700 | 10,000 |
| Ethylbenzene | 100414 | 700 | 700 |
| Iron | 7439896 | 2,000 | 5,600 |
| Manganese | 7439965 | 860 | 2,500 |
| Methyl-tert-butyl ether (MTBE) | 1634044 | 240 | 690 |
| Toluene | 108883 | 1,000 | 1,000 |
| 1,2,4-Trimethylbenzene | 95636 | 1,000 | 2,900 |
| 1,3,5-Trimethylbenzene | 108678 | 1,000 | 2,900 |
| Xylenes | 1330207 | 10,000 | 10,000 |

(F) Criterion is based on adverse impacts to plant life and phytotoxicity.

(G) Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote.

| Hazardous Substance | FCV Formula ug/L | FCV Conversion Factor (CF) | WV ug/L | HNDV ug/L |
|---|---|---|---|---|
| Acetate | EXP(0.2732*(pH) + 7.0362) | NA | NA | 1.3E+6 |
| Acetic Acid | EXP(0.2732*(pH) + 7.0362) | NA | NA | 1.3E+6 |
| Barium | EXP(1.0629*(LnH)+1.1869) | NA | NA | 1.6E+5 |
| Beryllium | EXP(2.5279*(LnH)-10.7689) | NA | NA | 1,200 |
| Cadmium⊗ | (EXP(0.7852*(LnH)-2.715))*CF | 1.101672-((LnH)*(0.041838)) | NA | 130 |
| Chromium (III) ⊗ | (EXP(0.819*(LnH)+0.6848))*CF | 0.86 | NA | 9,400 |
| Copper | (EXP(0.8545*(LnH)-1.702))*CF | 0.96 | NA | 38,000 |
| Lead⊗ | (EXP(0.9859*(LnH)-1.270))*CF | 1.46203-((LnH)*(0.14571)) | NA | 190 |
| Manganese⊗ | EXP(0.8784*(LnH)+3.5385) | NA | NA | 59,000 |
| Nickel | (EXP(0.846*(LnH)+0.0584))*CF | 0.997 | NA | 2.1E+5 |
| Pentachlorophenol⊗ | EXP(1.005*(pH)-5.134) | NA | NA | 2.8 |
| Zinc | (EXP(0.8473*(LnH)+0.884))*CF | 0.986 | NA | 16,000 |

where,

EXP(x) = The base of the natural logarithm raised to power x ($e^x$).

LnH = The natural logarithm of water hardness in mg $CaCO_3$/L.

* = The multiplication symbol.

⊗ = The GSI criterion developed here may not be protective for surface water that is used as a drinking water source. Refer to footnote (X) for further guidance.

A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environmental Quality (DEQ) internet web site.

(H) Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.

(I) Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(J) Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.

(K) Hazardous substance may be flammable or explosive, or both.

(L) Criteria for lead are derived using a biologically based model, as allowed for under Sections 20120a(9) of the NREPA, and are not calculated using the algorithms and assumptions specified in pathway-specific rules. The generic residential drinking water criterion of 4 ug/L is linked to the generic residential soil direct contact criterion of 400 mg/kg. A higher concentration in the drinking water, up to the state action level of 15 ug/L, may be allowed as a site-specific remedy and still allow for drinking water use, under Section 20120a(2) and 20120b of the NREPA if soil concentrations are appropriately lower than 400 mg/kg. If a site-specific criterion is approved based on this subdivision, a notice shall be filed on the deed for all property where the groundwater concentrations will exceed 4 ug/L to provide notice of the potential for unacceptable risk if soil

or groundwater concentrations increase. Acceptable combinations of site-specific soil and drinking water concentrations are presented in the following table:

Acceptable Combinations of Lead in Drinking Water and Soil

| Drinking Water Concentration (ug/L) | Soil Concentration (mg/kg) |
|---|---|
| 5 | 386-395 |
| 6 | 376-385 |
| 7 | 376-385 |
| 8 | 366-375 |
| 9 | 356-365 |
| 10 | 346-355 |
| 11 | 336-345 |
| 12 | 336-345 |
| 13 | 326-335 |
| 14 | 316-325 |
| 15 | 306-315 |

(M) Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

(N) The concentrations of all potential sources of nitrate-nitrogen (e.g., ammonia-N, nitrite-N, nitrate-N) in groundwater that is used as a source of drinking water shall not, when added together, exceed the nitrate drinking water criterion of 10,000 ug/L. Where leaching to groundwater is a relevant pathway, soil concentrations of all potential sources of nitrate-nitrogen shall not, when added together, exceed the nitrate drinking water protection criterion of 2.0E+5 ug/kg.

(O) The concentration of all polychlorinated and polybrominated dibenzodioxin and dibenzofuran isomers present at a facility, expressed as an equivalent concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin based upon their relative potency, shall be added together and compared to the criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin. The generic cleanup criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin are not calculated according to the algorithms presented in R 299.14 to R 299.26. The generic cleanup criteria are being held at the values that the DEQ has used since August 1998, in recognition of the fact that national efforts to reassess risks posed by dioxin are not yet complete. Until these studies are complete, it is premature to select a revised slope factor and/or reference dose for calculation of generic cleanup criteria.

(P) Amenable cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with all groundwater criteria. Total cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with soil criteria. Nonresidential direct contact criteria may not be protective of the potential for release of hydrogen cyanide gas. Additional land or resource use restrictions may be necessary to protect for the acute inhalation concerns associated with hydrogen cyanide gas.

(Q) Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene.

(R) Hazardous substance may exhibit the characteristic of reactivity as defined in 40 C.F.R. §261.23 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(S) Criterion defaults to the hazardous substance-specific water solubility limit.

(T) Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the following table if TSCA standards are not applicable.

| Land Use Category | TSCA, Subpart D Cleanup Standards | Part 201 Soil Direct Contact Cleanup Criteria |
|---|---|---|
| Residential | 1,000 ppb, or 10,000 ppb if capped | 4,000 ppb |
| Nonresidential | 1,000 ppb, or 10,000 ppb if capped | 16,000 ppb |

(U) Hazardous substance may exhibit the characteristic of corrosivity as defined in 40 C.F.R. §261.22 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(V) Criterion is the aesthetic drinking water value as required by Section 20120(a)(5) of the NREPA. Concentrations up to 200 ug/L may be acceptable, and still allow for drinking water use, as part of a site-specific cleanup under Section 20120a(2) and 20120b of the NREPA.

(W) Concentrations of trihalomethanes in groundwater shall be added together to determine compliance with the Michigan drinking water standard of 80 ug/L. Concentrations of trihalomethanes in soil shall be added together to determine compliance with the drinking water protection criterion of 1,600 ug/kg.

(X) The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. For a groundwater discharge to the Great Lakes and their connecting waters or discharge in close proximity to a water supply intake in inland surface waters, the generic GSI criterion shall be the surface water human drinking water value (HDV) listed in the table in this footnote, except for those HDV indicated with an asterisk. For HDV with an asterisk, the generic GSI criterion shall be the lowest of the HDV, the WV, and the calculated FCV. See formulas in footnote (G). Soil protection criteria based on the HDV shall be as listed in the table in this footnote, except for those values with an asterisk. Soil GSI protection criteria based on the HDV shall be as listed in the table in this footnote, except for those values with an asterisk. Soil GSI protection criteria for compounds with an asterisk shall be the greater of 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote.

| Hazardous Substance | Chemical Abstract Service Number | Surface Water Human Drinking Water Values (HDV) (ug/L) | Soil GSI Protection Criteria for HDV (ug/kg) |
|---|---|---|---|
| Acrylamide | 79061 | 0.5 (M); 0.12 | 10 |
| Alachlor | 15972608 | 3.5 | 88 |
| Antimony | 7440360 | 2.0 (M); 1.7 | 1,200 |
| Benzene | 71432 | 12 | 240 |
| Boron | 7440428 | 4,000 | 80,000 |
| Bromate | 15541454 | 10 (M); 0.5 | 200 |
| n-Butanol | 71363 | 3,500 | 70,000 |
| Butyl benzyl phthalate | 85687 | 6.9 | 13,000 |
| Cadmium | 7440439 | 2.5* | * |
| Carbon tetrachloride | 56235 | 5.6 | 110 |
| Chloride | 16887006 | 50,000 | 1.0E+6 |
| Chloroethane | 75003 | 170 | 3,400 |
| Chromium (III) | 16065831 | 120* | * |
| Cyanazine | 21725462 | 2.0 (M); 0.93 | 200 (M); 40 |
| 1,2-Dichloroethane | 107062 | 6.0 | 120 |
| trans-1,2-Dichloroethylene | 156605 | 470 | 9,400 |
| 1,2-Dichloropropane | 78875 | 9.1 | 180 |
| 1,3-Dichloropropene | 542756 | 3.3 | 100 (M); 66 |
| N,N-Dimethylacetamide | 127195 | 700 | 14,000 |
| 1,4-Dioxane | 123911 | 34 | 680 |
| Ethylene dibromide | 106934 | 0.17 | 20 (M); 3.4 |
| Ethylene glycol | 107211 | 56,000 | 1.1E+6 |
| Hexachloroethane | 67721 | 5.3 | 310 |
| Isophorone | 78591 | 310 | 6,200 |
| Isopropyl alcohol | 67630 | 28,000 | 5.6E+5 |
| Lead | 7439921 | 14* | * |
| Manganese | 7439965 | 1,300* | * |
| Methanol | 67561 | 14,000 | 2.8E+5 |
| Methyl-tert-butyl ether (MTBE) | 1634044 | 100 | 2,000 |
| Methylene chloride | 75092 | 47 | 940 |
| Molybdenum | 7439987 | 120 | 2,400 |
| Nitrobenzene | 98953 | 4.7 | 330 (M); 94 |
| Pentachlorophenol | 87865 | 1.8* | * |
| Styrene | 100425 | 20 | 530 |
| 1,2,4,5-Tetrachlorobenzene | 95943 | 2.8 | 3,300 |
| 1,1,2,2-Tetrachloroethane | 79345 | 3.2 | 64 |
| Tetrachloroethylene | 127184 | 11 | 220 |
| Tetrahydrofuran | 109999 | 350 | 7,000 |

| Hazardous Substance | Chemical Abstract Service Number | Surface Water Human Drinking Water Values (HDV) (ug/L) | Soil GSI Protection Criteria for HDV (ug/kg) |
|---|---|---|---|
| Thallium | 7440280 | 2.0 (M); 1.2 | 1,400 |
| 1,2,4-Trichlorobenzene | 120821 | 80 | 4,700 |
| 1,1,2-Trichloroethane | 79005 | 12 | 240 |
| Trichloroethylene | 79016 | 29 | 580 |
| Vinyl chloride | 75014 | 1.0 (M); 0.25 | 40 (M); 20 |

(Y) Source size modifiers shown in the following table shall be used to determine soil inhalation criteria for ambient air when the source size is not one-half acre. The modifier shall be multiplied by the generic soil inhalation criteria shown in the table of generic cleanup criteria to determine the applicable criterion. See Footnote (C).

| Source Size sq. feet or acres | Modifier |
|---|---|
| 400 sq feet | 3.17 |
| 1000 sq feet | 2.2 |
| 2000 sq feet | 1.76 |
| 1/4 acre | 1.15 |
| 1/2 acre | 1 |
| 1 acre | 0.87 |
| 2 acre | 0.77 |
| 5 acre | 0.66 |
| 10 acre | 0.6 |
| 32 acre | 0.5 |
| 100 acre | 0.43 |

(Z) Mercury is typically measured as total mercury. The generic cleanup criteria, however, are based on data for different species of mercury. Specifically, data for elemental mercury, chemical abstract service (CAS) number 7439976, serve as the basis for the soil volatilization to indoor air criteria, groundwater volatilization to indoor air, and soil inhalation criteria. Data for methyl mercury, CAS number 22967926, serve as the basis for the GSI criterion; and data for mercuric chloride, CAS number 7487947, serve as the basis for the drinking water, groundwater contact, soil direct contact, and the groundwater protection criteria. Comparison to criteria shall be based on species-specific analytical data only if sufficient facility characterization has been conducted to rule out the presence of other species of mercury.

(AA) Use 10,000 ug/l where groundwater enters a structure through the use of a water well, sump or other device. Use 28,000 ug/l for all other uses.

(BB) The state drinking water standard for asbestos (fibers greater than 10 micrometers in length) is in units of a million fibers per liter of water (MFL). Soil concentrations of asbestos are determined by polarized light microscopy.

(CC) Groundwater: The generic GSI criteria are based on the toxicity of unionized ammonia ($NH_3$); the criteria are 29 ug/L and 53 ug/L for cold water and warm water surface water, respectively. As a result, the GSI criterion shall be compared to the percent of the total ammonia concentration in the groundwater that will become $NH_3$ in the surface water. This percent $NH_3$ is a function of the pH and temperature of the receiving surface water and can be estimated using the following table, taken from Emerson, et al., (Journal of the Fisheries Research Board of Canada, Volume 32(12):2382, 1975).

Percent $NH_3$ in Aqueous Ammonia Solutions for 0-30 °C and pH 6-10

| | | pH | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Temp (°F) | Temp (°C) | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | 10.0 |
| 32.0 | 0 | 0.00827 | 0.0261 | 0.0826 | 0.261 | 0.820 | 2.55 | 7.64 | 20.7 | 45.3 |
| 33.8 | 1 | 0.00899 | 0.0284 | 0.0898 | 0.284 | 0.891 | 2.77 | 8.25 | 22.1 | 47.3 |
| 35.6 | 2 | 0.00977 | 0.0309 | 0.0977 | 0.308 | 0.968 | 3.00 | 8.90 | 23.6 | 49.4 |
| 37.4 | 3 | 0.0106 | 0.0336 | 0.106 | 0.335 | 1.05 | 3.25 | 9.60 | 25.1 | 51.5 |
| | | pH | | | | | | | | |
| Temp (°F) | Temp (°C) | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | 10.0 |
| 39.2 | 4 | 0.0115 | 0.0364 | 0.115 | 0.363 | 1.14 | 3.52 | 10.3 | 26.7 | 53.5 |
| 41.0 | 5 | 0.0125 | 0.0395 | 0.125 | 0.394 | 1.23 | 3.80 | 11.1 | 28.3 | 55.6 |
| 42.8 | 6 | 0.0136 | 0.0429 | 0.135 | 0.427 | 1.34 | 4.11 | 11.9 | 30.0 | 57.6 |
| 44.6 | 7 | 0.0147 | 0.0464 | 0.147 | 0.462 | 1.45 | 4.44 | 12.8 | 31.7 | 59.5 |
| 46.4 | 8 | 0.0159 | 0.0503 | 0.159 | 0.501 | 1.57 | 4.79 | 13.7 | 33.5 | 61.4 |
| 48.2 | 9 | 0.0172 | 0.0544 | 0.172 | 0.542 | 1.69 | 5.16 | 14.7 | 35.3 | 63.3 |
| 50.0 | 10 | 0.0186 | 0.0589 | 0.186 | 0.586 | 1.83 | 5.56 | 15.7 | 37.1 | 65.1 |
| 51.8 | 11 | 0.0201 | 0.0637 | 0.201 | 0.633 | 1.97 | 5.99 | 16.8 | 38.9 | 66.8 |
| 53.6 | 12 | 0.0218 | 0.0688 | 0.217 | 0.684 | 2.13 | 6.44 | 17.9 | 40.8 | 68.5 |
| 55.4 | 13 | 0.0235 | 0.0743 | 0.235 | 0.738 | 2.30 | 6.92 | 19.0 | 42.6 | 70.2 |
| 57.2 | 14 | 0.0254 | 0.0802 | 0.253 | 0.796 | 2.48 | 7.43 | 20.2 | 44.5 | 71.7 |
| 59.0 | 15 | 0.0274 | 0.0865 | 0.273 | 0.859 | 2.67 | 7.97 | 21.5 | 46.4 | 73.3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 60.8 | 16 | 0.0295 | 0.0933 | 0.294 | 0.925 | 2.87 | 8.54 | 22.8 | 48.3 | 74.7 |
| 62.6 | 17 | 0.0318 | 0.101 | 0.317 | 0.996 | 3.08 | 9.14 | 24.1 | 50.2 | 76.1 |
| 64.4 | 18 | 0.0343 | 0.108 | 0.342 | 1.07 | 3.31 | 9.78 | 25.5 | 52.0 | 77.4 |
| 66.2 | 19 | 0.0369 | 0.117 | 0.368 | 1.15 | 3.56 | 10.5 | 27.0 | 53.9 | 78.7 |
| 68.0 | 20 | 0.0397 | 0.125 | 0.396 | 1.24 | 3.82 | 11.2 | 28.4 | 55.7 | 79.9 |
| 69.8 | 21 | 0.0427 | 0.135 | 0.425 | 1.33 | 4.10 | 11.9 | 29.9 | 57.5 | 81.0 |
| 71.6 | 22 | 0.0459 | 0.145 | 0.457 | 1.43 | 4.39 | 12.7 | 31.5 | 59.2 | 82.1 |
| 73.4 | 23 | 0.0493 | 0.156 | 0.491 | 1.54 | 4.70 | 13.5 | 33.0 | 60.9 | 83.2 |
| 75.2 | 24 | 0.0530 | 0.167 | 0.527 | 1.65 | 5.03 | 14.4 | 34.6 | 62.6 | 84.1 |
| 77.0 | 25 | 0.0569 | 0.180 | 0.566 | 1.77 | 5.38 | 15.3 | 36.3 | 64.3 | 85.1 |
| 78.8 | 26 | 0.0610 | 0.193 | 0.607 | 1.89 | 5.75 | 16.2 | 37.9 | 65.9 | 85.9 |
| 80.6 | 27 | 0.0654 | 0.207 | 0.651 | 2.03 | 6.15 | 17.2 | 39.6 | 67.4 | 86.8 |
| 82.4 | 28 | 0.0701 | 0.221 | 0.697 | 2.17 | 6.56 | 18.2 | 41.2 | 68.9 | 87.3 |
| 84.2 | 29 | 0.0752 | 0.237 | 0.747 | 2.32 | 7.00 | 19.2 | 42.9 | 70.4 | 88.3 |
| 86.0 | 30 | 0.0805 | 0.254 | 0.799 | 2.48 | 7.46 | 20.3 | 44.6 | 71.8 | 89.0 |

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The generic approach for estimating $NH_3$ assumes a default pH of 8 and default temperatures of 68°F and 85°F for cold water and warm water surface water, respectively. The resulting percent $NH_3$ is 3.8 percent and 7.2 percent for cold water and warm water, respectively. This default percentage shall be multiplied by the total ammonia-nitrogen ($NH_3$-N) concentration in the groundwater and the resulting $NH_3$ concentration compared to the applicable GSI criterion. As an alternative, the maximum pH and temperature data from the specific receiving surface water can be used to estimate, from the table in this footnote, a lower percent unionized ammonia concentration for comparison to the generic GSI.

Soil: The generic soil GSI protection criteria for unionized ammonia are 580 ug/kg and 1,100 ug/kg for cold water and warm water surface water, respectively.

(DD) Hazardous substance causes developmental effects. Residential direct contact criteria are protective of both prenatal and postnatal exposure. Nonresidential direct contact criteria are protective for a pregnant adult receptor.

(EE) The following are applicable generic GSI criteria as required by Section 20120e of the NREPA.

| Hazardous Substance | GSI (ug/L) | Notes |
|---|---|---|
| Phosphorus | 1,000 | Criteria applicable unless receiving water is a surface water that has a phosphorus waste load allocation or is an inland lake. In those cases, contact the department for applicable values. |
| Total dissolved solids (TDS) | 5.0E+5 | If TDS data are not available, the TDS criterion may be used a screening level for the sum of the concentrations of the following substances: calcium, chlorides, iron, magnesium, potassium, sodium, sulfate. |
| Dissolved Oxygen (DO):<br>Cold receiving waters<br>Warm receiving waters | <br>≥ 7,000<br>≥ 5,000 | Since a low level of DO can be harmful to aquatic life, the criterion represents a minimum level that on-site samples must exceed. This is in contrast to other criteria which represent "not to exceed" concentrations. DO criteria are not applicable if groundwater Carbonaceous Biochemical Oxygen Demand (CBOD) is less than 10,000 ug/L and groundwater ammonia concentration is less than 2,000 ug/L. |

(FF) The chloride GSI criterion shall be 125 mg/l when the discharge is to surface waters of the state designated as public water supply sources or 50 mg/l when the discharge is to the Great Lakes or connecting waters. Chloride GSI criteria shall not apply for surface waters of the state that are not designated as a public water supply source, however, the total dissolved solids criterion is applicable.

(GG) Risk-based criteria are not available for methane due to insufficient toxicity data. An acceptable soil gas concentration (presented for both residential and nonresidential land uses) was derived utilizing 25 percent of the lower explosive level for methane. This equates to 1.25 percent or 8.4E+6 ug/$m^3$.

(HH) The residential criterion for sodium is 230,000 ug/l in accordance with the Sodium Advisory Council recommendation and revised Groundwater Discharge Standards.

(II) The residential drinking water criterion for 1,4-dioxane is not calculated using the equations of R 299.10 or the toxicological and chemical-physical data as shown in table 4 of R 299.50. The drinking water criterion is calculated using the United States Environmental Protection Agency's (U.S. EPA) "Toxicological Review of 1,4-Dioxane," EPA/635/R-11/003F, September 2013, and the department's

residential exposure algorithms to protect both children and adults from unsafe levels of the chemical. A copy of the U.S. EPA's "Toxicological Review of 1,4-dioxane," may be obtained on the U.S. EPA website, www.epa.gov, free of charge as of the time of adoption of these rules. A copy of the department's residential exposure algorithms may be obtained without charge from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933.

"ID" means insufficient data to develop criterion.
"NA" means a criterion or value is not available or, in the case of background and CAS numbers, not applicable.
"NLL" means hazardous substance is not likely to leach under most soil conditions.
"NLV" means hazardous substance is not likely to volatilize under most conditions.

History: 2013 AACS; 2017 AACS.

**R 299.50 Toxicological and chemical-physical properties.**

Rule 50. (1) The toxicological and chemical-physical properties used to calculate generic shall be as shown in table 4, except as provided in section 20120a(9) of the act, R 299.49(1)(l) and R 299.49(1)(o).

(2) Abbreviations used in table 4 have the following meanings when used in this rule:

(a) "NA" means not available.

(b) "NR" means not relevant.

History: 2013 AACS.