

R 299.5715 Rescinded.**R 299.5716 Cleanup criteria for groundwater based on protection of surface water resources from hazardous substances in venting groundwater.**

Rule 716. (1) The pathway addressed by groundwater surface water interface (GSI) criteria shall be considered a relevant pathway when a remedial investigation or application of best professional judgment leads to the conclusion that a hazardous substance in groundwater is reasonably expected to vent to surface water in concentrations that exceed the generic GSI criteria. The factors to be considered in determining whether the pathway is relevant include all of the following:

(a) Whether there is a hydraulic connection between groundwater and the surface water in question.

(b) The proximity of surface water to source areas and areas of the groundwater contaminant plume that currently, or may in the future be expected to, exceed the generic GSI criteria.

(c) Whether the receiving surface water is surface waters of the state as that term is defined in administrative rules under part 31 of the act.

(d) The direction of groundwater movement.

(e) The presence of artificial structures or natural features that would alter hydraulic pathways. This includes, but is not limited to, highly permeable zones, utility corridors, and seawalls.

(f) The mass of hazardous substances present at the facility that may affect groundwater.

(g) Documented facility-specific evidence of natural attenuation, if any.

(2) GSI monitoring wells, as described in subrule (10) of this rule, are not required in order to make a determination under subrule (1) of this rule if other information is sufficient to make a judgment that the pathway is not relevant. Fate and transport modeling may be used, if appropriate, to support a professional judgment under subrule (1) of this rule. Predictions of fate and transport modeling shall be confirmed by field measurements.

(3) The hazardous substances in groundwater and water quality characteristics in surface water for which response activity is required under this rule are all of the following:

(a) Those hazardous substances determined to have been released at the facility.

(b) Any breakdown product of a hazardous substance determined to have been released at the facility.

(c) Any hazardous substance or water quality characteristic that has resulted from a reaction with the hazardous substance released, or that has been adversely affected by a release.

(4) Cleanup criteria for venting groundwater shall be in 1 or more of the following categories:

(a) Generic GSI criteria identified under subrule (6) of this rule, which shall be allowable in the categories provided for in section 20120a(1)(a) to (j) of the act.

(b) Mixing zone-based GSI criteria developed under subrule (8) of this rule, which shall be allowable in the categories provided for in section 20120a(1)(f) to (j) and (2) of the act.

(c) Site-specific criteria developed under section 201201a(2) of the act and subrules (11) and (12) of this rule. Mixing zones may be applied to site-specific criteria.

(5) R 299.5526(9) and subrules (6) to (13) and (15) of this rule specify procedures for demonstrating compliance with part 31 of the act through modifications of the part 31 rules that accommodate the differences between venting groundwater and a permitted discharge to surface water under part 31. As such, the subrules include alternative methods, as allowed for under section 20120a(15) of the act, to the procedures set forth in the rules promulgated under part 31.

(6) The department shall identify water quality standards for hazardous substances developed under part 31 of the act that constitute generic GSI criteria. Compliance with section 20120a(15) of the act and this rule is demonstrated if generic GSI criteria are not exceeded in the groundwater in the GSI monitoring wells required by subrule (10) of this rule and no water quality characteristics as described in subrule (3) of this rule exist that require response activity. If compliance cannot be achieved under subrule (6) of this rule, then a person may proceed under subrule (7) of this rule.

(7) A person may request, as provided in R 299.5526(9) and R 299.5532(11)(d), that the department authorize a response activity that includes a mixing zone. The mixing zone determination request shall provide the information required by the department to process the request, including all of the following:

(a) The name of the receiving surface water and the location where groundwater is venting.

(b) The location, nature, and chemical characteristics of past and current sources of groundwater contamination.

(c) The name, chemical abstract service number, and concentration in the groundwater at the GSI and upgradient of the interface to the source area of hazardous substances and water quality characteristics described in subrule (3) of this rule.

(d) The discharge rate, in cubic feet per second, of that portion of the venting groundwater plume that exceeds, or is likely in the future to exceed, a generic GSI criterion.

(e) The location of other venting groundwater plumes in the vicinity of the facility in question, together with information about the names and concentrations of hazardous substances in those plumes, if available.

(f) If the venting groundwater is a new or increased discharge to the surface waters of the state, then information to support an antidegradation demonstration or exemption, if one is required or allowed under R 323.1098.

(8) In response to a request under subrule (7) of this rule, the department shall calculate mixing zone based GSI criteria according to section 3109a of the act and the related rules promulgated under part 31.

(9) Compliance with mixing zone-based GSI criteria shall be assessed according to the following procedures:

(a) Compliance with section 20120a(15) of the act and this rule is demonstrated if the mixing zone based GSI criteria are not exceeded at the GSI monitoring wells required by subrule (10) of this rule and no water quality characteristics as described in subrule (3) of this rule exist that require response activity.

(b) Compliance with mixing zone-based GSI criteria that are based on chronic toxicity endpoints may be established by a statistical evaluation of the data, if that evaluation is part of a department-approved monitoring plan. The statistical evaluation may be based, if sufficient data are available, on a properly calculated and documented 95% upper confidence limit on the mean, or other statistical technique approved by the department. Compliance with mixing zone-based GSI criteria that are based on acute toxicity shall be demonstrated on a point-by-point basis.

(c) A contingency plan may be required by the department in conjunction with an authorization to rely on mixing zone-based GSI criteria if it is necessary to identify additional response activity that may be required in response to a future exceedance of the mixing zone-based GSI criteria and to assure protection of the public health, safety, and welfare, and the environment. The contingency plan shall allow for evaluation of the significance of any exceedance before implementation of additional response activity to control a future discharge that exceeds the mixing zone-based GSI criteria. Such evaluations shall consider, at a minimum, the magnitude and expected duration of the exceedance and the feasibility of implementing additional response activity during the anticipated duration of the exceedance.

(10) For groundwater venting to surface water, that does not vent indirectly through a storm sewer, GSI monitoring points shall be established by installing vertical wells at locations in the saturated zone that are representative of groundwater entering surface water. The vertical wells shall be installed as close as is practical to the surface water, where it can be demonstrated that the groundwater flow direction is toward the surface water in question. GSI monitoring activities shall also satisfy all of the following requirements:

(a) Concentrations in samples from GSI monitoring points shall be compared to generic GSI criteria, site-specific GSI criteria developed under section 20120a(2) of the act, or mixing zone-based GSI criteria, and applicable water quality standards to determine compliance with part 31 of the act and this rule.

(b) GSI monitoring points shall include the interval or intervals within each well or well cluster that shows the highest concentration of each hazardous substance present in that well or well cluster, in light of the physical properties of the hazardous substance and the characteristics of the saturated zone.

(c) Samples from GSI monitoring points shall be representative of groundwater, not surface water, and account for seasonal or periodic shifts in groundwater flow direction, or other natural or human-made features that affect groundwater flow.

(d) The location of a GSI monitoring point shall be selected after taking into consideration changes in groundwater flow direction, so that samples from the well are representative of groundwater flowing to surface water. This requirement does not preclude location of monitoring points in a floodplain.

(e) If a portion of the saturated zone does not vent to the surface water in question, then that portion of the groundwater is not required to be monitored as a GSI monitoring location for that surface water.

(11) A person may request that the department approve a site-specific GSI criterion or site-specific mixing zone under section 20120a(2) of the act only if all of the following conditions are satisfied:

(a) A site-specific criterion shall comply with part 31 of the act and the rules promulgated under part 31, as modified by this rule to apply to venting groundwater.

(b) Only numerical criteria, expressed as hazardous substance concentrations in water or as limits for water quality characteristics for which response activity is required by subrule (3) of this rule, are acceptable as site-specific criteria under 201201a(2) of the act.

(c) A site-specific criterion may be proposed for approval by the department under the rules promulgated pursuant to part 31 of the act that allow for water quality standards based on site-specific modifications, mixing zone demonstrations, or conditions resulting from discharge into the same body of water, as that term is defined in those rules.

(12) Compliance with a site-specific criterion or mixing zone approved under subrule (11) of this rule shall be based on a site-specific monitoring plan that takes into account the basis for the site-specific criterion or mixing zone.

(13) A person may propose to rely on monitoring points other than GSI monitoring wells required by subrule (10) of this rule. Alternative monitoring points are acceptable only if approved by the department in accordance with the requirements and procedures set forth in this rule. A proposal for alternative monitoring points shall be submitted to the department for approval and shall include all of the following:

(a) A demonstration that the proposed monitoring points are more representative of venting groundwater and allow a more accurate calculation of the discharge rate described in subrule (7)(d) of this rule than the monitoring wells required by subrule (10) of this rule.

(b) A demonstration that the locations where venting groundwater enters surface water have been comprehensively identified. That demonstration shall include all of the following:

(i) Identification of the location of proposed monitoring points within areas of venting groundwater, including, if relevant, monitoring of water from pore spaces in lake or stream sediment, and the rationale for those locations.

(ii) Documentation of the boundaries of the areas where the groundwater plume vents to surface water, including the size, shape, location, and manner in which dispersion and diffusion would occur. This documentation shall include information about the substrate character and geology in the areas where groundwater vents to surface water.

(iii) Documentation that the venting area identified and proposed monitoring points include points that are representative of the highest concentrations of hazardous substances present in the groundwater at the GSI, considering spatial and temporal variability.

(iv) If compliance with a mixing zone based GSI criterion is to be determined with data from the alternative monitoring points, documentation that it is possible to accurately calculate the volume of venting groundwater.

(c) A demonstration that the alternative GSI monitoring points will allow for venting groundwater to be sampled before mixing with surface water.

(d) A demonstration that the proposed alternative GSI monitoring points allow for reliable, representative monitoring of groundwater quality. This demonstration shall take into account all of the following:

(i) Temporal and spatial variability of hazardous substance concentrations in groundwater throughout the plume from the source or sources to the points of venting to surface water.

(i) Seasonal or periodic changes in groundwater flow.

(ii) Other natural or human-made features that affect groundwater flow.

(e) Identification and documentation of the chemical, physical, or biological processes that result in the reduction of hazardous substance concentrations between the monitoring wells required by subrule (10) of this rule and the proposed alternative monitoring points.

(f) The location of an alternative GSI monitoring point shall be selected after taking into consideration changes in groundwater flow conditions, so that samples from the monitoring point are representative of groundwater flowing to surface water. This requirement does not preclude location of monitoring points in a floodplain.

(g) Identification of sentinel monitoring points that will be used in conjunction with the alternative GSI monitoring points to assure that any potential exceedance of an applicable water quality standard can be identified with sufficient notice to allow additional response activity to be implemented that will prevent the exceedance. Sentinel monitoring points shall include, at a minimum, the monitoring points required by subrule (10) of this rule.

(14) If there is an exceedance of a GSI criterion based on acute toxicity at a monitoring well required by subrule (10) of this rule or an alternative monitoring point approved under subrule (13) of this rule then immediate action shall be taken as described in this rule:

(a) A person who is implementing response activity who determines that there is an exceedance of a GSI criterion based on acute toxicity at a monitoring well required by subrule (10) of this rule or an alternative monitoring point approved under subrule (13) of this rule shall notify the department of that condition within 7 days of obtaining knowledge that the exceedance is occurring, or within 30 days of the effective date of this rule, whichever is later, if that person is liable under section 20126 of the act, or if the person intends to seek approval of an alternative monitoring point under subrule (13) of this rule when one is not already approved.

(b) The person implementing response activity shall, within 60 days of the date on which notice is required under subdivision (a) of this subrule, do one or more of the following:

(i) Implement response activity to prevent the exceedance of a GSI criterion based on acute toxicity at the monitoring wells required by subrule (10) of this rule or an alternative monitoring point approved under subrule (13) of this rule, if applicable, and submit a schedule to the department for completion of response activity to prevent a discharge that exceeds a GSI criterion based on acute toxicity.

(ii) Submit notice of intent to propose an alternative monitoring point that complies with subrule (13) of this rule, if one has not already been approved. The notice shall include a schedule for submission of the proposal.

(iii) Submit notice of intent to propose a site-specific criterion under section 20120a(2) of the act. The notice shall include a schedule for submission of the proposal.

The department may approve a schedule as submitted under this subdivision or direct reasonable modifications in the schedule. The department may grant extensions of time for actions required under subdivision (b) of this subrule and for activities in an approved or department-modified schedule if the person is acting in good faith and site conditions inhibit progress or completion of such activity or if there is no adverse impact on surface water resources as a result of the discharge. The department's decision to grant an extension or impose a schedule modification shall consider the practical problems associated with carrying out the required response activity and the nature and extent of the exceedances of GSI criteria.

(c) If the person does not implement effective response activity or submit a notice as required by subdivision (b) of this subrule, or does not comply with the schedule in his or her notice, including modifications made by the department, if any, and no schedule extension was approved by the department, the person shall perform interim response activity sufficient to prevent the exceedance of any GSI criterion based on acute toxicity at the monitoring wells required by subrule (10) of this rule or an alternative monitoring point approved under subrule (13) of this rule, if applicable. He or she shall continue such activity until agreement on an alternative monitoring point or site-specific criterion is reached, if applicable, or, if the proposal is rejected by the department, until a different response activity is implemented to protect the surface water. If an alternative monitoring point was approved by the department prior to detection of the exceedance of a GSI criterion based on acute toxicity in that alternative monitoring point, action to prevent that exceedance shall continue as long as there is a reasonable potential for an exceedance to occur or until a different response activity is implemented to protect the surface water. Interim response activity undertaken to prevent the exceedance during the time needed for review by the department of the proposal shall be documented. An alternative monitoring point proposal that does not adequately document interim response activity required to satisfy this rule, if applicable, shall be considered lacking information necessary or required for the department to make its decision.

(15) If a person proposes a site-specific GSI criterion or alternative GSI monitoring point and the department does not approve the proposal, then the department shall indicate, in writing, the rationale for its disapproval, citing the scientific, mathematical, or legal basis for its disapproval. This written communication shall also indicate whether the department will entertain further proposals to address the issue.

(16) When groundwater is venting indirectly to surface waters of the state, that groundwater shall be addressed in one of the following ways, as applicable to the situation:

(a) If venting groundwater enters a storm drainage system owned by an entity that is subject to storm water regulation under the federal water pollution control act, 33 U.S.C. §§ 1251-1387, then the person who is conducting response activity to address that venting groundwater shall comply with applicable storm water program requirements regarding elimination of illicit discharges in the storm drainage system owner's discharge permit or with local ordinances regarding illicit discharges, if such ordinances apply.

(b) In all other cases, when groundwater is venting indirectly to surface waters of the state through storm sewers, monitoring points shall be established in locations that are as close as practical to the storm sewer or shall be at alternative monitoring locations approved by the department to allow representative monitoring before the groundwater mixes with any flow in the sewer. The GSI criteria applicable at the monitoring point required by this subdivision may be mixing zone based criteria that are based on the characteristics of the receiving water to which the sewer discharges, if a proposal for mixing zone based criteria is approved by the department under this rule.

(17) If a person has controlled the source of groundwater contamination and has demonstrated that compliance with a GSI criterion developed under this rule is unachievable, then that person may appeal to the director for resolution of the matter. An appeal to the director under this rule shall be made in writing and include documentation of the reasons why compliance is unachievable. If a decision on the appeal is not rendered with 60 days after the director receives the appeal, the director shall provide a preliminary response within that time period. The director's preliminary response shall indicate the additional information, if any, required to make a determination and specify the anticipated time required to render a final decision. Decisions by the director under this subrule shall consider the public interest and the need to protect the public health, safety, and welfare, and the environment.

R 299.5717 Rescinded.

R 299.5718 Cleanup criteria for soil generally.

Rule 718. (1) The generic cleanup criteria for soil at a facility shall be the most restrictive of the applicable criteria developed under R 299.5720 to R 299.5728, considering those pathways that are reasonable and relevant at the facility and the category of remedial action being proposed or implemented.

(2) If a generic soil cleanup criterion developed under R 299.5720 to R 299.5726 is greater than the C_{sat} concentration for that hazardous substance, then the C_{sat} concentration shall be the generic criteria for that pathway, unless a facility-specific C_{sat} concentration is established using facility-specific soil characteristics.

R 299.5719 Rescinded.

R 299.5720 Generic cleanup criteria for soil based on direct contact.

Rule 720. (1) Cleanup criteria for soil based on direct contact shall be calculated for the generic residential and commercial I categories according to the following algorithms, except as provided in R 299.5734(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-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 299.5720(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 299.5720(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
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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 299.5720(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 299.5720(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 industrial and commercial II, III, and IV categories according to the following algorithms, except as provided in R 299.5734(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-day) ⁻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)	=	100 mg/day (commercial IV) chemical-specific or default specified at R 299.5720(3)
EF_d	(Dermal exposure frequency)	=	160 days/year
SA	(Skin surface area)	=	$3,300 \text{ cm}^2/\text{day event}$
EV	(Event frequency)	=	1 event/day
AF	(Soil adherence factor)	=	$0.2 \text{ mg}/\text{cm}^2$ (industrial and commercial II) $0.1 \text{ mg}/\text{cm}^2$ (commercial IV) $0.01 \text{ mg}/\text{cm}^2$ (commercial III)
AE_d	(Dermal absorption efficiency)	=	chemical-specific or default specified at R 299.5720(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 (commercial IV)
AE _i	(Ingestion absorption efficiency)	=	chemical-specific or default specified at R 299.5720(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 (industrial and commercial II)
		=	0.1 mg/cm ² (commercial IV)
		=	0.01 mg/cm ² (commercial III)
AE _d	(Dermal absorption efficiency)	=	chemical-specific or default specified at R 299.5720(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 299.5706a(10) or (11) 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 an 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.