

WAC 173-340-720 Groundwater cleanup standards. (1) General considerations.

(a) Groundwater cleanup levels shall be based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site use conditions. The department has determined that at most sites use of groundwater as a source of drinking water is the beneficial use requiring the highest quality of groundwater and that exposure to hazardous substances through ingestion of drinking water and other domestic uses represents the reasonable maximum exposure. Unless a site qualifies under subsection (2) of this section for a different groundwater beneficial use, groundwater cleanup levels shall be established using this presumed exposure scenario and be established in accordance with subsection (3), (4) or (5) of this section. If the site qualifies for a different groundwater beneficial use, groundwater cleanup levels shall be established under subsection (6) of this section.

(b) In the event of a release of a hazardous substance at a site, a cleanup action complying with this chapter shall be conducted to address all areas where the concentration of the hazardous substance in groundwater exceeds cleanup levels.

(c) Groundwater cleanup levels shall be established at concentrations that do not directly or indirectly cause violations of surface water, sediments, soil, or air cleanup standards established under this chapter or other applicable state and federal laws. A site that qualifies for a Method C groundwater cleanup level under this section does not necessarily qualify for a Method C cleanup level in other media. Each medium must be evaluated separately using the criteria applicable to that medium.

(d) The department may require more stringent cleanup levels than specified in this section where necessary to protect other beneficial uses or otherwise protect human health and the environment. Any imposition of more stringent requirements under this provision shall comply with WAC 173-340-702 and 173-340-708. The following are examples of situations that may require more stringent cleanup levels:

(i) Concentrations that are necessary to protect sensitive subgroups;

(ii) Concentrations that eliminate or minimize the potential for food chain contamination;

(iii) Concentrations that eliminate or minimize the potential for damage to soils or biota in the soils which could impair the use of the soil for agricultural or silvicultural purposes;

(iv) Concentrations that eliminate or minimize the potential for the accumulation of vapors in buildings or other structures to concentrations which pose a threat to human health or the environment; and

(v) Concentrations that protect nearby surface waters.

(2) **Potable groundwater defined.** Groundwater shall be classified as potable to protect drinking water beneficial uses unless the following can be demonstrated:

(a) The groundwater does not serve as a current source of drinking water;

(b) The groundwater is not a potential future source of drinking water for any of the following reasons:

(i) The groundwater is present in insufficient quantity to yield greater than 0.5 gallon per minute on a sustainable basis to a well constructed in compliance with chapter 173-160 WAC and in accordance with normal domestic water well construction practices for the area in which the site is located;

(ii) The groundwater contains natural background concentrations of organic or inorganic constituents that make use of the water as a drinking water source not practicable. Groundwater containing total dissolved solids at concentrations greater than 10,000 mg/l shall normally be considered to have fulfilled this requirement; *(NOTE: The total dissolved solids concentration provided here is an example. There may be other situations where high natural background levels also meet this requirement.)* or

(iii) The groundwater is situated at a great depth or location that makes recovery of water for drinking water purposes technically impossible; and

(c) The department determines it is unlikely that hazardous substances will be transported from the contaminated groundwater to groundwater that is a current or potential future source of drinking water, as defined in (a) and (b) of this subsection, at concentrations which exceed groundwater quality criteria published in chapter 173-200 WAC.

In making a determination under this provision, the department shall consider site-specific factors including:

(i) The extent of affected groundwater;

(ii) The distance to existing water supply wells;

(iii) The likelihood of interconnection between the contaminated groundwater and groundwater that is a current or potential future source of drinking water due to well construction practices in the area of the state where the site is located;

(iv) The physical and chemical characteristics of the hazardous substance;

(v) The hydrogeologic characteristics of the site;

(vi) The presence of discontinuities in the affected geologic stratum; and

(vii) The degree of confidence in any predictive modeling performed.

(d) Even if groundwater is classified as a potential future source of drinking water under (b) of this subsection, the department recognizes that there may be sites where there is an extremely low probability that the groundwater will be used for that purpose because of the site's proximity to surface water that is not suitable as a domestic water supply. An example of this situation would be shallow groundwaters in close proximity to marine waters such as on Harbor Island in Seattle. At such sites, the department may allow groundwater to be classified as nonpotable for the purposes of this section if each of the following conditions can be demonstrated. These determinations must be for reasons other than that the groundwater or surface water has been contaminated by a release of a hazardous substance at the site.

(i) The conditions specified in (a) and (c) of this subsection are met;

(ii) There are known or projected points of entry of the groundwater into the surface water;

(iii) The surface water is not classified as a suitable domestic water supply source under chapter 173-201A WAC; and

(iv) The groundwater is sufficiently hydraulically connected to the surface water that the groundwater is not practicable to use as a drinking water source.

(3) Method A cleanup levels for potable groundwater.

(a) **Applicability.** Method A groundwater cleanup levels may only be used at sites qualifying under WAC 173-340-704(1).

(b) **General requirements.** Method A cleanup levels shall be at least as stringent as all of the following:

(i) Concentrations listed in Table 720-1 and compliance with the corresponding footnotes;

(ii) Concentrations established under applicable state and federal laws, including the following requirements:

(A) Maximum contaminant levels established under the Safe Drinking Water Act and published in 40 C.F.R. 141;

(B) Maximum contaminant level goals for noncarcinogens established under the Safe Drinking Water Act and published in 40 C.F.R. 141;

(C) Maximum contaminant levels established by the state board of health and published in chapter 246-290 WAC.

(iii) For hazardous substances deemed indicator hazardous substances for groundwater under WAC 173-340-708(2) and for which there is no value in Table 720-1 or applicable state and federal laws, concentrations that do not exceed natural background or the practical quantitation limit, subject to the limitations in this chapter.

(iv) **Protection of surface water beneficial uses.** Concentrations established in accordance with the methods specified in WAC 173-340-730 for protecting surface water beneficial uses, unless it can be demonstrated that the hazardous substances are not likely to reach surface water. This demonstration must be based on factors other than implementation of a cleanup action at the site.

(4) **Method B cleanup levels for potable groundwater.**

(a) **Applicability.** Method B potable groundwater cleanup levels consist of standard and modified cleanup levels determined using the procedures in this subsection. Either standard or modified Method B groundwater cleanup levels based on drinking water beneficial uses may be used at any site.

(b) **Standard Method B potable groundwater cleanup levels.** Where the groundwater cleanup level is based on a drinking water beneficial use, standard Method B cleanup levels shall be at least as stringent as all of the following:

(i) **Applicable state and federal laws.** Concentrations established under applicable state and federal laws, including the requirements in subsection (3)(b)(ii) of this section;

(ii) **Protection of surface water beneficial uses.** Concentrations established in accordance with the methods specified in WAC 173-340-730 for protecting surface water beneficial uses, unless it can be demonstrated that the hazardous substances are not likely to reach surface water. This demonstration must be based on factors other than implementation of a cleanup action at the site.

(iii) **Human health protection.** For hazardous substances for which sufficiently protective, health-based criteria or standards have not been established under applicable state and federal laws, those concentrations which protect human health as determined by the following methods:

(A) **Noncarcinogens.** Concentrations that are estimated to result in no acute or chronic toxic effects on human health as determined using Equation 720-1.

[Equation 720-1]

$$\text{Groundwater cleanup level (ug/l)} = \frac{\text{RfD} \times \text{ABW} \times \text{UCF} \times \text{HQ} \times \text{AT}}{\text{DWIR} \times \text{INH} \times \text{DWF} \times \text{ED}}$$

Where:

RfD = Reference dose as specified in WAC 173-340-708(7) (mg/kg-day)

ABW	=	Average body weight during the exposure duration (16 kg)
UCF	=	Unit conversion factor (1,000 ug/mg)
HQ	=	Hazard quotient (1) (unitless)
AT	=	Averaging time (6 years)
DWIR	=	Drinking water ingestion rate (1.0 liter/day)
INH	=	Inhalation correction factor (use value of 2 for volatile organic compounds and 1 for all other substances [unitless])
DWF	=	Drinking water fraction (1.0) (unitless)
ED	=	Exposure duration (1.0) (6 years)

(B) **Carcinogens.** For known or suspected carcinogens, concentrations for which the upper bound on the estimated excess cancer risk is less than or equal to one in one million (1×10^{-6}) as determined using Equation 720-2.

[Equation 720-2]

$$\text{Groundwater cleanup level (ug/l)} = \frac{\text{RISK} \times \text{ABW} \times \text{AT} \times \text{UCF}}{\text{CPF} \times \text{DWIR} \times \text{ED} \times \text{INH} \times \text{DWF}}$$

Where:

RISK	=	Acceptable cancer risk level (1 in 1,000,000) (unitless)
ABW	=	Average body weight during the exposure duration (70 kg)
AT	=	Averaging time (75 years)
UCF	=	Unit conversion factor (1,000 ug/mg)
CPF	=	Carcinogenic potency factor as specified in WAC 173-340-708(8) (kg-day/mg)
DWIR	=	Drinking water ingestion rate (2.0 liters/day)
ED	=	Exposure duration (30 years)
INH	=	Inhalation correction factor (use value of 2 for volatile organic compounds and 1 for all other substances [unitless])
DWF	=	Drinking water fraction (1.0) (unitless)

(C) **Petroleum mixtures.** For noncarcinogenic effects of petroleum mixtures, a total petroleum hydrocarbon cleanup level shall be calculated taking into account the additive effects of the petroleum fractions and volatile organic compounds present in the petroleum mixture. Equation 720-3 shall be used for this calculation. Cleanup levels for other noncarcinogens and known or suspected carcinogens within the petroleum mixture shall be calculated using Equations 720-1 and 720-2. See Table 830-1 for the analyses required for various petroleum products to use this method. A total petroleum hydrocarbon cleanup level for petroleum mixtures derived using Equation 720-3 shall be adjusted when necessary so that biological degradation of the petroleum does not result in exceedances of the maximum contaminant levels in chapter 246-290 WAC or natural background, whichever is higher.

[Equation 720-3]

$$C_w = \frac{HI \times AT}{\left[\frac{DWIR \times DWF \times ED}{ABW \times UCF} \right] \times \sum_{i=1}^n \frac{F(i) \times INH(i)}{RfD(i)}}$$

AT and ED added to above equation

Where:

C _w	=	TPH groundwater cleanup level (ug/l)
HI	=	Hazard index (1) (unitless)
AT	=	Averaging time (6 years)
DWIR	=	Drinking water intake rate (1.0 liter/day)
DWF	=	Drinking water fraction (1.0) (unitless)
ED	=	Exposure duration (6 years)
ABW	=	Average body weight during the exposure duration (16 kg)
UCF	=	Unit conversion factor (1,000 ug/mg)
F(i)	=	Fraction by weight of petroleum component (i). (Unitless) (Use site specific groundwater composition data, provided the data is representative of present and future conditions at the site, or use the groundwater composition predicted under WAC 173-340-747 ⁴)
INH(i)	=	Inhalation correction fraction for petroleum component (i) (use value of 2 for volatile organic compounds and 1 for all other components [unitless])
RfD(i)	=	Reference dose of petroleum component (i) as specified in WAC 173-340-708(7) (mg/kg day)
n	=	The number of petroleum components (petroleum fractions plus volatile organic compounds with an RfD) present in the petroleum mixture. (See Table 830-1.)

(c) **Modified Method B potable groundwater cleanup levels.** Modified Method B groundwater cleanup levels for drinking water beneficial uses are standard Method B groundwater cleanup levels modified with chemical-specific or site-specific data. When making these adjustments, the resultant cleanup levels shall meet applicable state and federal laws and health risk levels for standard Method B groundwater cleanup levels. Changes to exposure assumptions must comply with WAC 173-340-708(10). The following adjustments may be made to the default assumptions in the standard Method B equations to derive modified Method B groundwater cleanup levels for drinking water beneficial uses:

(i) The inhalation correction factor is an adjustment factor that takes into account exposure to hazardous substances that are volatilized and inhaled during showering and other domestic activities. When available, hazardous substance-specific information may be used to estimate this factor;

(ii) Where separate toxicity factors (reference doses and carcinogenic potency factors) are available for inhalation and oral exposures, the health hazards associated with the inhalation of hazardous substances in groundwater during showering and other domestic activities may be evaluated separately from the health hazards associated with ingestion of drinking water. In these cases, the groundwater cleanup level based on ingestion of drinking water shall be modified to take into account multiple exposure pathways in accordance with WAC 173-340-708(6);

(iii) The toxicity equivalency factor procedures described in WAC 173-340-708(8) may be used for assessing the potential carcinogenic risk of mixtures of chlorinated dibenzo-p-dioxins, chlorinated dibenzofurans and polycyclic aromatic hydrocarbons;

(iv) Adjustments to the reference dose and cancer potency factor may be made if the requirements in WAC 173-340-708 (7) and (8) are met; and

(v) Modifications incorporating new science as provided for in WAC 173-340-702 (14), (15) and (16).

(d) **Using modified Method B to evaluate groundwater remediation levels.** In addition to the adjustments allowed under (c) of this subsection, other adjustments to the reasonable maximum exposure scenario or default exposure assumptions are allowed when using a quantitative site-specific risk assessment to evaluate the protectiveness of a remedy. See WAC 173-340-355, 173-340-357, and 173-340-708 (3)(d) and (10)(b).

(5) **Method C cleanup levels for potable groundwater.**

(a) **Applicability.** Method C potable groundwater cleanup levels consist of standard and modified cleanup levels as described in this subsection.

The department may approve of both standard and modified Method C groundwater cleanup levels based on drinking water beneficial uses only at sites qualifying under WAC 173-340-706(1).

(b) **Standard Method C potable groundwater cleanup levels.** Where the groundwater cleanup level is based on a drinking water beneficial use and the site qualifies for a Method C groundwater cleanup level, the standard Method C cleanup levels for groundwater shall be at least as stringent as all of the following:

(i) **Applicable state and federal laws.** Concentrations established under applicable state and federal laws, including the requirements in subsection (3)(b)(ii) of this section;

(ii) **Protection of surface water beneficial uses.** Concentrations established in accordance with the methods specified in WAC 173-340-730 for protecting surface water beneficial uses, unless it can be demonstrated that the hazardous substances are not likely to reach surface water. This demonstration must be based on factors other than implementation of a cleanup action at the site.

(iii) **Human health protection.** For hazardous substances for which sufficiently protective, health-based standards or criteria have not been established under applicable state and federal laws, those concentrations that protect human health as determined using the following methods:

(A) **Noncarcinogens.** Concentrations that are estimated to result in no significant acute or chronic toxic effects on human health and are estimated using Equation 720-1, except that the average body weight shall be 70 kg and the drinking water intake rate shall be 2 liters/day;

(B) **Carcinogens.** Concentrations for which the upper bound on the estimated excess cancer risk is less than or equal to one in one hundred thousand (1×10^{-5}), using Equation 720-2;

(C) **Petroleum mixtures.** Cleanup levels for petroleum mixtures shall be determined as specified in subsection (4)(b)(iii)(C) of this section except that the average body weight shall be 70 kg and the drinking water rate shall be 2 liters/day.

(c) **Modified Method C potable groundwater cleanup levels.** Modified Method C groundwater cleanup levels for drinking water beneficial uses are standard Method C groundwater cleanup levels modified with chemical-specific or site-specific data. The same limitations and adjustments specified for modified Method B in subsection (4)(c) of this section apply to modified Method C groundwater cleanup levels.

(d) **Using Modified Method C to evaluate groundwater remediation levels.** In addition to the adjustments allowed under (c) of this subsection, other adjustments to the reasonable maximum exposure scenario

or default exposure assumptions are allowed when using a quantitative site-specific risk assessment to evaluate the protectiveness of a remedy. See WAC 173-340-355, 173-340-357, and 173-340-708 (3)(d) and (10)(b).

(6) **Cleanup levels for nonpotable groundwater.**

(a) **Applicability.** Groundwater cleanup levels may be established under this subsection only if the contaminated groundwater is not classified as potable under subsection (2) of this section.

(b) **Requirements.** Cleanup levels shall be established in accordance with either of the following:

(i) The methods specified in subsections (3), (4) or (5) of this section, as applicable, for protection of drinking water beneficial uses; or

(ii) A site-specific risk assessment as provided for under (c) of this subsection for protection of other groundwater beneficial uses.

(c) **Site-specific risk assessment.**

(i) **Method B site-specific groundwater cleanup levels.** Where a site-specific risk assessment is used to establish a Method B groundwater cleanup level under (b)(ii) of this subsection, the risk assessment shall conform to the requirements in WAC 173-340-702 and 173-340-708. The risk assessment shall evaluate all potential exposure pathways and groundwater uses at the site, including potential impacts to persons engaged in site development or utility construction and maintenance activities. The risk assessment shall demonstrate the following:

(A) The cleanup levels will meet any applicable state and federal laws (drinking water standards are not applicable to these sites);

(B) The cleanup levels will result in no significant acute or chronic toxic effects on human health as demonstrated by not exceeding a hazard quotient of one (1) for individual hazardous substances;

(C) The cleanup levels will result in an upper bound on the estimated excess cancer risk that is less than or equal to one in one million (1×10^{-6}) for individual hazardous substances;

(D) For organic hazardous substances and petroleum products, the cleanup levels comply with the limitation on free product in subsection (7)(d) of this section;

(E) The cleanup levels will not exceed the surface water cleanup levels derived under WAC 173-340-730 at the groundwater point of compliance or exceed the surface water or sediment quality standards at any point downstream, unless it can be demonstrated that the hazardous substances are not likely to reach surface water. This demonstration must be based on factors other than implementation of a cleanup action at the site; and

(F) Where it is demonstrated that hazardous substances are not likely to reach surface water, the use of a groundwater cleanup level less stringent than a surface water cleanup level will not pose a threat to surface water through pathways that could result in groundwater affected by the site entering surface water (such as use of the water for irrigation or discharges from foundation drains or utility corridors).

(ii) **Method C site-specific groundwater cleanup levels.**

(A) **Applicability.** The department may approve of a site-specific Method C groundwater cleanup level derived under (b)(ii) of this subsection only at sites qualifying under WAC 173-340-706(1).

(B) **Requirements.** Where a site-specific risk assessment is used to establish a Method C groundwater cleanup level under (b)(ii) of

this subsection, the site-specific risk assessment shall comply with the requirements in (c)(i) of this subsection except that the level of risk for individual carcinogens shall be one in one hundred thousand (1×10^{-5}).

(iii) **Limitations on the use of site-specific risk assessment.** If the site-specific risk assessment results in a Method B or Method C groundwater cleanup level that exceeds the applicable potable groundwater cleanup level derived under (b)(i) of this subsection, then the potable groundwater cleanup level shall be used unless the following conditions are met:

(A) All potentially affected property owners, local governments, tribes and water purveyors with jurisdiction in the area potentially affected by the groundwater contamination have been mailed a notice of the proposal and provided an opportunity to comment. The notice shall specifically ask for information on existing and planned uses of the groundwater. The notice shall be in addition to any notice provided under WAC 173-340-600. In determining whether it is appropriate to use a cleanup level less stringent than the potable groundwater cleanup level, the department will give greater weight to information based on an adopted or pending plan or similar preexisting document.

(B) For sites where the groundwater is classified as nonpotable under WAC 173-340-720 (2)(d), the cleanup action includes institutional controls complying with WAC 173-340-440 that will prevent the use of contaminated groundwater for drinking water purposes at any point between the source of hazardous substances and the point(s) of entry of groundwater into the surface water.

(C) For sites where the risk assessment includes assumptions of restricted use or contact with the groundwater (other than for the reason of being nonpotable), or restricted use of the land above the groundwater, the cleanup action includes institutional controls complying with WAC 173-340-440 that will implement the restrictions.

(7) **Adjustments to cleanup levels.**

(a) **Total site risk adjustments.** Groundwater cleanup levels for individual hazardous substances developed in accordance with subsection (4), (5) or (6) of this section, including those based on applicable state and federal laws, shall be adjusted downward to take into account exposure to multiple hazardous substances and/or exposure resulting from more than one pathway of exposure. These adjustments need to be made only if, without these adjustments, the hazard index would exceed one (1) or the total excess cancer risk would exceed one in one hundred thousand (1×10^{-5}). These adjustments shall be made in accordance with the procedures in WAC 173-340-708 (5) and (6). In making these adjustments, the hazard index shall not exceed one (1) and the total excess cancer risk shall not exceed one in one hundred thousand (1×10^{-5}).

(b) **Adjustments to applicable state and federal laws.** Where a cleanup level developed under subsection (3), (4), (5), or (6) of this section is based on an applicable state or federal law and the level of risk upon which the standard is based exceeds an excess cancer risk of one in one hundred thousand (1×10^{-5}) or a hazard index of one (1), the cleanup level shall be adjusted downward so that the total excess cancer risk does not exceed one in one hundred thousand (1×10^{-5}) and the hazard index does not exceed one (1) at the site.

(c) **Natural background and PQL considerations.** Cleanup levels determined under subsection (3), (4), (5), or (6) of this section, including cleanup levels adjusted under subsection (7)(a) and (b) of

this section, shall not be set at levels below the practical quantitation limit or natural background concentrations, whichever is higher. See WAC 173-340-707 and 173-340-709 for additional requirements pertaining to practical quantitation limits and natural background.

(d) **Nonaqueous phase liquid limitation.** For organic hazardous substances and total petroleum hydrocarbons, the cleanup level determined under subsection (3), (4), (5), or (6) shall not exceed a concentration that would result in nonaqueous phase liquid being present in or on the groundwater. Physical observations of groundwater at or above the cleanup level, such as the lack of a film, sheen, or discoloration of the groundwater or lack of sludge or emulsion in the groundwater, may be used to determine compliance with this requirement.

(8) **Point of compliance.**

(a) **Point of compliance defined.** For groundwater, the point of compliance is the point or points where the groundwater cleanup levels established under subsection (3), (4), (5), or (6) of this section must be attained for a site to be in compliance with the cleanup standards. Groundwater cleanup levels shall be attained in all groundwaters from the point of compliance to the outer boundary of the hazardous substance plume.

(b) **Standard point of compliance for all sites.** The standard point of compliance shall be established throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site.

(c) **Conditional point of compliance.** Where it can be demonstrated under WAC 173-340-350 through 173-340-390 that it is not practicable to meet the cleanup level throughout the site within a reasonable restoration time frame, the department may approve a conditional point of compliance that shall be as close as practicable to the source of hazardous substances, and except as provided under (d) of this subsection, not to exceed the property boundary. Where a conditional point of compliance is proposed, the person responsible for undertaking the cleanup action shall demonstrate that all practicable methods of treatment are to be used in the site cleanup.

(d) **Off-property conditional point of compliance.** A conditional point of compliance shall not exceed the property boundary except in the three situations described below. In each of these three situations the person responsible for undertaking the cleanup action shall demonstrate that, in addition to making the demonstration required by (c) of this subsection, the following requirements are met:

(i) **Properties abutting surface water.** Where the groundwater cleanup level is based on protection of surface water beneficial uses under subsection (3), (4), (5), or (6) of this section, and the property containing the source of contamination directly abuts the surface water, the department may approve a conditional point of compliance that is located within the surface water as close as technically possible to the point or points where groundwater flows into the surface water subject to the following conditions:

(A) It has been demonstrated that the contaminated groundwater is entering the surface water and will continue to enter the surface water even after implementation of the selected cleanup action;

(B) It has been demonstrated under WAC 173-340-350 through 173-340-390 that it is not practicable to meet the cleanup level at a point within the groundwater before entering the surface water, within a reasonable restoration time frame;

(C) Use of a mixing zone under WAC 173-201A-100 to demonstrate compliance with surface water cleanup levels shall not be allowed;

(D) Groundwater discharges shall be provided with all known available and reasonable methods of treatment before being released into surface waters;

(E) Groundwater discharges shall not result in violations of sediment quality values published in chapter 173-204 WAC;

(F) Groundwater and surface water monitoring shall be conducted to assess the long-term performance of the selected cleanup action including potential bioaccumulation problems resulting from surface water concentrations below method detection limits; and

(G) Before approving the conditional point of compliance, a notice of the proposal shall be mailed to the natural resource trustees, the Washington state department of natural resources and the United States Army Corps of Engineers. The notice shall be in addition to any notice provided under WAC 173-340-600 and invite comments on the proposal.

(ii) **Properties near, but not abutting, surface water.** Where the groundwater cleanup level is based on protection of surface water beneficial uses under subsection (3), (4), (5), or (6) of this section and the property that is the source of the contamination is located near, but does not directly abut, a surface water body, the department may approve a conditional point of compliance that is located as close as practicable to the source, not to exceed the point or points where the groundwater flows into the surface water.

For a conditional point of compliance to be approved under this provision the conditions specified in (d)(i) of this section must be met and the affected property owners between the source of contamination and the surface water body must agree in writing to the use of the conditional point of compliance. Also, if the groundwater cleanup level is not exceeded in the groundwater prior to its entry into the surface water, the conditional point of compliance cannot extend beyond the extent of groundwater contamination above the cleanup level at the time the department approves the conditional point of compliance.

(iii) **Area-wide conditional point of compliance.** As part of remedy selection, the department may approve an area-wide conditional point of compliance to address an area-wide groundwater contamination problem. The area-wide conditional point(s) of compliance shall be as close as practicable to each source of hazardous substances, not to exceed the extent of groundwater contamination at the time the department approves an area-wide conditional point of compliance.

This provision may be applied only at areas that are affected by hazardous substances released from multiple sources that have resulted in commingled plumes of contaminated groundwater that are not practicable to address separately. A site may have more than one area-wide conditional point of compliance to address multiple sources and types of contaminants. An area-wide conditional point of compliance may be approved under this provision only if all of the following conditions have been met:

(A) The person conducting the cleanup action has complied with WAC 173-340-350 through 173-340-390, including a demonstration that it is not practicable to meet a point of compliance throughout the groundwater contamination within a reasonable restoration time frame;

(B) A plan has been developed for implementation of the cleanup action, including a description of how any necessary access to the affected properties will be obtained;

(C) If the contaminated groundwater is considered to be potable under WAC 173-340-720(2), current developments in the area encompassed by the area-wide conditional point of compliance and any other areas potentially affected by the groundwater contamination are served by a public water system that obtains its water from an offsite source and it can be demonstrated that the water system has sufficient capacity to serve future development in these areas. This demonstration may be made by obtaining a written statement to this effect from the water system operator;

(D) All property owners, tribes, local governments, and water purveyors with jurisdiction in the area potentially affected by the groundwater contamination, have been mailed a notice of the proposal to establish an area-wide conditional point of compliance and provided an opportunity to comment. The notice shall specifically ask for information on existing and planned uses of the groundwater. The notice shall be in addition to any notice provided under WAC 173-340-600. The department will give greater weight to information based on an adopted or pending plan or similar preexisting document. When the department is providing technical assistance under WAC 173-340-515, the department shall also provide an opportunity to comment to the public through the *Site Register* before issuing a written opinion.

(E) Other conditions as determined by the department on a case-by-case basis.

(e) Monitoring wells and surface water compliance.

(i) The department may require or approve the use of upland monitoring wells located between the surface water and the source of contamination to establish compliance where a conditional point of compliance has been established under subsection (8)(d)(i) or (ii) of this section.

(ii) Where such monitoring wells are used, the department should consider an estimate of natural attenuation between the monitoring well and the point or points where groundwater flows into the surface water in evaluating whether compliance has been achieved.

(iii) When evaluating how much, if any, natural attenuation will occur, the department shall consider site-specific factors including:

(A) Whether the groundwater could reach the surface water in ways that would not provide for natural attenuation within the groundwater flow system (such as short circuiting through high permeability zones, utility corridors or foundation drains); and

(B) Whether changes to the groundwater chemistry due to natural attenuation processes would cause an exceedance of surface water or sediment quality standards.

(9) Compliance monitoring.

(a) When groundwater cleanup levels have been established at a site, sampling of the groundwater shall be conducted to determine if compliance with the groundwater cleanup levels has been achieved. Compliance with groundwater cleanup levels shall be determined by analysis of groundwater samples representative of the groundwater. Surface water analysis, bioassays or other biomonitoring methods may also be required where the groundwater cleanup level is based on protection of surface water. Sampling and analytical procedures shall be defined in a compliance monitoring plan prepared under WAC 173-340-410. The sample design shall provide data that are representative of the site.

(b) Analyses shall be conducted on unfiltered groundwater samples, unless it can be demonstrated that a filtered sample provides a more representative measure of groundwater quality. The department ex-

pects that filtering will generally be acceptable for iron and manganese and other naturally occurring inorganic substances where:

(i) A properly constructed monitoring well cannot be sufficiently developed to provide low turbidity water samples;

(ii) Due to the natural background concentration of hazardous substances in the aquifer material, unfiltered samples would not provide a representative measure of groundwater quality; and

(iii) Filtering is performed in the field with all practicable measures taken to avoid exposing the groundwater sample to the ambient air before filtering.

(c) The data analysis and evaluation procedures used to evaluate compliance with groundwater cleanup levels shall be defined in a compliance monitoring plan prepared under WAC 173-340-410. These procedures shall meet the following general requirements:

(i) Methods of data analysis shall be consistent with the sampling design;

(ii) When cleanup levels are based on requirements specified in applicable state and federal laws, the procedures for evaluating compliance that are specified in those requirements shall be used to evaluate compliance with cleanup levels unless those procedures conflict with the intent of this section;

(iii) Where procedures for evaluating compliance are not specified in an applicable state and federal law, statistical methods used shall be appropriate for the distribution of sampling data for each hazardous substance. If the distributions for hazardous substances differ, more than one statistical method may be required;

(iv) Compliance with groundwater cleanup levels shall be determined for each groundwater monitoring well or other monitoring points such as a spring;

(v) The data analysis procedures identified in the compliance monitoring plan shall specify the statistical parameters to be used to determine compliance with groundwater cleanup levels.

(A) For cleanup levels based on short-term or acute toxic effects on human health or the environment, an upper percentile concentration shall be used to evaluate compliance with groundwater cleanup levels.

(B) For cleanup levels based on chronic or carcinogenic threats, the true mean concentration shall be used to evaluate compliance with groundwater cleanup levels.

(vi) When active groundwater restoration is performed, or containment technologies are used that incorporate active pumping of groundwater, compliance with groundwater cleanup levels shall be determined when the groundwater characteristics at the site are no longer influenced by the cleanup action.

(d) When data analysis procedures for evaluating compliance are not specified in an applicable state or federal law, the following procedures shall be used:

(i) A confidence interval approach that meets the following requirements:

(A) The upper one-sided ninety-five percent confidence limit on the true mean groundwater concentration shall be less than the groundwater cleanup level. For lognormally distributed data, the upper one-sided ninety-five percent confidence limit shall be calculated using Land's method; and

(B) Data shall be assumed to be lognormally distributed unless this assumption is rejected by a statistical test. If a lognormal distribution is inappropriate, data shall be assumed to be normally distributed unless this assumption is rejected by a statistical test. The

W test, D'Agostino's test, or, censored probability plots, as appropriate for the data, shall be the statistical methods used to determine whether the data is lognormally or normally distributed.

(ii) Evaluations conducted under subsection (9)(c)(v)(A) of this subsection may use a parametric test for percentiles based on tolerance intervals to test the proportion of groundwater samples having concentrations less than the groundwater cleanup level. When using this method, the true proportion of samples that do not exceed the groundwater cleanup level shall not be less than ninety percent. Statistical tests shall be performed with a Type I error level of 0.05; or

(iii) Other statistical methods approved by the department.

(e) All data analysis methods used, including those specified in state or federal law, must meet the following requirements:

(i) No single sample concentration shall be greater than two times the groundwater cleanup level. Higher exceedances to control false positive error rates at five percent may be approved by the department when the cleanup level is based on background concentrations; and

(ii) Less than ten percent of the sample concentrations shall exceed the groundwater cleanup level during a representative sampling period. Higher exceedances to control false positive error rates at five percent may be approved by the department when the cleanup level is based on background concentrations; and

(f) When using statistical methods to demonstrate compliance with groundwater cleanup levels, the following procedures shall be used for measurements below the practical quantitation limit:

(i) Measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit when not more than fifteen percent of the measurements are below the practical quantitation limit.

(ii) Measurements above the method detection limit but below the practical quantitation limit shall be assigned a value equal to the method detection limit when not more than fifteen percent of the measurements are below the practical quantitation limit.

(iii) When between fifteen and fifty percent of the measurements are below the practical quantitation limit and the data are assumed to be lognormally or normally distributed, Cohen's method shall be used to calculate a corrected mean and standard deviation for use in calculating an upper confidence limit on the true mean groundwater concentration.

(iv) If more than fifty percent of the measurements are below the practical quantitation limit, the largest value in the data set shall be used in place of an upper confidence limit on the true mean groundwater calculation.

(v) If a hazardous substance or petroleum fraction has never been detected in any sample at a site and these substances are not suspected of being present at the site based on site history and other knowledge, that hazardous substance or petroleum fraction may be excluded from the statistical analysis.

(vi) The department may approve alternate statistical procedures for handling nondetected values or values below the practical quantitation limit.

[Statutory Authority: Chapter 70.105D RCW. WSR 01-05-024 (Order 97-09A), § 173-340-720, filed 2/12/01, effective 8/15/01; WSR 91-04-019, § 173-340-720, filed 1/28/91, effective 2/28/91.]

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency.