

WAC 173-340-708 Human health risk assessment procedures. (1)

Purpose. This section defines the risk assessment framework that shall be used to establish cleanup levels, and remediation levels using a quantitative risk assessment, under this chapter. As used in this section, cleanup levels and remediation levels means the human health risk assessment component of these levels. This chapter defines certain default values and methods to be used in calculating cleanup levels and remediation levels. This section allows varying from these default values and methods under certain circumstances. When deciding whether to approve alternate values and methods the department shall ensure that the use of alternative values and methods will not significantly delay site cleanups.

(2) Selection of indicator hazardous substances.

When defining cleanup requirements at a site that is contaminated with a large number of hazardous substances, the department may eliminate from consideration those hazardous substances that contribute a small percentage of the overall threat to human health and the environment. The remaining hazardous substances shall serve as indicator hazardous substances for purposes of defining site cleanup requirements. See WAC 173-340-703 for additional information on establishing indicator hazardous substances.

(3) Reasonable maximum exposure.

(a) Cleanup levels and remediation levels shall be based on estimates of current and future resource uses and reasonable maximum exposures expected to occur under both current and potential future site use conditions, as specified further in this chapter.

(b) The reasonable maximum exposure is defined as the highest exposure that is reasonably expected to occur at a site under current and potential future site use. WAC 173-340-720 through 173-340-760 define the reasonable maximum exposures for groundwater, surface water, soil, and air. These reasonable maximum exposures will apply to most sites where individuals or groups of individuals are or could be exposed to hazardous substances. For example, the reasonable maximum exposure for most groundwater is defined as exposure to hazardous substances in drinking water and other domestic uses.

(c) Persons performing cleanup actions under this chapter may use the evaluation criteria in WAC 173-340-720 through 173-340-760, where allowed in those sections, to demonstrate that the reasonable maximum exposure scenarios specified in those sections are not appropriate for cleanup levels for a particular site. For example, the criteria in WAC 173-340-720(2) could be used to demonstrate that the reasonable maximum exposure for groundwater beneath a site does not need to be based on drinking water use. The use of an alternate exposure scenario shall be documented by the person performing the cleanup action. Documentation for the use of alternate exposure scenarios under this provision shall be based on the results of investigations performed in accordance with WAC 173-340-350.

(d) Persons performing cleanup actions under this chapter may also use alternate reasonable maximum exposure scenarios to help assess the protectiveness to human health of a cleanup action alternative that incorporates remediation levels and uses engineered controls and/or institutional controls to limit exposure to the contamination remaining on the site.

(i) An alternate reasonable maximum exposure scenario shall reflect the highest exposure that is reasonably expected to occur under current and potential future site conditions considering, among other appropriate factors, the potential for institutional controls to fail

and the extent of the time period of failure under these scenarios and the land uses at the site.

(ii) Land uses other than residential and industrial, such as agricultural, recreational, and commercial, shall not be used as the basis for a reasonable maximum exposure scenario for the purpose of establishing a cleanup level. However, these land uses may be used as a basis for an alternate reasonable maximum exposure scenario for the purpose of assessing the protectiveness of a remedy. For example, if a cap (with appropriate institutional controls) is the proposed cleanup action at a commercial site, the reasonable maximum exposure scenario for assessing the protectiveness of the cap with regard to direct soil contact could be changed from a child living on the site to a construction or maintenance worker and child trespasser scenario.

(iii) The department expects that in evaluating the protectiveness of a remedy with regard to the soil direct contact pathway, many types of commercial sites may, where appropriate, qualify for alternative exposure scenarios under this provision since contaminated soil at these sites is typically characterized by a cover of buildings, pavement, and landscaped areas. Examples of these types of sites include:

(A) Commercial properties in a location removed from single family homes, duplexes or subdivided individual lots;

(B) Private and public recreational facilities where access to these facilities is physically controlled (e.g., a private golf course to which access is restricted by fencing);

(C) Urban residential sites (e.g., upper-story residential units over ground floor commercial businesses);

(D) Offices, restaurants, and other facilities primarily devoted to support administrative functions of a commercial/industrial nature (e.g., an employee credit union or cafeteria in a large office or industrial complex).

(e) A conceptual site model may be used to identify when individuals or groups of individuals may be exposed to hazardous substances through more than one exposure pathway. For example, a person may be exposed to hazardous substances from a site by drinking contaminated groundwater, eating contaminated fish, and breathing contaminated air. At sites where the same individuals or groups of individuals are or could be consistently exposed through more than one pathway, the reasonable maximum exposure shall represent the total exposure through all of those pathways. At such sites, the cleanup levels and remediation levels derived for individual pathways under WAC 173-340-720 through 173-340-760 and WAC 173-340-350 through 173-340-390 shall be adjusted downward to take into account multiple exposure pathways.

(4) **Cleanup levels for individual hazardous substances.** Cleanup levels for individual hazardous substances will generally be based on a combination of requirements in applicable state and federal laws and risk assessment.

(5) **Multiple hazardous substances.**

(a) Cleanup levels for individual hazardous substances established under Methods B and C and remediation levels shall be adjusted downward to take into account exposure to multiple hazardous substances. This adjustment needs to be made only if, without this adjustment, the hazard index would exceed one (1) or the total excess cancer risk would exceed one in one hundred thousand (1×10^{-5}).

(b) Adverse effects resulting from exposure to two or more hazardous substances with similar types of toxic response are assumed to

be additive unless scientific evidence is available to demonstrate otherwise. Cancer risks resulting from exposure to two or more carcinogens are assumed to be additive unless scientific evidence is available to demonstrate otherwise.

(c) For noncarcinogens, for purposes of establishing cleanup levels under Methods B and C, and for remediation levels, the health threats resulting from exposure to two or more hazardous substances with similar types of toxic response may be apportioned between those hazardous substances in any combination as long as the hazard index does not exceed one (1).

(d) For carcinogens, for purposes of establishing cleanup levels under Methods B and C, and for remediation levels, the cancer risks resulting from exposure to multiple hazardous substances may be apportioned between hazardous substances in any combination as long as the total excess cancer risk does not exceed one in one hundred thousand (1×10^{-5}).

(e) The department may require biological testing to assess the potential interactive effects associated with chemical mixtures.

(f) When making adjustments to cleanup levels and remediation levels for multiple hazardous substances, the concentration for individual hazardous substances shall not be adjusted downward to less than the practical quantitation limit or natural background.

(6) Multiple pathways of exposure.

(a) Estimated doses of individual hazardous substances resulting from more than one pathway of exposure are assumed to be additive unless scientific evidence is available to demonstrate otherwise.

(b) Cleanup levels and remediation levels based on one pathway of exposure shall be adjusted downward to take into account exposures from more than one exposure pathway. The number of exposure pathways considered at a given site shall be based on the reasonable maximum exposure scenario as defined in WAC 173-340-708(3). This adjustment needs to be made only if exposure through multiple pathways is likely to occur at a site and, without the adjustment, the hazard index would exceed one (1) or the total excess cancer risk would exceed one in one hundred thousand (1×10^{-5}).

(c) For noncarcinogens, for purposes of establishing cleanup levels under Methods B and C, and remediation levels, the health threats associated with exposure via multiple pathways may be apportioned between exposure pathways in any combination as long as the hazard index does not exceed one (1).

(d) For carcinogens, for purposes of establishing cleanup levels under Methods B and C, and for remediation levels, the cancer risks associated with exposure via multiple pathways may be apportioned between exposure pathways in any combination as long as the total excess cancer risk does not exceed one in one hundred thousand (1×10^{-5}).

(e) When making adjustments to cleanup levels and remediation levels for multiple pathways of exposure, the concentration for individual hazardous substances shall not be adjusted downward to less than the practical quantitation limit or natural background.

(7) Reference doses.

(a) The chronic reference dose/reference concentration and the developmental reference dose/reference concentration shall be used to establish cleanup levels and remediation levels under this chapter. Cleanup levels and remediation levels shall be established using the value which results in the most protective concentration.

(b) Inhalation reference doses/reference concentrations shall be used in WAC 173-340-750. Where the inhalation reference dose/reference concentration is reported as a concentration in air, that value shall be converted to a corresponding inhaled intake (mg/kg-day) using a human body weight of 70 kg and an inhalation rate of 20 m³/day, and take into account, where available, the respiratory deposition and absorption characteristics of the gases and inhaled particles.

(c) A subchronic reference dose/reference concentration may be used to evaluate potential noncarcinogenic effects resulting from exposure to hazardous substances over short periods of time. This value may be used in place of the chronic reference dose/reference concentration where it can be demonstrated that a particular hazardous substance will degrade to negligible concentrations during the exposure period.

(d) For purposes of establishing cleanup levels and remediation levels for hazardous substances under this chapter, a reference dose/reference concentration established by the United States Environmental Protection Agency and available through the "integrated risk information system" (IRIS) database shall be used. If a reference dose/reference concentration is not available through the IRIS database, a reference dose/reference concentration from the U.S. EPA Health Effects Assessment Summary Table ("HEAST") database or, if more appropriate, the National Center for Environmental Assessment ("NCEA") shall be used.

(e) If a reference dose/reference concentration is available through IRIS, HEAST, or the NCEA, it shall be used unless the department determines that there is clear and convincing scientific data which demonstrates that the use of this value is inappropriate.

(f) If a reference dose/reference concentration for a hazardous substance including petroleum fractions and petroleum constituents is not available through IRIS, HEAST or the NCEA or is demonstrated to be inappropriate under (e) of this subsection and the department determines that development of a reference dose/reference concentration is necessary for the hazardous substance at the site, then a reference dose/reference concentration shall be established on a case-by-case basis. When establishing a reference dose on a case-by-case basis, the methods described in "Reference Dose (RfD): Description and Use in Health Risk Assessment: Background Document 1A", USEPA, March 15, 1993, shall be used.

(g) In estimating a reference dose/reference concentration for a hazardous substance under (e) or (f) of this subsection, the department shall, as appropriate, consult with the science advisory board, the department of health, and the United States Environmental Protection Agency and may, as appropriate, consult with other qualified persons. Scientific data supporting such a change shall be subject to the requirements under WAC 173-340-702 (14), (15) and (16). Once the department has established a reference dose/reference concentration for a hazardous substance under this provision, the department is not required to consult again for the same hazardous substance.

(h) Where a reference dose/reference concentration other than those established under (d) or (g) of this subsection is used to establish a cleanup level or remediation level at individual sites, the department shall summarize the scientific rationale for the use of those values in the cleanup action plan. The department shall provide the opportunity for public review and comment on this value in accordance with the requirements of WAC 173-340-380 and 173-340-600.

(8) **Carcinogenic potency factor.**

(a) For purposes of establishing cleanup levels and remediation levels for hazardous substances under this chapter, a carcinogenic potency factor established by the United States Environmental Protection Agency and available through the IRIS database shall be used. If a carcinogenic potency factor is not available from the IRIS database, a carcinogenic potency factor from HEAST or, if more appropriate, from the NCEA shall be used.

(b) If a carcinogenic potency factor is available from the IRIS, HEAST or the NCEA, it shall be used unless the department determines that there is clear and convincing scientific data which demonstrates that the use of this value is inappropriate.

(c) If a carcinogenic potency factor is not available through IRIS, HEAST or the NCEA or is demonstrated to be inappropriate under (b) of this subsection and the department determines that development of a cancer potency factor is necessary for the hazardous substance at the site, then one of the following methods shall be used to establish a carcinogenic potency factor:

(i) The carcinogenic potency factor may be derived from appropriate human epidemiology data on a case-by-case basis; or

(ii) The carcinogenic potency factor may be derived from animal bioassay data using the following procedures:

(A) All carcinogenicity bioassays shall be reviewed and data of appropriate quality shall be used for establishing the carcinogenic potency factor.

(B) The linearized multistage extrapolation model shall be used to estimate the slope of the dose-response curve unless the department determines that there is clear and convincing scientific data which demonstrates that the use of an alternate extrapolation model is more appropriate;

(C) All doses shall be adjusted to give an average daily dose over the study duration; and

(D) An interspecies scaling factor shall be used to take into account differences between animals and humans. For oral carcinogenic toxicity values this scaling factor shall be based on the assumption that milligrams per surface area is an equivalent dose between species unless the department determines there is clear and convincing scientific data which demonstrates that an alternate procedure is more appropriate. The slope of the dose response curve for the test species shall be multiplied by this scaling factor in order to obtain the carcinogenic potency factor, except where such scaling factors are incorporated into the extrapolation model under (B) of this subsection. The procedure to derive a human equivalent concentration of inhaled particles and gases shall take into account, where available, the respiratory deposition and absorption characteristics of the gases and inhaled particles. Where adequate pharmacokinetic and metabolism studies are available, data from these studies may be used to adjust the interspecies scaling factor.

(d) **Mixtures of dioxins and furans.** When establishing and determining compliance with cleanup levels and remediation levels for mixtures of chlorinated dibenzo-p-dioxins (dioxins) and/or chlorinated dibenzofurans (furans), the following procedures shall be used:

(i) **Assessing as single hazardous substance.** When establishing and determining compliance with cleanup levels and remediation levels, including when determining compliance with the excess cancer risk requirements in this chapter, mixtures of dioxins and/or furans shall be considered a single hazardous substance.

(ii) **Establishing cleanup levels and remediation levels.** The cleanup levels and remediation levels established for 2,3,7,8 tetra-chloro dibenzo-p-dioxin (2,3,7,8-TCDD) shall be used, respectively, as the cleanup levels and remediation levels for mixtures of dioxins and/or furans.

(iii) **Determining compliance with cleanup levels and remediation levels.** When determining compliance with the cleanup levels and remediation levels established for mixtures of dioxins and/or furans, the following procedures shall be used:

(A) Calculate the total toxic equivalent concentration of 2,3,7,8-TCDD for each sample of the mixture. The total toxic equivalent concentration shall be calculated using the following method, unless the department determines that there is clear and convincing scientific data which demonstrates that the use of this method is inappropriate:

(I) Analyze samples from the medium of concern to determine the concentration of each dioxin and furan congener listed in Table 708-1;

(II) For each sample analyzed, multiply the measured concentration of each congener in the sample by its corresponding toxicity equivalency factor (TEF) in Table 708-1 to obtain the toxic equivalent concentration of 2,3,7,8-TCDD for that congener; and

(III) For each sample analyzed, add together the toxic equivalent concentrations of all the congeners within the sample to obtain the total toxic equivalent concentration of 2,3,7,8-TCDD for that sample.

(B) After calculating the total toxic equivalent concentration of each sample of the mixture, use the applicable compliance monitoring requirements in WAC 173-340-720 through 173-340-760 to determine whether the total toxic equivalent concentrations of the samples comply with the cleanup level or remediation level for the mixture at the applicable point of compliance.

(iv) **Protecting the quality of other media.** When establishing cleanup levels and remediation levels for mixtures of dioxins and/or furans in a medium of concern that are based on protection of another medium (the receiving medium) (e.g., soil levels protective of ground-water quality), the following procedures shall be used:

(A) The cleanup level or remediation level for 2,3,7,8-TCDD in the receiving medium shall be used, respectively, as the cleanup level or remediation level for the receiving medium.

(B) When determining the concentrations in the medium of concern that will achieve the cleanup level or remediation level in the receiving medium, the congener-specific physical and chemical properties shall be considered during that assessment.

(e) **Mixtures of carcinogenic PAHs.** When establishing and determining compliance with cleanup levels and remediation levels for mixtures of carcinogenic polycyclic aromatic hydrocarbons (carcinogenic PAHs), the following procedures shall be used:

(i) **Assessing as single hazardous substance.** When establishing and determining compliance with cleanup levels and remediation levels, including when determining compliance with the excess cancer risk requirements in this chapter, mixtures of carcinogenic PAHs shall be considered a single hazardous substance.

(ii) **Establishing cleanup levels and remediation levels.** The cleanup levels and remediation levels established for benzo(a)pyrene shall be used, respectively, as the cleanup levels and remediation levels for mixtures of carcinogenic PAHs.

(iii) **Determining compliance with cleanup levels and remediation levels.** When determining compliance with cleanup levels and remediation levels,

tion levels established for mixtures of carcinogenic PAHs, the following procedures shall be used:

(A) Calculate the total toxic equivalent concentration of benzo(a)pyrene for each sample of the mixture. The total toxic equivalent concentration shall be calculated using the following method, unless the department determines that there is clear and convincing scientific data which demonstrates that the use of this method is inappropriate:

(I) Analyze samples from the medium of concern to determine the concentration of each carcinogenic PAH listed in Table 708-2 and, for those carcinogenic PAHs required by the department under WAC 173-340-708 (8)(e)(iv), in Table 708-3;

(II) For each sample analyzed, multiply the measured concentration of each carcinogenic PAH in the sample by its corresponding toxicity equivalency factor (TEF) in Tables 708-2 and 708-3 to obtain the toxic equivalent concentration of benzo(a)pyrene for that carcinogenic PAH; and

(III) For each sample analyzed, add together the toxic equivalent concentrations of all the carcinogenic PAHs within the sample to obtain the total toxic equivalent concentration of benzo(a)pyrene for that sample.

(B) After calculating the total toxic equivalent concentration of each sample of the mixture, use the applicable compliance monitoring requirements in WAC 173-340-720 through 173-340-760 to determine whether the total toxic equivalent concentrations of the samples comply with the cleanup level or remediation level for the mixture at the applicable point of compliance.

(iv) **Protecting the quality of other media.** When establishing cleanup levels and remediation levels for mixtures of carcinogenic PAHs in a medium of concern that are based on protection of another medium (the receiving medium) (e.g., soil levels protective of groundwater quality), the following procedures shall be used:

(A) The cleanup level or remediation level for benzo(a)pyrene in the receiving medium shall be used, respectively, as the cleanup level or remediation level for the receiving medium.

(B) When determining the concentrations in the medium of concern that will achieve the cleanup level or remediation level in the receiving medium, the carcinogenic PAH-specific physical and chemical properties shall be considered during that assessment.

(v) When using this methodology, at a minimum, the compounds in Table 708-2 shall be analyzed for and included in the calculations. The department may require additional compounds in Table 708-3 to be included in the methodology should site testing data or information from other comparable sites or waste types indicate the additional compounds are potentially present at the site. *NOTE: Many of the polycyclic aromatic hydrocarbons in Table 708-3 are found primarily in air emissions from combustion sources and may not be present in the soil or water at contaminated sites. Users should consult with the department for information on the need to test for these additional compounds.*

(f) **PCB mixtures.** When establishing and determining compliance with cleanup levels and remediation levels for polychlorinated biphenyls (PCBs) mixtures, the following procedures shall be used:

(i) **Assessing as single hazardous substance.** When establishing and determining compliance with cleanup levels and remediation levels, including when determining compliance with the excess cancer risk re-

quirements in this chapter, PCB mixtures shall be considered a single hazardous substance.

(ii) **Establishing cleanup levels and remediation levels.** When establishing cleanup levels and remediation levels under Methods B and C for PCB mixtures, the following procedures shall be used unless the department determines that there is clear and convincing scientific data which demonstrates that the use of these methods is inappropriate:

(A) Assume the PCB mixture is equally potent and use the appropriate carcinogenic potency factor provided for under WAC 173-340-708 (8) (a) through (c) for the entire mixture; or

(B) Use the toxicity equivalency factors for the dioxin-like PCBs congeners in Table 708-4 and procedures approved by the department. When using toxicity equivalency factors, the department may require that the health effects posed by the dioxin-like PCB congeners and nondioxin-like PCB congeners be considered in the evaluation.

(iii) **Determining compliance with cleanup levels and remediation levels.** When determining compliance with cleanup levels and remediation levels established for PCB mixtures, the following procedures shall be used:

(A) Analyze compliance monitoring samples for a total PCB concentration and use the applicable compliance monitoring requirements in WAC 173-340-720 through 173-340-760 to determine whether the total PCB concentrations of the samples complies with the cleanup level or remediation level for the mixture at the applicable point of compliance; or

(B) When using toxicity equivalency factors to determine compliance with cleanup or remediation levels for PCB mixtures, use procedures approved by the department.

(g) In estimating a carcinogenic potency factor for a hazardous substance under (c) of this subsection, or approving the use of a toxicity equivalency factor other than that established under (d), (e) or (f) of this subsection, the department shall, as appropriate, consult with the science advisory board, the department of health, and the United States Environmental Protection Agency and may, as appropriate, consult with other qualified persons. Scientific data supporting such a change shall be subject to the requirements under WAC 173-340-702 (14), (15) and (16). Once the department has established a carcinogenic potency factor or approved an alternative toxicity equivalency factor for a hazardous substance under this provision, the department is not required to consult again for the same hazardous substance.

(h) Where a carcinogenic potency factor other than that established under (a) of this subsection or a toxicity equivalency factor other than that established under (d), (e) or (f) of this subsection is used to establish cleanup levels or remediation levels at individual sites, the department shall summarize the scientific rationale for the use of that value in the cleanup action plan. The department shall provide the opportunity for public review and comment on this value in accordance with the requirements of WAC 173-340-380 and 173-340-600.

(9) **Bioconcentration factors.**

(a) For purposes of establishing cleanup levels and remediation levels for a hazardous substance under WAC 173-340-730, a bioconcentration factor established by the United States Environmental Protection Agency and used to establish the ambient water quality criterion for that substance under section 304 of the Clean Water Act shall be used. These values shall be used unless the department determines that there is adequate scientific data which demonstrates that the use of

an alternate value is more appropriate. If the department determines that a bioconcentration factor is appropriate for a specific hazardous substance and no such factor has been established by USEPA, then other appropriate EPA documents, literature sources or empirical information may be used to determine a bioconcentration factor.

(b) When using a bioconcentration factor other than that used to establish the ambient water quality criterion, the department shall, as appropriate, consult with the science advisory board, the department of health, and the United States Environmental Protection Agency. Scientific data supporting such a value shall be subject to the requirements under WAC 173-340-702 (14), (15) and (16). Once the department has established a bioconcentration factor for a hazardous substance under this provision, the department is not required to consult again for the same hazardous substance.

(c) Where a bioconcentration factor other than that established under (a) of this subsection is used to establish cleanup levels or remediation levels at individual sites, the department shall summarize the scientific rationale for the use of that factor in the draft cleanup action plan. The department shall provide the opportunity for public review and comment on the value in accordance with the requirements of WAC 173-340-380 and 173-340-600.

(10) Exposure parameters.

(a) As a matter of policy, the department has defined in WAC 173-340-720 through 173-340-760 the default values for exposure parameters to be used when establishing cleanup levels and remediation levels under this chapter. Except as provided for in (b) and (c) of this subsection and in WAC 173-340-720 through 173-340-760, these default values shall not be changed for individual hazardous substances or sites.

(b) Exposure parameters that are primarily a function of the exposed population characteristics (such as body weight and lifetime) and those that are primarily a function of human behavior that cannot be controlled through an engineered or institutional control (such as: Fish consumption rate; soil ingestion rate; drinking water ingestion rate; and breathing rate) are not expected to vary on a site-by-site basis. The default values for these exposure parameters shall not be changed when calculating cleanup levels except when necessary to establish a more stringent cleanup level to protect human health. For remediation levels the default values for these exposure parameters may only be changed when an alternate reasonable maximum exposure scenario is used, as provided for in WAC 173-340-708 (3)(d), that reflects a different exposed population such as using an adult instead of a child exposure scenario. Other exposure parameters may be changed only as follows:

(i) For calculation of cleanup levels, the types of exposure parameters that may be changed are those that are:

(A) Primarily a function of reliably measurable characteristics of the hazardous substance, soil, hydrologic or hydrogeologic conditions at the site; and

(B) Not dependent on the success of engineered controls or institutional controls for controlling exposure of persons to the hazardous substances at the site.

The default values for these exposure parameters may be changed where there is adequate scientific data to demonstrate that use of an alternative or additional value would be more appropriate for the conditions present at the site. Examples of exposure parameters for which the default values may be changed under this provision are as follows:

Contaminant leaching and transport variables (such as the soil organic carbon content, aquifer permeability and soil sorption coefficient); inhalation correction factor; fish bioconcentration factor; soil gastrointestinal absorption fraction; and inhalation absorption percentage.

(ii) For calculation of remediation levels, in addition to the exposure parameters that may be changed under (b)(i) of this subsection, the types of exposure parameters that may be changed from the default values are those where a demonstration can be made that the proposed cleanup action uses engineered controls and/or institutional controls that can be successfully relied on, for the reasonably foreseeable future, to control contaminant mobility and/or exposure to the contamination remaining on the site. In general, exposure parameters that may be changed under this provision are those that define the exposure frequency, exposure duration and exposure time. The default values for these exposure parameters may be changed where there is adequate scientific data to demonstrate that use of an alternative or additional value would be more appropriate for the conditions present at the site. Examples of exposure parameters for which the default value may be changed under this provision are as follows: Infiltration rate; frequency of soil contact; duration of soil exposure; duration of drinking water exposure; duration of air exposure; drinking water fraction; and fish diet fraction.

(c) When the modifications provided for in (b) of this subsection result in significantly higher values for cleanup levels or remediation levels than would be calculated using the default values for exposure parameters, the risk from other potentially relevant pathways of exposure shall be addressed under the procedures provided for in WAC 173-340-720 through 173-340-760. For exposure pathways and parameters for which default values are not specified in this chapter, the framework provided for by this subsection, along with the quality of information requirements in WAC 173-340-702, shall be used to establish appropriate or additional assumptions for these parameters and pathways.

(d) Where the department approves the use of exposure parameters other than those established under WAC 173-340-720 through 173-340-760 to establish cleanup levels or remediation levels at individual sites, the department shall summarize the scientific rationale for the use of those parameters in the cleanup action plan. The department shall provide the opportunity for public review and comment on those values in accordance with the requirements of WAC 173-340-380 and 173-340-600. Scientific data supporting such a change shall be subject to the requirements under WAC 173-340-702 (14), (15) and (16).

(11) **Probabilistic risk assessment.** Probabilistic risk assessment methods may be used under this chapter only on an informational basis for evaluating alternative remedies. Such methods shall not be used to replace cleanup standards and remediation levels derived using deterministic methods under this chapter until the department has adopted rules describing adequate technical protocols and policies for the use of probabilistic risk assessment under this chapter.

[Statutory Authority: RCW 70.105D.030(2). WSR 07-21-065 (Order 06-10), § 173-340-708, filed 10/12/07, effective 11/12/07. Statutory Authority: Chapter 70.105D RCW. WSR 01-05-024 (Order 97-09A), § 173-340-708, filed 2/12/01, effective 8/15/01; WSR 91-04-019, § 173-340-708, filed 1/28/91, effective 2/28/91.]