STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 * Olympia, Washington 98504-8711 * (206) 459-6000

Cleanup Standards

for the

The Model Toxics Control Act Cleanup Regulation

The Model Toxics Control Act (Initiative 97) passed in the 1988 general election, requires Ecology to adopt minimum cleanup standards that protect human health and the environment. During the past year, Ecology has developed draft regulations to implement this law.

Enclosed is the March 9, 1990, draft cleanup standards. Please remember that this is only a draft and individual sections may undergo considerable change in response to public review and comments. Comments on the March 9 draft cleanup standards will be accepted until April 13, 1990.

The Department of Ecology is developing The Model Toxics Control Act Cleanup Regulation (WAC 173-340) in two phases. The Phase I portion defines the administrative process for identifying, investigating, and cleaning up hazardous substance sites. The Phase I regulation was published in the State Register on January 17 (WSR 90-02-097) and is scheduled to become effective in the spring of 1990.

The cleanup standards will be included in the Phase II portion of the cleanup regulation. The Department intends to propose the standards as an amendment to the Phase I regulation in the spring of 1990. The twelve sections in the Phase II portion of the regulation will define the detailed requirements for establishing cleanup standards and selecting cleanup actions within the overall administrative framework. Phase II sections fall into one of three categories:

1. GENERAL REQUIREMENTS APPLICABLE TO ALL MEDIA

   There are four sections in the Phase II regulation which will include cleanup provisions that apply to hazardous substances in all media. These include:

   General Procedures (WAC 173-340-700) introduces the concepts of compliance cleanup levels and conditional cleanup levels and defines how the cleanup standards sections relate to other portions of the regulation.

   General Principles (WAC 173-340-705) defines the policies and principles that the Department will utilize to ensure that cleanup standards are established and implemented in a scientifically and technically sound manner.

Pub. No. 90-09-904

Applicable State and Federal Laws (WAC 173-340-710) defines the criteria for determining what requirements are legally applicable or relevant and appropriate.

Definitions (WAC 173-340-200) will also be amended to incorporate those terms that are unique to the cleanup standards portions of the regulation.

2. MEDIA-SPECIFIC CLEANUP STANDARDS

There are six sections which will provide more detailed procedures for establishing cleanup standards in the various environmental media. These include:

- **Ground Water Cleanup Standards** (WAC 173-340-720);
- **Surface Water Cleanup Standards** (WAC 173-340-730);
- **Soil Cleanup Standards** (WAC 173-340-740);
- **Industrial Soil Cleanup Standards** (WAC 173-340-745);
- **Cleanup Standards to Protect Air Quality** (WAC 173-340-750);
- **Sediment Cleanup Standards** (WAC 173-340-760).

The latter section is being reserved until Ecology's Sediment Management Unit has developed regulations which will define a comprehensive approach for managing sediments.

3. SELECTION OF CLEANUP ACTIONS

There are two sections which will specify requirements for selecting and implementing cleanup actions. These include:

Selection of Cleanup Actions (WAC 173-340-360) defines the basic requirements for cleanup actions under this chapter and procedures for documenting cleanup decisions.

Institutional Controls (WAC 173-340-440) defines the general requirements for restricting site usage when hazardous substances are left on-site as part of the cleanup action. (This section is not included in this review draft.)

Written comments may be submitted until April 13, 1990, by mailing them to:

David Bradley
Hazardous Waste Investigations
and Cleanup Program
Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504-8711

If you have questions on the draft cleanup standards, please contact Elena Guilfoil at (206) 438-3012.

EG:DB:bv
Enclosure

CLEANUP STANDARDS AMENDMENTS
TO
MODEL TOXICS CONTROL ACT CLEANUP REGULATION

March 9, 1990 Draft

PART VII - CLEANUP STANDARDS

WAC 173-340-700	General Procedures
WAC 173-340-705	General Principles
WAC 173-340-710	Applicable State and Federal Laws
WAC 173-340-720	Ground Water Cleanup Standards
WAC 173-340-730	Surface Water Cleanup Standards
WAC 173-340-740	Soil Cleanup Standards
WAC 173-340-745	Industrial Soil Cleanup Standards
WAC 173-340-750	Cleanup Standards to Protect Air Quality
WAC 173-340-760	Sediment Cleanup Standards [RESERVED]

SIGNIFICANT AMENDMENTS TO OTHER SECTIONS

WAC 173-340-200	Definitions
WAC 173-340-360	Selection of Cleanup Actions
WAC 173-340-440	Institutional Controls [REVISIONS PENDING]

APPENDIX A TABLES

TABLE A-1	Method A Compliance Cleanup Levels - Ground Water
TABLE A-2	Method A Compliance Cleanup Levels - Marine Waters
TABLE A-3	Method A Compliance Cleanup Levels - Fresh Water
TABLE A-4	Method A Compliance Cleanup Levels - Soils
TABLE A-5	Method A Compliance Cleanup Levels - Air [RESERVED]

PART VII CLEANUP STANDARDS

WAC 173-340-700 GENERAL PROCEDURES. (1) Purpose. This section defines the overall decisionmaking process for establishing cleanup standards under this chapter.

(2) Protection. All cleanup actions performed under this chapter shall attain a degree of cleanup of hazardous substances and control of further releases of hazardous substances that assures protection of present and future human health and the environment. The goal is to establish cleanup levels as close as possible to natural background levels.

(3) Selection of indicator hazardous substances. (a) When defining cleanup requirements at a facility 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 facility cleanup requirements.

(b) If the department considers this approach appropriate for a particular facility, the following factors may be used to justify eliminating individual hazardous substances from further consideration:

(i) The toxicological characteristics of a hazardous substance that influence its ability to adversely affect human health or the environment relative to the concentrations of that hazardous substance at the facility;

(ii) The chemical and physical characteristics of a hazardous substance which govern its tendency to persist in the environment;

(iii) The chemical and physical characteristics of a hazardous substance which govern its tendency to move into and through environmental media;

(iv) The naturally-occurring concentrations of individual hazardous substances; and

(v) The frequency that individual hazardous substances have been detected at the facility.

(c) When the department determines that the use of indicator hazardous substances is appropriate for a particular facility, it may require biological testing to address potential toxic effects associated with non-indicator hazardous substances.

(4) Reasonable maximum exposure. (a) Cleanup 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.

(b) The reasonable maximum exposure is defined as the highest exposure that is reasonably expected to occur at a site. Sections WAC 173-340-720 through WAC 173-340-750 define the reasonable maximum exposures for ground water, surface water, soil, and air. These reasonable maximum exposures will generally apply to sites where individuals or groups of individuals are exposed to hazardous substances. For example, the reasonable maximum exposure for ground water is defined as exposure to hazardous substances in drinking water and other domestic uses.

(c) Persons performing cleanup actions under this chapter may utilize the evaluation criteria in WAC 173-340-720 through WAC 173-340-750 to demonstrate that the reasonable maximum exposure scenarios specified in those sections are not appropriate for a particular site. Documentation for the use of alternate exposure scenarios shall be based on the results of investigations performed in accordance with WAC 173-340-350.

(d) Individuals or groups of individuals may be exposed to hazardous substances through more than one pathway. For example, a person may be exposed to hazardous substances from a site by drinking contaminated ground water, eating contaminated fish, and breathing contaminated air. At sites where the same individuals or groups of individuals are consistently exposed through several pathways, the reasonable maximum exposure shall represent the total exposure through all of those pathways.

(5) Compliance cleanup levels. (a) In the event of a release of a hazardous substance, removal, treatment, or containment measures shall be implemented to attain hazardous substance cleanup levels established by one of the following two methods:

(i) Method A; or

(ii) Method B.

(b) Method A may be used to establish cleanup levels at the following types of sites:

(i) Sites undergoing routine cleanup actions as defined in WAC 173-340-130; or

(ii) Sites where numerical standards are available for all indicator hazardous substances in all media of concern.

(c) Method B shall be applicable to all sites and shall be used to develop compliance cleanup levels unless one or more of the conditions for using method A are demonstrated to exist.

(d) Compliance cleanup levels shall not exceed the concentrations established using methods A or B except as follows:

(i) When natural background levels exceed concentrations established using methods A or B, then the compliance cleanup level shall be equal to natural background levels;

(ii) When the method detection limit for approved analytical techniques is higher than the concentrations established using methods A or B, the compliance cleanup level shall be considered to have been achieved at levels equal to the method detection limit. In these circumstances, the department shall consider the availability of improved analytical techniques when performing periodic reviews under WAC 173-340-420. Subsequent to those reviews, the department may require the use of improved analytical techniques with lower method detection limits.

(6) Method A compliance cleanup levels. Compliance cleanup levels established using method A must be at least as stringent as all of the following:

(a) Concentrations of individual hazardous substances listed in tables 1, 2, 3, 4, and 5 in appendix A of this chapter;

(b) Concentrations of individual hazardous substances established under applicable state and federal laws as defined in WAC 173-340-710;

(c) Any other concentrations which the department determines are necessary to protect human health and the environment.

(7) Method B compliance cleanup levels. Compliance cleanup levels established using method B must be at least as stringent as all of the following:

(a) Concentrations of individual hazardous substances established under applicable state and federal laws as defined in WAC 173-340-710;

(b) Concentrations which are anticipated to result in no acute or chronic toxic effects on human health as estimated using a hazard index of 0.2 and the procedures specified in WAC 173-340-720 through 173-340-750;

(c) For known or suspected carcinogens, concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 1,000,000 as estimated using the procedures specified in WAC 173-340-720 through 173-340-750;

(d) Concentrations which are expected to result in no adverse effects on the protection and propagation of aquatic and terrestrial life;

(e) Concentrations which eliminate or substantially reduce the potential for food chain contamination; and

(f) Any other concentrations which the department determines are necessary to protect human health and the environment.

(8) Conditional cleanup levels. (a) Compliance cleanup levels established under subsections (5) through (7) shall not apply where conditional cleanup levels are approved by the department. The department may approve conditional cleanup levels if the person undertaking the

cleanup action can demonstrate that such levels are consistent with applicable state and federal laws, that all reasonable methods of treatment are utilized, and that one or more of the following conditions exist:

(a) Background concentrations. Where compliance cleanup levels established by methods A or B are below area background concentrations, the department may approve conditional cleanup levels that are as close as possible to area background concentrations, but in no case greater than levels specified in subsection (9) of this section;

(b) Net environmental protection. Where attainment of compliance cleanup levels established using methods A or B has the potential for creating a significantly greater overall threat to human health and the environment than attainment of conditional cleanup levels established under this chapter, the department may approve conditional cleanup levels which minimize those overall threats, but in no case greater than levels specified in subsection (9) of this section;

(c) Technical feasibility. Where compliance cleanup levels established using methods A or B are below technically achievable treatment levels, the department may approve conditional cleanup levels that are as close as possible to the technically achievable level, but in no case greater than levels specified in subsection (9) of this section; or

(d) Technical impracticability. Where compliance cleanup levels established by methods A or B are below technically practicable levels, the department may approve conditional cleanup levels which are at least as stringent as levels specified in subsection (9) of this section if

the person undertaking the cleanup action can demonstrate all of the following:

(i) The incremental cost of attaining the more stringent cleanup level is substantial and disproportionate to the incremental reduction in the threat to human health and the environment;

(ii) Attainment of the more stringent cleanup level will limit that person's ability to respond to other environmental threats at the facility in question or other facilities owned or operated by the person undertaking the cleanup action;

(iii) Financial benefits resulting from the approval of a less stringent cleanup level will be utilized to eliminate or substantially reduce such threats;

(iv) Requirement for performing such actions are included in an enforceable agreement with the department; and

(v) Containment or isolation of hazardous substance is not part of the cleanup action.

(9) Conditional cleanup levels established under this chapter shall be at least as stringent as all of the following:

(a) Applicable state and federal laws as defined in WAC 173-340-710;

(b) Concentrations which are expected to result in no significant adverse effects on the protection and propagation of aquatic and terrestrial life;

(c) Concentrations which are expected to result in no significant adverse acute or chronic toxic effects on human health as estimated

using a hazard index of 1.0 and the procedures defined in WAC 173-340-720 through 173-340-750;

(d) For known or suspected carcinogens, concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 100,000 as estimated using the procedures defined in WAC 173-340-720 through 173-340-750;

(e) Concentrations which eliminate or reduce the potential for food chain contamination; and

(f) Any other concentrations which the department determines are necessary to protect human health and the environment.

(10) Multiple hazardous substances. (a) Adverse effects of multiple hazardous substances with similar types of toxic response are assumed to be additive unless evidence is available to demonstrate otherwise.

(b) Cancer risks associated with multiple carcinogens are assumed to be additive unless evidence is available to demonstrate otherwise.

(c) For purposes of establishing cleanup levels for non-carcinogens, the health threats associated with exposure to multiple hazardous substances with similar types of toxic response shall be apportioned between hazardous substances in any combination as long as the hazard indices for similar types of effects or mechanisms of action do not exceed values specified in subsections (6), (7), or (9) of this section.

(d) For purposes of establishing cleanup levels for carcinogens, the cancer risks associated with multiple hazardous substances may be apportioned between hazardous substances in any combination as long as

the total cancer risk does not exceed acceptable risk levels specified in subsections (6), (7), or (9) of this section.

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

(11) 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 evidence is available to demonstrate otherwise.

(b) Cleanup levels based on one pathway of exposure shall be modified to take into account multiple exposure pathways. Assessments of the potential interactive effects associated with multiple routes of exposure shall be based on reasonable maximum exposure scenarios as defined in WAC 173-340-700(4).

(12) Points of compliance. (a) The point of compliance is the point or points where cleanup levels established in accordance with WAC 173-340-720 through WAC 173-340-750 shall be attained.

(b) The point of compliance under this chapter shall be established throughout the facility unless the department approves a conditional point of compliance in accordance with WAC 173-340-720 through WAC 173-340-750.

(c) The department shall not approve a conditional point of compliance unless the person undertaking the cleanup action can demonstrate that all reasonable methods of treatment have been utilized.

(13) Selection of cleanup actions. Cleanup actions which result in compliance with cleanup levels shall be selected in accordance with the requirements in WAC 173-340-360.

WAC 173-340-705. GENERAL PRINCIPLES. (1) Purpose. This section defines the policies and principles that the department will utilize to ensure that cleanup standards under this chapter are established and implemented in a scientifically and technically sound manner.

(2) Implementation. (a) When evaluating cleanup actions performed under the federal cleanup law, the department shall consider WAC 173-340-700 through 173-340-750 to be a legally applicable requirement under Section 121(d) of the federal cleanup law.

(b) The department shall review and, as appropriate, update WAC 173-340-700 through 173-340-750 no less frequently than once every five years.

(c) The department shall require appropriate restrictions on future site use under WAC 173-340-440 whenever conditional cleanup levels or conditional points of compliance are approved by the department under WAC 173-340-720 through 173-340-750. For cleanup levels established under WAC 173-340-745, appropriate restrictions shall include a deed restriction.

(d) Under WAC 173-340-420, the department shall review the effectiveness of cleanup actions no less frequently than once every five

years whenever hazardous substances exceeding compliance cleanup levels are left on-site.

(e) Liability for natural resource damages are not affected by this regulation.

(f) For those facilities where the department determines it is unlikely there will be exposure to multiple hazardous substances, health-based standards under applicable state and federal laws shall be used to establish compliance cleanup levels and conditional cleanup levels under WAC 173-340-720 through WAC 173-340-750.

(g) Any person responsible for undertaking a cleanup action under the act who proposes to establish a conditional cleanup level or a conditional point of compliance shall have the burden of demonstrating to the department that compliance with such requirements is protective of human health and the environment and that such requirements are allowable under this chapter. The department shall only approve conditional cleanup levels or conditional points of compliance when it determines that the person undertaking the cleanup action has met the burden of proof mentioned above.

(3) New scientific information. The department shall consider new scientific information when establishing cleanup levels for individual facilities. In making a determination on how to use this new information, the department shall, as appropriate, consult with the science advisory board, the department of health, and the u.s. environmental protection agency.

(4) Reference doses. (a) Reference doses are defined as an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without appreciable risk of non-carcinogenic effects.

(b) Chronic reference doses and developmental reference doses shall be used.to establish cleanup levels for non-carcinogens under this chapter.

(c) Subchronic reference doses may be utilized to evaluate potential non-carcinogenic effects of exposure periods between two weeks and seven years. These values may be used in place of the chronic reference dose where it can be demonstrated that a particular chemical will degrade to negligible concentrations within several months.

(d) For purposes of establishing cleanup levels under this chapter, the department shall utilize reference doses derived by one of the following methods:

(i) Reference doses established by the u.s. environmental protection agency and available through the "integrated risk information system" data base shall be used unless the department determines that there is convincing scientific evidence which demonstrates that the use of these values is clearly inappropriate.

(ii) If a reference dose value is not available through the "integrated risk information system" or is demonstrated to be clearly inappropriate, reference doses shall be established utilizing the methods described in Risk Assessment Guidance for Superfund. Human Health Evaluation Manual. Part A. (October 1989).

(c) In estimating reference doses for individual hazardous substances under section (b)(ii), the department shall consult with the science advisory board, the department of health, and the u.s. environmental protection agency.

(d) Where reference doses other than those established under subsection (b)(i) are used to establish cleanup levels at individual sites, the department shall summarize the scientific rationale for the use of those values in the draft cleanup action plan. The department shall provide the opportunity for public review and comment on those values in accordance with the requirements of WAC 173-340-360.

(5) Carcinogenic potency factors. (a) Carcinogenic potency factors are defined as the upper 95th percent confidence limit of the slope of the dose-response curve and are expressed in units of (mg/kg/day)-1.

(b) For purposes of establishing cleanup levels under this chapter, carcinogenic potency factors shall be derived using one of the following methods:

(i) Carcinogenic potency factors established by the u.s. environmental protection agency and available through the "integrated risk information system" data base shall be used unless the department determines that there is convincing scientific information which demonstrates that the use of these values is clearly inappropriate.

(ii) If a carcinogenic potency factor is not available through the "integrated risk information system" or is demonstrated to be clearly inappropriate, the following methods shall be utilized to establish carcinogenic potency factors:

(A) All carcinogenesis bioassays shall be reviewed and data of appropriate quality shall be used for establishing carcinogenic potency factors.

(B) The linearized multistage computer model shall be utilized to estimate the slope of the dose-response curve unless the department determines that there is convincing scientific data which demonstrates an alternate approach is clearly more appropriate.

(C) If a single study in which a hazardous substance induces more than one type of tumor is available, then the response for the tumor type predicting the highest estimate of the carcinogenic potency shall generally be used. If two or more studies of equal quality are available, but vary in species, strain, sex or tumor type, then the data set giving the highest estimate of carcinogenic potency shall generally be used for the risk assessment.

(D) All doses shall be adjusted to give an average daily dose over the study duration.

(E) An interspecies scaling factor shall be used to take into account differences between animals and humans. This scaling factor shall be based on the assumption that milligrams per surface area is an equivalent dose between species. The slope of the dose response curve for the test species shall be multiplied by this scaling factor to obtain the carcinogenic potency factor. Where adequate pharmacokinetic and metabolism studies are available, data from these studies shall be utilized to adjust the interspecies scaling factor.

(c) In estimating carcinogenic potency factors for individual hazardous substances under section (b)(ii), the department shall consult with the science advisory board, the department of health, and the u.s. environmental protection agency.

(d) Where carcinogenic potency factors other than those established under subsection (b)(i) are used to establish cleanup levels at individual sites, the department shall summarize the scientific rationale for the use of those values in the draft cleanup action plan. The department shall provide the opportunity for public review and comment on those values in accordance with the requirements of WAC 173-340-360.

(6) Bioconcentration factors. (a) The bioconcentration factor is the ratio of the concentration of a hazardous substance in the tissue of aquatic organisms divided by the hazardous substance concentration in the ambient waters in which they reside.

(b) For purposes of establishing cleanup levels under this chapter, bioconcentration factors established by the u.s. environmental protection agency and utilized to establish ambient water quality criteria values shall be used unless there is convincing scientific evidence which demonstrates that the use of these values is clearly inappropriate.

(c) In estimating bioconcentration factors other than those utilized to establish ambient water quality criteria, the department shall consult with the science advisory board, the department of health, and the u.s. environmental protection agency.

(d) Where bioconcentration factors other than those established under subsection (b) are used to establish cleanup levels at individual sites, the department shall summarize the scientific rationale for the use of those values in the draft cleanup action plan. The department shall provide the opportunity for public review and comment on those values in accordance with the requirements of WAC 173-340-360.

(7) Background concentrations. (a) Background sampling may be conducted to distinguish facility-related contamination from non-site related levels of hazardous substances or to support the development of a conditional cleanup level under the provisions of subsections (8) and (9) of WAC 173-340-700. For purposes of this chapter, two types of background concentrations may be defined:

(i) Natural background concentrations are the ambient concentrations of hazardous substances present in the environment that have not been influenced by human activities; or

(ii) Area background concentrations are the ambient concentrations of hazardous substances consistently present in the environment in the vicinity of the facility which are the result of human activities unrelated to releases from the facility.

(b) For purposes of establishing conditional cleanup levels, procedures for defining background concentrations shall meet the following minimum requirements:

(i) Samples shall be collected from areas that have the same basic characteristics as the medium of concern at the facility and have not been influenced by releases from the facility;

(ii) The number of samples shall be sufficient to ensure that the power of statistical tests approved by the department is within an acceptable range;

(c) For purposes of defining background concentrations to support the development of a conditional cleanup level, the following procedures shall be utilized:

(i) The upper 95th percent confidence limit of the arithmetic mean, not to exceed the maximum reported value, shall be the statistical measure used to define background concentrations; and

(ii) For purposes of estimating background concentrations, values below the detection limit shall generally be assigned a value equal to one half of the method detection limit. The department may also approve the use of alternate statistical procedures for handling censored measurements

(8) Analytical considerations. (a) Analytical methods used to evaluate the effectiveness of a cleanup action shall be approved by the department.

(b) If a hazardous substance is not detected utilizing sampling and analytical procedures approved by the department and the method detection limit is higher than cleanup levels required under this chapter, the cleanup level shall be considered to have been attained.

(c) In cases where the cleanup levels required by this chapter are less than the method detection limits for approved analytical procedures, the department may also require one or more of the following:

(i) Use of surrogate measures of contamination;

(ii) Use or development of specialized sample collection or analysis techniques to improve method detection limits for individual hazardous substances; or

(iii) Monitoring to assure that concentrations of hazardous substances do not exceed detectable levels.

WAC 173-340-710. APPLICABLE STATE AND FEDERAL LAWS. (1) Applicable state and federal laws. For purposes of this chapter, the term "applicable state and federal laws" shall include both legally applicable standards and relevant and appropriate requirements as defined below. The person undertaking a cleanup action shall identify all applicable state and federal laws. The department shall make the final interpretation on whether individual requirements have been correctly identified as applicable.

(2) Legally applicable requirements. Legally applicable requirements include those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under state or federal law that specifically address a hazardous substance, cleanup action, location or other circumstances at the facility.

(3) Relevant and appropriate requirements. Relevant and appropriate requirements include those cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that, while not legally applicable to the

hazardous substance, cleanup action, location, or other circumstance at a facility, address problems or situations sufficiently similar to those encountered at the facility that their use is well suited to the particular facility. The following criteria shall be evaluated, where pertinent, to determine whether a requirement is relevant and appropriate:

(a) Whether the purpose for which the statute and regulations under which the requirement was created are similar to the specific objectives of the cleanup action;

(b) Whether the media regulated or affected by the requirements are similar to the media contaminated or affected at the facility;

(c) Whether the substances regulated by the requirements are similar to the substances found at the facility;

(d) Whether the entities or interests affected or protected by the requirement are similar to the entities or interests affected by the facility;

(e) Whether the actions or activities regulated by the environment are similar to the remedial action contemplated at the facility;

(f) Whether any variances, waivers, or exemptions of the requirements are available for the circumstances of the facility;

(g) Whether the type of place regulated is similar to the facility;

(h) Whether the type and size of structure or facility regulated is similar to the type and size of structure or facility affected by the release or contemplated by the remedial action; and

(i) Whether any consideration of use or potential use of affected resources in the requirement is similar to the use or potential use of the affected resource.

(4) Variances. For purposes of this chapter, a regulatory variance or waiver provision included in an applicable state and federal law shall be considered potentially applicable to cleanup actions and the department may determine that a particular regulatory variance or waiver is appropriate if the substantive conditions for such a regulatory variance or waiver are met. In all cases, cleanup actions shall be protective of human health and the environment.

(5) New requirements. The department will consider new applicable state and federal laws as part of the periodic review under WAC 173-340-420. Cleanup actions will evaluated in light of these new requirements to determine whether the cleanup action is still protective of human health and the environment.

WAC 173-340-720 GROUND WATER CLEANUP STANDARDS. (1) General considerations. (a) Ground water 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 drinking water is generally the beneficial use requiring the highest quality of ground water and that exposure to hazardous substances via ingestion of drinking water and other domestic uses represents the reasonable maximum exposure. In the event

of a release of a hazardous substance, treatment, removal, or containment measures shall be implemented to reduce the level of hazardous substances in ground water to levels consistent with this use unless all of the following can be demonstrated:

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

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

(A) The ground water is present in insufficient quantity to yeild greater than 0.1 gallons per minute on a sustainable basis;

(B) The ground water contains naturally-occurring organic or inorganic constituents which make use of the water for drinking technically infeasible; or

(C) The ground water is situated at a depth or location which makes recovery of water for drinking water purposes technically infeasible; or

(iii) There is no likelihood that hazardous substances will be transported from the contaminated ground water to ground water that is a current or potential future source of drinking water at concentrations which exceed cleanup levels established under this section.

(b) Cleanup levels to protect beneficial uses of ground water other than drinking water shall be established on a case-by-case basis.

(c) Releases of hazardous substances to ground waters of the state shall not directly or indirectly cause violations of surface water, soil, or air cleanup standards established pursuant to this chapter.

(2) Method A compliance cleanup levels. Where the ground water is a current or potential future source of drinking water, compliance cleanup levels established using method A shall be at least as stringent as all of the following:

(a) Concentrations listed in table 1 in appendix A of this chapter;

(b) Concentrations established under applicable state and federal laws, including, but not limited to the following requirements:

(i) Maximum contaminant levels established under the safe drinking water act and published in 40 C.F.R. 141, as amended;

(ii) Maximum contaminant level goals for non-carcinogens established under the safe drinking water act and published in 40 C.F.R. 141, as amended;

(iii) Secondary maximum contaminant levels established under the safe drinking water act and published in 40 C.F.R. 143, as amended; and

(iv) Maximum contaminant levels established by the state board of health and published in WAC 248-54, as amended; and

(c) Any other concentrations which the department determines are necessary to protect human health and the environment.

(3) Method B compliance cleanup levels. Where the ground water is a current or potential future source of drinking water, compliance cleanup levels established using method B shall be at least as stringent as all of the following:

(a) Concentrations established under applicable state and federal laws, including, but not limited to the requirements in subsection 3(b) of this section;

(b) Concentrations which are anticipated to result in no acute or chronic toxic effects on human health as estimated using the following equation and standard exposure assumptions:

$$\text{Ground water cleanup level (ug/l)} = \frac{RFD \times ABW \times UCF \times HQ}{DWIR \times INH}$$

Where:

RFD = Reference Dose as defined in WAC 173-340-705(4)

ABW = Average body weight during the period of exposure (16 kg)

UCF = Unit conversion factor (1,000 ug/mg)

HQ = Hazard quotient (0.2)

DWIR = Drinking water ingestion rate (1.0 liter/day)

INH = Inhalation correction factor (determined according to the criteria in subsection (8) of this section);

(c) For known or suspected carcinogens, concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 1,000,000 as estimated using the following equation and standard exposure assumptions:

$$\text{Ground water cleanup level (ug/l)} = \frac{RISK \times ABW \times LIFE \times UCF}{CPF \times DWIR \times DUR \times INH}$$

Where:

RISK = Acceptable cancer risk level (1 in 1,000,000)

ABW = Average body weight during the period of exposure (70 kg)

LIFE = Lifetime (70 years)

UCF = Unit conversion factor (1,000 ug/mg)

CPF = Carcinogenic potency factor as defined in WAC 173-340-705(5)

DWIR = Drinking water ingestion rate (2.0 liters/day)

DUR = Duration of exposure (30 years)

INH = Inhalation correction factor (determined according to the criteria in subsection (8) of this section);

(d) Any other concentrations which the department determines are necessary to protect human health and the environment, including, but not limited to the following:

(i) Concentrations which are necessary to protect susceptible subgroups;

(ii) Concentrations which eliminate or substantially reduce the potential for food chain contamination; and

(iii) Concentrations which eliminate or substantially reduce the potential for damage to soils which impair its' use for agricultural purposes.

(4) Conditional cleanup levels. Conditional cleanup levels may be approved by the department if the person undertaking the cleanup action can demonstrate that such levels are consistent with applicable state

and federal laws, that all reasonable methods of treatment have been utilized, and that one or more of the conditions in WAC 173-340-700(8) exist. Where the ground water is a current or potential future source of drinking water, conditional cleanup levels for ground water shall be at least as stringent as all of the following:

(a) Maximum contaminant levels established under the safe drinking water act and published in 40 C.F.R. 141, as amended;

(b) Concentrations which are anticipated to result in no significant acute or chronic toxic effects on human health and are estimated in accordance with WAC 173-340-720(3)(b) except that the hazard quotient shall be 1.0, the average body weight shall be 70 kg, and the drinking water intake rate shall be 2 liters/day;

(c) Concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 100,000 and are estimated in accordance with WAC 173-340-720(3)(c);

(d) Any other concentrations which the department determines are necessary to protect human health and the environment.

(5) Multiple hazardous substances/multiple pathways of exposure. Ground water cleanup levels for individual hazardous substances developed in accordance with subsections (2),(3), and (4) of this section shall be adjusted to take into account potential interactive effects using the criteria in WAC 173-340-700 (10) and (11).

(6) Environmental degradation. (a) When establishing cleanup levels under this section, the department may consider the potential for reduction in hazardous substance concentrations due to biodegradation,

photolysis, or volatilization and the impact that those natural removal processes have on the average levels of a hazardous substance during the period of exposure.

(b) The department shall consider the potential for exposure to degradation products when establishing cleanup requirements.

(7) Point of Compliance. (a) For ground water, the point of compliance is the point or points where the ground water cleanup levels established under subsections (2), (3), (4), and (5) of this section must be attained. Ground water cleanup levels shall be attained in all ground waters from the point of compliance to the outer boundary of the contaminant plume.

(b) The point of compliance shall be established throughout the facility from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the facility.

(c) Where hazardous substances remain on-site as part of the cleanup action, the department may approve a conditional point of compliance which shall be as close as practicable to the edge of the area of contamination, not to exceed the property boundary. The person responsible for undertaking the cleanup action shall demonstrate that all reasonable methods of treatment have been utilized.

(8) Inhalation correction factors. (a) The inhalation correction factor is an adjustment factor which takes into account exposure to hazardous substances which are volatilized and inhaled during showering and

other domestic activities. When available, substance-specific information shall be used to estimate these values.

(b) Where substance-specific information is not available, inhalation correction factors shall be one of the following:

(i) For volatile organic hazardous substances, 2.0; or

(ii) Other hazardous substances, 1.0.

(9) Compliance monitoring. (a) Compliance with ground water standards shall be determined by analyses of unfiltered ground water samples, unless it can be demonstrated that a filtered sample provides a more representative measure of ground water quality.

(b) Compliance with ground water cleanup levels shall be determined for each ground water monitoring well. The upper 95th percent confidence limit of the arithmetic mean shall be the statistical measure used to evaluate compliance with ground water cleanup levels established in accordance with subsections (2), (3), or (5) of this section.

(c) For purposes of demonstrating compliance, measurements below the method detection limit shall generally be assigned a value equal to one half of the method detection limit. The department may approve alternate statistical procedures for handling censored measurements.

WAC 173-340-730 SURFACE WATER CLEANUP STANDARDS. (1) General considerations. (a) Surface water 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 highest beneficial use of a surface water body shall be determined in accordance with WAC 173-201. In the event of a release of a hazardous substance, treatment, removal, or containment measures shall be implemented to reduce the level of hazardous substances in surface water to levels consistent with that use.

(b) Surface water cleanup standards established under this section apply to those surface waters of the state affected or potentially affected by releases of hazardous substances from facilities addressed under this chapter.

(c) Releases of hazardous substances to surface waters of the state shall not directly or indirectly cause violations of ground water, soil, or air cleanup standards established pursuant to this chapter.

(2) Method A compliance cleanup levels. Compliance cleanup levels established using method A shall be at least as stringent as all of the following:

(a) Concentrations in tables 2 or 3 in appendix A of this chapter;

(b) Concentrations established under applicable state and federal laws, including, but not limited to the following requirements:

(i) Water quality criteria published in the water quality standards for surface waters of the state of washington, chapter 173-201 WAC, as amended;

(ii) Water quality criteria published pursuant to section 304 of the clean water act; and

(c) Any other concentrations which the department determines are necessary to protect human health and the environment.

(3) Method B compliance cleanup levels. Compliance cleanup levels for surface waters established using method B shall be at least as stringent as all of the following:

(a) Concentrations established under applicable state and federal laws, including, but not limited to the requirements identified in subsection 2(b) of this section;

(b) Concentrations which are expected to result in no adverse effects on the protection and propagation of fish and other aquatic life;

(c) For surface waters which support fish or shellfish populations, concentrations which are anticipated to result in no acute or chronic toxic effects on human health as estimated using the following equations and standard exposure assumptions:

$$\text{Surface water cleanup level (ug/l)} = \frac{RFD \times ABW \times UCF1 \times UCF2 \times HQ}{BCF \times FCR \times FDF}$$

Where:

RFD = Reference Dose as defined in WAC 173-340-705(4) (mg/kg-day)

ABW = Average body weight during the exposure period (70 kg)

UCF1 = Unit conversion factor (1,000 ug/mg)

UCF2 = Unit conversion factor (1,000 grams/liter)

BCF = Fish bioconcentration factor as defined in WAC 173-340-705(6) (unitless)

FCR = Fish consumption rate (30 grams/day)

FDF = Diet fraction (0.5)

HQ = Hazard Index (0.2)

(d) For surface waters which support fish or shellfish populations, concentrations which are anticipated to result in a total incremental cancer risks less than or equal to 1 in 1,000,000 as estimated using the following equation and standard exposure assumptions:

$$\text{Surface water cleanup level (ug/l)} = \frac{\text{RISK} \times \text{ABW} \times \text{LIFE} \times \text{UCF1} \times \text{UCF2}}{\text{CPF} \times \text{BCF} \times \text{FCR} \times \text{FDF} \times \text{DUR}}$$

Where:

CPF = Cancer Potency Factor as defined in WAC 173-340-705(5) (kg-day/mg)

RISK = Acceptable cancer risk level (1 in 1,000,000)

ABW = Average body weight during the exposure period (70 kg)

LIFE = Lifetime (70 years)

UCF1 = Unit conversion factor (1,000 ug/mg)

UCF2 = Unit conversion factor (1,000 grams/liter)

BCF = Fish bioconcentration factor as defined in WAC 173-340-705(6) (unitless)

FCR = Fish consumption rate (30 grams/day)

FDF = Diet fraction (0.5)

DUR = Duration of exposure (30 years);

(e) For surface waters which represent a source or potential future source of drinking water, concentrations which are anticipated to result in no adverse impacts on human health and are established in accordance with WAC 173-340-720.

(f) Any other concentrations which the department determines are necessary to protect human health and the environment.

(4) Conditional cleanup levels. Conditional cleanup levels may be approved by the department if the person undertaking the cleanup action can demonstrate that such levels are consistent with applicable state and federal laws, that all reasonable methods of treatment have been utilized, and that one or more of the conditions in WAC 173-340-700 (8) exist. Conditional cleanup levels for surface waters shall be at least as stringent as all of the following:

(a) Concentrations which are anticipated to result in no significant acute or chronic toxic effects on human health or the environment and are estimated in accordance with WAC 173-340-730(3)(c) except that the hazard index shall be 1.0 and the fish diet fraction shall be twenty percent;

(b) Concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 100,000 and are estimated in accordance with WAC 173-340-730(3)(d) except that the fish diet fraction shall be twenty percent;

(c) Any other concentrations which the department determines are necessary to protect human health and the environment.

(5) Multiple hazardous substances/multiple pathways of exposure. Surface water cleanup levels for individual hazardous substances developed in accordance with paragraphs (2), (3) and (4) shall be adjusted to take into account potential interactive effects using the criteria in WAC 173-340-700 (10) and (11).

(6) Point of compliance. Surface water cleanup levels established under subsections (2), (3), (4) and (5) of this section shall be applied to all surface waters of the state affected or potentially affected by releases of hazardous substances from facilities unless the department has authorized a dilution zone in accordance with WAC 173-201-035.

(7) Compliance monitoring (a) Compliance with surface water cleanup standards shall be determined by analyses of unfiltered surface water samples, unless it can be demonstrated that a filtered sample provides a more representative measure of surface water quality.

(b) The upper 95th percent confidence limit of the arithmetic mean shall be the statistical measure used to evaluate compliance with surface water cleanup levels established in accordance with subsections (2), (3), or (4) of this section.

(c) For purposes of demonstrating compliance, measurements below the method detection limit shall generally be assigned a value equal to one half of the method detection limit. The department may approve alternate statistical procedures for handling sample results below the method detection limit.

WAC 173-340-740 SOIL CLEANUP STANDARDS. (1) General considerations. (a) Soil cleanup levels shall be based on estimates of the reasonable maximum exposure expected to occur under both current and future site use conditions. The department has determined that residential site use is generally the site use requiring the most protective cleanup levels and that exposure to hazardous substances under residential site use conditions represents the reasonable maximum exposure. In the event of a release of a hazardous substance, treatment, removal, or containment measures shall be implemented to reduce the levels of hazardous substances in soils to levels consistent with this use unless all of the following can be demonstrated:

(i) The site does not serve as a current residential area;

(ii) The site is not likely to serve as a future residential area based on the consideration of site zoning, statutory and regulatory restrictions, comprehensive plans, historical site use, adjacent land uses, and other relevant factors; and

(iii) Appropriate site use restrictions are implemented at the site to prohibit residential use.

(b) Soil cleanup levels for industrial sites shall be established in accordance with the requirements in WAC 173-340-745.

(c) Soil cleanup levels for other non-residential site uses such as recreational or agricultural uses shall be established on a case-by-case basis. Cleanup levels for these types of sites shall be at least as stringent as conditional cleanup levels established under subsection (4) of this section.

(d) Soil cleanup levels shall be established at levels which do not directly or indirectly cause violations of ground water, surface water, or air cleanup standards established pursuant to this chapter.

(2) Method A compliance cleanup levels. Compliance cleanup levels established using method A shall be at least as stringent as all of the following:

(a) Concentrations in Table 4 in appendix A of this chapter;

(b) Concentrations established under applicable state and federal laws as defined in WAC 173-340-710;

(c) Any other concentrations which the department determines are necessary to protect human health or environment.

(3) Method B compliance cleanup levels. Compliance cleanup levels for soils established using method B shall be at least as stringent as all of the following:

(a) Concentrations established under applicable state and federal laws as defined in WAC 173-340-710;

(b) Concentrations which are less than one hundred times the ground water cleanup level established in accordance with WAC 173-340-720 unless it can be demonstrated that soils containing levels which exceed these concentrations will not cause exceedances of ground water cleanup levels at the site.

(c) Concentrations which are anticipated to result in no acute or chronic toxic effects on human health via direct contact with contaminated soil and are estimated using the following equation and standard exposure assumptions:

$$\text{Soil Cleanup Level (mg/kg)} = \frac{\text{RFD} \times \text{ABW} \times \text{UCF2} \times \text{HQ}}{\text{SIR} \times \text{AB1} \times \text{FOC}}$$

Where:

RFD = Reference Dose as defined in WAC 173-340-705(4) (mg/kg-day)

ABW = Average body weight over the period of exposure (16 kg)

UCF2 = Units conversion factor (1,000,000 mg/kg)

SIR = Soil ingestion rate (200 mg/day)

AB1 = Gastrointestinal absorption rate (1.0)

FOC = Frequency of contact (1.0)

HQ = Hazard quotient (0.2);

(d) Concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 1,000,000 and are estimated using the following equation and standard exposure assumptions:

$$\text{Soil Cleanup Level (mg/kg)} = \frac{\text{RISK} \times \text{ABW} \times \text{LIFE} \times \text{UCF1}}{\text{CPF} \times \text{SIR} \times \text{AB1} \times \text{DUR} \times \text{FOC}}$$

Where:

RISK = Acceptable cancer risk level (1 in 1,000,000)

ABW = Average body weight over the period of exposure (16 kg)

LIFE = Lifetime (70 years)

UCF1 = Unit conversion factor (1,000,000 mg/kg)

CPF = Carcinogenic Potency Factor as defined in WAC 173-340-705(5) (kg-day/mg)

SIR = Soil ingestion rate (200 mg/day)

AB1 = Gastrointestinal absorption rate (1.0)

DUR = Duration of exposure (6 years)

FOC = Frequency of contact (1.0);

(e) Any other concentrations which the department determines are necessary to protect human health or environment, including, but not limited to the following:

(i) Concentrations which eliminate or substantially reduce the potential for food chain contamination;

(ii) Concentrations which eliminate or substantially reduce the potential for damage to soils or biota in the soils which could impair the use of soils for agricultural purposes;

(iii) Concentrations which eliminate or substantially reduce the potential for adverse effects on vegetation or wildlife; and

(iv) Concentrations more stringent than those in subsection 3(b) above where the department determines that such levels are necessary to protect the ground water at a particular site.

(4) Conditional cleanup levels. Conditional cleanup levels may be approved by the department if the person undertaking the cleanup action can demonstrate that such levels are consistent with applicable state and federal laws, that all reasonable methods of treatment have been utilized, and that one or more of the conditions in WAC 173-340-700(8) exist. Conditional cleanup levels for soils shall be at least as stringent as all of the following:

(a) Concentrations which are less than one hundred times the ground water cleanup level established in accordance with WAC 173-340-720 unless it can be demonstrated that soils containing levels which exceed these concentrations will not cause exceedances of ground water cleanup levels at the site.

(b) Concentrations which are anticipated to result in no significant acute or chronic toxic effects on human health or the environment and estimated in accordance with WAC 173-340-740(3)(c) except that the hazard index shall be 1.0, the frequency of contact shall be 0.3, the soil ingestion rate shall be 50 milligrams per day, and the average body weight shall be 70 kilograms;

(c) For known or suspected carcinogens, concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 100,000 and are estimated in accordance with WAC 173-340-740(3)(d) except that the average duration of exposure shall be twenty years, the frequency of contact shall be 0.3, the soil ingestion rate shall be 50 milligrams per day; and

(d) Any other concentrations which the department determines are necessary to protect human health and the environment.

(5) Multiple hazardous substances/multiple pathways of exposure. Soil cleanup levels for individual hazardous substances developed in accordance with subsections (2), (3), (4) of this section shall be adjusted to take into account potential interactive effects using the criteria in WAC 173-340-700(10) and (11).

(6) Environmental degradation. (a) When establishing cleanup levels under this section, the department may consider the potential for reduction in hazardous substance concentrations due to biodegradation, photolysis, or volatilization and the impact that those natural removal processes have on the average levels of a hazardous substance during the period of exposure.

(b) The department shall consider the potential for exposure to degradation products when establishing cleanup requirements under this chapter.

(7) Point of compliance. (a) The point of compliance is the point or points where the soil cleanup levels established under subsections (2), (3), (4), and (5) of this section shall be attained.

(b) For soil cleanup levels based on the protection of ground water, the point of compliance shall be established throughout the facility.

(c) For soil cleanup levels based on human exposure via direct contact, the point of compliance shall be established throughout the facility from the soil surface to the lowest depth which could potentially

result in human exposure via direct contact. In making this determination, the presumption shall be that this depth is 15 feet from the ground surface, unless the person undertaking the cleanup action can demonstrate otherwise. In no case shall the depth be less than two feet.

(8) Compliance monitoring. (a) Compliance shall be based on total soil analyses of the soil fraction less than 2 millimeters in size.

(b) The upper 95th percent confidence limit of the arithmetic mean shall be the statistical measure used to evaluate compliance with soil cleanup levels established in accordance with subsections (2), (3), or (4) of this section.

(c) For purposes of demonstrating compliance, measurements below the method detection limit shall generally be assigned a value equal to one half of the method detection limit. The department may approve alternate statistical procedures for handling data with a large percentage of non-detected values.

WAC 173-340-745 SOIL CLEANUP STANDARDS FOR INDUSTRIAL SITES. (1) General considerations. (a) This section shall be used to establish soil cleanup levels where the department has determined that industrial site use represents the reasonable maximum exposure in accordance with the criteria in WAC 173-340-740(1)(a).

(b) Soil cleanup levels established under this section shall be as close as practicable to compliance cleanup levels established in accordance with WAC 173-340-740.

(c) Soil cleanup levels for areas beyond the industrial facility boundary shall be established in accordance with WAC 173-340-740.

(d) Soil cleanup levels shall be established at levels which do not directly or indirectly cause violations of ground water, surface water, or air cleanup standards established pursuant to this chapter.

(2) Method A compliance cleanup levels. Compliance cleanup levels established using method A shall be at least as stringent as all of the following:

(a) Concentrations in Table 4 in appendix A of this chapter;

(b) Concentrations established under applicable state and federal laws as defined in WAC 173-340-710;

(c) Any other concentrations which the department determines are necessary to protect human health or environment.

(3) Method B compliance cleanup levels. Compliance cleanup levels for soils established using method B shall be at least as stringent as all of the following:

(a) Concentrations established under applicable state and federal laws as defined in WAC 173-340-710;

(b) Concentrations which are less than one hundred times the ground water cleanup level established in accordance with WAC 173-340-720 unless it can be demonstrated that soils containing levels which exceed

these concentrations will not cause exceedances of ground water cleanup levels at the site.

(c) Concentrations which are anticipated to result in no acute or chronic toxic effects on human health via direct contact with contaminated soil and are estimated using the following equation and standard exposure assumptions:

$$\text{Soil Cleanup Level (mg/kg)} = \frac{\text{RFD} \times \text{ABW} \times \text{UCF2} \times \text{HQ}}{\text{SIR} \times \text{AB1} \times \text{FOC}}$$

Where:

RFD = Reference Dose as defined in WAC 173-340-705(4) (mg/kg-day)

ABW = Average body weight over the period of exposure (70 kg)

UCF2 = Unit conversion factor (1,000,000 mg/kg)

SIR = Soil ingestion rate (50 mg/day)

AB1 = Gastrointestinal absorption rate (1.0)

FOC = Frequency of contact (1.0)

HQ = Hazard quotient (1.0);

(d) Concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 100,000 and are estimated using the following equation and standard exposure assumptions:

$$\text{Soil Cleanup Level (mg/kg)} = \frac{\text{RISK} \times \text{ABW} \times \text{LIFE} \times \text{UCF1}}{\text{CPF} \times \text{SIR} \times \text{AB1} \times \text{DUR} \times \text{FOC}}$$

Where:

RISK = Acceptable cancer risk level (1 in 100,000)

ABW = Average body weight over the period of exposure (70 kg)

LIFE = Lifetime (70 years)

UCF1 = Units conversion factor (1,000,000 mg/kg)

CPF = Carcinogenic Potency Factor as defined in WAC 173-340-705(5) (kg-day/mg)

SIR = Soil ingestion rate (50 mg/day)

AB1 = Gastrointestinal absorption rate (1.0)

DUR = Duration of exposure (20 years)

FOC = Frequency of contact (0.3);

(e) Any other concentrations which the department determines are necessary to protect human health or environment.

(4) Multiple hazardous substances/multiple pathways of exposure. Soil cleanup levels for individual hazardous substances developed in accordance with subsections (2) and (3) of this section shall be adjusted to take into account potential interactive effects using the criteria in WAC 173-340-700(10) and (11).

(5) When establishing cleanup levels under this section, the department may consider the potential for reduction in hazardous substance concentrations due to biodegradation, photolysis, or volatilization and the impact that those natural removal processes have on the average levels of a hazardous substance during the period of exposure.

(6) Point of compliance. (a) The point of compliance is the point or points where the soil cleanup levels established under subsections (2), (3), and (4) of this section shall be attained.

(b) For soil cleanup levels based on the protection of ground water, the point of compliance shall be established throughout the facility.

(c) For soil cleanup levels based on human exposure via direct contact, the point of compliance shall be established throughout the facility from the soil surface to the lowest depth which could potentially result in human exposure via direct contact. In making this determination, the presumption shall be that this depth is 15 feet from the ground surface, unless the person undertaking the cleanup action can demonstrate otherwise. In no case shall the depth be less than two feet.

(7) Compliance monitoring. Compliance monitoring shall be performed in accordance with WAC 173-340-410 and 173-340-740(8).

WAC 173-340-750 CLEANUP STANDARDS TO PROTECT AIR QUALITY. (1) General considerations. (a) Cleanup levels to protect air quality shall be based

on estimates of the reasonable maximum exposure expected to occur under both current and future site use conditions. The department has determined that residential site use will generally require the most protective ambient air cleanup levels and that exposure to hazardous substances under these conditions represents the reasonable maximum exposure. In the event of a release or potential release of hazardous substances into the ambient air, treatment, removal, or containment measures shall be implemented to reduce the levels of hazardous substances in the ambient air to levels consistent with this use unless all of the following can be demonstrated:

(i) The site does not serve as a current residential area;

(ii) The site is not likely to become a residential area in the future based on a review of site zoning, comprehensive plans, historic site use, adjacent land uses, and other relevant factors; and

(iii) Air emissions from the site will not reduce the air quality in adjacent residential areas.

(b) Ambient air cleanup levels for non-residential site uses shall be established on a case-by-case basis. Cleanup levels for these types of sites shall be at least as stringent as conditional cleanup levels established under subsection (4) of this section.

(c) Ambient air cleanup levels shall be established at levels which do not directly or indirectly cause violations of ground water, surface water, or soil cleanup standards established pursuant to this chapter.

(2) Method A compliance cleanup levels. Compliance cleanup levels for ambient air established using method A shall be at least as stringent as all of the following:

(a) Concentrations in table 6 of appendix A of this chapter;

(b) Concentrations established under applicable state and federal laws;

(c) Any other concentrations which the department determines are necessary to protect human health and the environment.

(3) Method B compliance cleanup levels. Compliance cleanup levels for ambient air established using method B shall be at least as stringent as all of the following:

(a) Concentrations established under applicable state and federal laws as defined in WAC 173-340-710;

(b) Concentrations which are expected to result in no acute or chronic toxic effects on human health and are estimated using the following equation and standard exposure assumptions:

$$\text{Ambient air cleanup level } (\text{ug/m}^3) = \frac{\text{RFD} \times \text{ABW} \times \text{UCF} \times \text{HQ}}{\text{BR} \times \text{ABS}}$$

Where:

RFD = Reference Dose as defined in WAC 173-340-705(4)

(mg/kg-day)

BW = Body weight (16 kg)

UCF = Units conversion factor (1,000 ug/mg)

BR = Breathing rate (10 m^3/day)

ABS = Absorption percentage (1.0)

HQ = Hazard Index (0.2)

(c) For known or suspected carcinogens, concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 1,000,000 and are estimated using the following equation and standard exposure assumptions:

$$\text{Ambient air cleanup level } (ug/m^3) = \frac{RISK \times BW \times LIFE \times UCF}{CPF \times BR \times ABS \times DUR}$$

Where:

RISK = Acceptable cancer risk level (1 in 1,000,000)

BW = Body weight (70 kg)

LIFE = Lifetime (70 years)

UCF = Units conversion factor (1,000 ug/mg)

CPF = Carcinogenic potency factor as defined in WAC 173-340-705(5) (kg-day/mg)

BR = Breathing rate (20 m^3/day)

ABS = Absorption percentage (1.0)

DUR = Duration of exposure (30 years);

(d) Any other concentrations which the department determines are necessary to protect human health and the environment.

(4) Conditional cleanup levels. Conditional cleanup levels may be approved by the department if the person undertaking the cleanup action can demonstrate that such levels are consistent with applicable state and federal laws, that best available control technology for toxics has been utilized, and that one or more of the conditions in WAC 173-340-700(8) exist. Conditional cleanup levels for ambient air shall be at least as stringent as all of the following:

(a) Concentrations which are anticipated to result in no significant acute or chronic effects on human health and are estimated in accordance with WAC 173-340-750(3)(c) except that the hazard quotient shall be 1.0, the average body weight shall be 70 kg, and the estimated breathing rate shall be 20 m3/day;

(b) For known or suspected carcinogens, concentrations which are anticipated to result in a total incremental cancer risk less than or equal to 1 in 100,000 and are estimated in accordance with WAC 173-340-750(3)(d).

(c) Any other concentrations which the department determines are necessary to protect human health and the environment.

(5) Multiple hazardous substances/multiple pathways of exposure. Cleanup levels for individual hazardous substances developed in accordance with subsections (2), (3), and (4) of this section shall be

adjusted to take into account potential interactive effects using the criteria in WAC 173-340-700(10) and (11).

(6) Points of compliance. Cleanup levels established under subsections (2), (3), (4), and (5) of this section shall be attained in the ambient air throughout the site. For industrial sites, the department may approve a conditional point of compliance not to exceed the property boundary.

(7) Compliance monitoring. Ambient air cleanup levels for non-carcinogens are 24-hour time weighted average limits. Ambient air levels for carcinogens are annual averages.

WAC 173-340-760 SEDIMENT CLEANUP STANDARDS. [RESERVED]

WAC 173-340-200 DEFINITIONS. For the purposes of this chapter, the following additional definitions shall apply:

(49) "Acute toxicity" means the ability of a hazardous substance to cause an injurious change in an organism which results from a single short-term exposure to the chemical.

(50) "Applicable state and federal laws" means all legally applicable or relevant and appropriate requirements. Legally applicable requirements include those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations promulgated under state or federal law that specifically address a hazardous substance, cleanup action, location, or other circumstances at the facility. Relevant and appropriate requirements include those cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state and federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstance at a facility, address problems or situations sufficiently similar to those encountered at the facility that their use is well suited to the particular facility.

(51) "Area Background" means the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a facility which are the result of human activities unrelated to releases from that facility.

(52) "Area of Contamination" means those areas of a facility with contamination which exceeds compliance cleanup levels.

(53) "Bioconcentration factor" means the ratio of the concentration of a hazardous substance in the tissue of aquatic organisms divided by the hazardous substance concentration in the ambient waters in which they reside.

(54) "Carcinogen" means any of the following:

(i) Any substance which meets the criteria for Group A - Human carcinogen as specified in the U.S. Environmental Protection Agency's Guidelines for Carcinogen Risk Assessment as set forth in 51 FR 33992 et seq.

(ii) Any substance which meets the criteria for Group B - Probable Human Carcinogen as specified in the U.S. Environmental Protection Agency's Guidelines for Carcinogen Risk Assessment as set forth in 51 FR 33992 et seq.

(iii) Any substance which causes a significant increased incidence of benign or malignant tumors in a single, well conducted animal bioassay, consistent with the weight of evidence approach specified in the U.S. Environmental Protection Agency's Guidelines for Carcinogen Risk Assessment as set forth in 51 FR 33992 et seq.

(55) "Carcinogenic potency factor" means the upper 95th percentile confidence limit of the slope of the dose-response curve and is expressed in units of (mg/kg-day)-1.

(56) "Chronic toxicity" means the ability of a hazardous substance to cause an injurious effect in an organism which results from repeated exposure to a hazardous substance over an extended period of time.

(57) "Curie" means the official unit of radioactivity, defined as exactly 3.70 x 10 10 disintegrations per second. This decay rate is nearly equivalent to that exhibited by 1 g of radium in equilibrium with its disintegration products.

(58) "Engineering feasibility" means that a cleanup action is capable of being designed, constructed, and implemented in a reliable and effective manner.

(59) "Federal cleanup law" means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601 et. seq.

(60) "Hazard index" means the sum of two or more hazard quotients for multiple substances and/or multiple exposure pathways.

(61) "Hazard quotient" means the ratio of the dose of a single hazardous substance over a specified time period to a reference dose for that hazardous substance derived for a similar exposure period.

(62) "Increased cancer risk of one in 100,000" means the upper 95th percent confidence limit on the estimated risk of one additional cancer above the background cancer rate per 100,000 individuals.

(63) "Increased cancer risk of one in 1,000,000" means the upper 95th percent confidence limit on the estimated risk of one additional cancer above the background cancer rate per 1,000,000 individuals.

(64) "Lowest observed adverse effect level" or "LOAEL" means the lowest exposure at which there are statistically or biologically significant increases in the frequency or severity of adverse effects between the exposed population and its appropriate control group.

(65) "Method detection limit" means the lowest concentration of a hazardous substance that can be accurately determined when the sample has been carried through the entire analytical protocol. The method detection limit is the lowest concentration that can be accurately determined, with 99% confidence, to be greater than zero and is determined from analysis of a sample in a given matrix containing the hazardous substance.

(66) "Natural background" means the concentrations of hazardous substances present in the environment that have not been influenced by human activities.

(67) "Natural non-potable ground water" means those ground waters which are unsuitable for drinking water because of natural background concentrations and treatment of those waters is not considered reasonable and practical.

(68) "No observed adverse effect level" or "NOAEL" means the highest level of a hazardous substance which results in no observable adverse effects in exposed test organisms.

(69) "Permanent solutions" means a cleanup action in which the cleanup standards of WAC 173-340-700 through -760 are achieved without further action being required at the original hazardous substance facility or any other facility involved with the cleanup action, such as an off-site landfill.

(70) "Rad" means that quantity of ionizing radiation that results in the absorption of 100 ergs of energy per gram of irradiated material, regardless of the source of radiation.

(71) "Radionuclide" means a type of atom which spontaneously undergoes radioactive decay.

(72) "Reasonable maximum exposure" means the highest exposure that can be reasonably expected for an individual at a site.

(73) " Reference dose" or "RfD" means a benchmark dose, derived from the NOAEL or LOAEL for a hazardous substance by consistent application of uncertainty factors that reflect various types of data used to estimate acceptable daily intake doses and an additional modifying factor, which is based on professional judgment when considering all available data about a substance, expressed in units of milligrams per kilogram body weight per day.

(74) "Rem" means the unit of radiation dose equivalent, the dosage in rads multiplied by a factor representing the different biological effects of various types of radiation.

(75) "Risk" means the probability that a hazardous substance, when released into the environment, will cause an adverse effect in exposed humans or other living organisms.

(76) "Sample mean" means the arithmetic mean which refers to the average of a set of measurements. The arithmetic mean is defined as the sum of all measurements divided by the number of measurements. For purposes of calculating the sample mean, measurements below the method detection limit shall be assigned a value equal to one half the method detection limit.

(77) "Saturated zone" means the area below the water table in which all the interstices are filled with water.

(78) "Seasonal ground water" means ground water that exists for a temporary period throughout the year and is usually associated with a particular activity or phenomenon.

WAC 173-340-360 SELECTION OF CLEANUP ACTIONS. (1) General requirements.

(a) All cleanup action plans approved and cleanup actions conducted under this chapter shall meet the following requirements:

(i) Be protective of human health and the environment, including compliance with cleanup standards in accordance with WAC 173-340-700 through -760;

(ii) Use permanent solutions to the maximum extent practicable;

(iii) Provide for monitoring in accordance with WAC 173-340-410; and

(iv) Use technologies that can be implemented at the facility.

(b) The cost of a cleanup action shall be a factor only in choosing among alternatives which fulfill the requirements of (1)(a) of this subsection. Consideration of cost shall be consistent with the requirements of subsection (5) of this section.

(2) General Considerations. (a) All cleanup actions performed under this chapter shall prevent or minimize present and future releases and migration of hazardous substances in the environment.

(b) All cleanup actions performed under this chapter shall provide for a net reduction in the amount of hazardous substance being released from the facility.

(c) A cleanup action that relies solely on dilution and dispersion shall not be approved by the department.

(d) Hazardous substances which are directly or indirectly released or proposed to be released to waters of the state shall be provided with all

known available and reasonable methods of treatment consistent with the requirements of Chapter 90.48 RCW and Chapter 90.54 RCW and the administrative codes that implement these statutes.

(e) Soils containing hazardous substances which are likely to be released to waters of the state shall be provided with all reasonable methods of treatment consistent with the antidegradation policy for waters of the state.

(f) All reasonable methods of treatment, consistent with the antidegradation policy for waters of the state, shall be required to restore the quality of ground water contaminated by a facility.

(3) Permanent solutions. (a) The department shall give preference to permanent solutions to the maximum extent practicable in accordance with RCW 70.105D(1)(b).

(b) A permanent solution is one in which the cleanup standards under WAC 173-340-700 through -760 are achieved without further action being required at the original facility or any other facility involved with the cleanup action, such as an off-site landfill.

(c) A determination of whether a cleanup action is practicable shall be based on the following criteria:

(i) Technical feasibility;

(ii) Reliability of the solution, and the assurance that it will provide for adequate and continued protection;

(iii) Availability and capacity of necessary treatment or disposal facilities;

(iv) Cost in accordance with subsection (5) of this section;

(v) Size and complexity of the facility.

(4) Hierarchy of cleanup actions. (a) In making a determination under subsection (3) of this section, the department shall consider cleanup actions in the following order of decreasing preference:

(i) Reuse or recycling;

(ii) Destruction or detoxification;

(iii) Separation or volume reduction with approved treatment or management of the hazardous residual;

(iv) Immobilization of hazardous substances;

(v) On- or off-site disposal, isolation or containment with attendant engineering controls;

(vi) Institutional controls and monitoring.

(b) A combination of cleanup actions exhibiting characteristics from more than one of the categories under (4)(a) may be used at a facility. For example, the source of the hazardous substance may be recovered and recycled or destroyed, while containment is used to stop migration of hazardous substances that have reached the ground water system.

(c) The cleanup action plan shall provide justification for selecting a cleanup action which is less preferred than other cleanup actions listed in section (4)(a) of this subsection. Valid justification may include the following:

(i) Overall protectiveness of human health and the environment;

(ii) Net environmental impact;

(iii) Short- and long-term effectiveness;

(iv) Degree of certainty of performance; and

(v) Whether the cleanup action is practicable using the criteria under (3)(c) above.

(d) Except as provided for in subsection 5(b) of this section, the department shall not approve of a cleanup action relying only on isolation or containment of hazardous substances if an alternative that utilizes a higher preference cleanup action for all or a portion of the facility is practicable.

(e) Long-term monitoring and appropriate institutional controls shall be required when on-site isolation, containment or a nonpermanent treatment method is part of the selected cleanup action.

(f) Institutional controls and monitoring shall not be used when a higher preference cleanup action is practicable.

(g) Periodic reviews of cleanup actions not involving a permanent solution shall be required in accordance with WAC 173-340-420. Additional cleanup actions shall be implemented if these periodic reviews indicate the requirements of subsection (1)(a) of this section are not fulfilled.

(h) The department shall not approve a cleanup action involving off-site transport and disposal of hazardous substances or contaminated materials without treatment if a practicable treatment method exists which meets the requirements of subsection (1)(a) of this section.

(5) Cost considerations. (a) For alternative cleanup actions which meet the requirements of subsection (1)(a) of this section and which have

an equivalent order of preference under subsection (4)(a) of this section, preference shall be given to the least cost cleanup action.

(b) The department may justify on the basis of cost the selection of a lower preference cleanup action, in accordance with (4)(a) of this section, if the incremental cost of a higher preference cleanup action is substantial and disproportionate to the incremental degree of permanent protection that would be achieved.

(c) Costs considered shall include present and future direct and indirect capital, operation and maintenance costs, plus natural resources damage and loss of economic opportunity due to restrictions on land use resulting from any hazardous substance remaining on the facility.

(6) Restoration time frame. (a) When the department determines that cleanup actions are required, the department shall select a reasonable restoration time frame for the facility.

(b) Restoration time frame refers to the period of time needed to achieve the required cleanup levels at the points of compliance established for the facility.

(c) In selecting a reasonable restoration time frame, the department shall consider the following factors:

(i) Potential risk posed by the facility to human health and the environment, including impacts to unique natural resources;

(ii) Technical practicability of achieving a shorter restoration time frame.

(iii) Current use of the facility, surrounding areas, and associated resources that are, or may be, affected by contamination from the facility;

(iv) Potential use of the facility, surrounding areas, and associated resources that are, or may be, affected by contamination from the facility;

(v) Feasibility of providing an alternative water supply to water users that may be affected by ground water or surface water contamination;

(vi) Effectiveness and reliability of institutional controls;

(vii) Ability to control and monitor contaminant migration from the facility;

(d) Extending the restoration time frame shall not be used as a substitute for active cleanup measures.

(7) Draft cleanup action plan. The department shall issue a draft cleanup action plan for cleanup actions conducted under provisions of this chapter. The cleanup action plan shall include the following:

(a) A description of the cleanup actions to be implemented and how they fulfill the requirements of 3(1)(b) and 3(2)(d), chapter 2, Laws of 1989;

(b) A brief summary of other cleanup alternatives evaluated in the remedial investigation/feasibility study or comparable documents;

(c) A brief summary of how the proposed cleanup alternative addresses the factors in WAC 173-340-360(1)(a);

(d) A schedule for implementation of the cleanup action plan;

(e) Identification of applicable federal, state, and local requirements to be met to complete the cleanup action; and

(f) A justification in accordance with subsection (4) for selection of the cleanup action.

(8) Public participation. The department will provide public notice and opportunity for comment on the draft cleanup plan as described in WAC 173-340-600.

(9) Final plan. After completion of the public comment period the department shall issue a final cleanup action plan and publish its availability in the state register and by other appropriate methods.

Appendix A

Table A-1
Method A Compliance Cleanup Levels - Ground Water

Hazardous Substance	CAS Number	Cleanup Level	
Arsenic	7440-38-2	2.0 ug/liter	(a)
Benzene	71-43-2	1.0 ug/liter	(b)
Cadmium	7440-43-9	2.0 ug/liter	(c)
Chromium (VI)	7440-47-3	50.0 ug/liter	(d)
Copper	7440-50-8	1000.0 ug/liter	(e)
DDT	50-29-3	0.12 ug/liter	(f)
1,2 Dicholorethane	107-06-2	1.0 ug/liter	(g)
Ethylbenzene	100-41-4	20.0 ug/liter	(h)
Ethylene dibromide	106-93-4	0.01 ug/liter	(i)
Lead	7439-92-1	5.0 ug/liter	(j)
Lindane	58-89-9	0.2 ug/liter	(k)
Methylene chloride	75-09-2	5.0 ug/liter	(l)
Mercury	7439-97-6	2.0 ug/liter	(m)
PAHs		0.1 ug/liter	(n)
PCB mixtures		0.1 ug/liter	(o)
Pentachlorophenol (PCP)	87-86-5	30.0 ug/liter	(p)
Tetrachloroethylene	127-18-4	1.0 ug/liter	(q)
Toluene	108-88-3	40.0 ug/liter	(r)
1,1,1 Trichloroethane	71-55-6	200.0 ug/liter	(s)
Trichloroethylene	79-01-5	5.0 ug/liter	(t)
Vinyl chloride	75-01-4	0.4 ug/liter	(u)
Xylenes	1330-20-7	20.0 ug/liter	(v)
Zinc	7440-66-6	5000.0 ug/liter	(w)

(a) Arsenic - Natural background concentrations as reported in PTI (1989)
(b) Benzene - Calculated health-based concentration - drinking water ingestion and inhalation of volatilized substances. Calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 0.029 (EPA, 1989a). The risk associated with the inhalation of volatilized contaminants was assumed to be equivalent to the risk from the ingestion of drinking water. The Maximum Contaminant Limit (MCL) is 5.0 ug/liter.
(c) Cadmium - Calculated health-based concentration - drinking water ingestion only. Calculated using the equation in WAC 173-340-720(3)(b)

and a reference dose of 0.0005 (EPA, 1989a). The current MCL is 10 ug/liter. The U.S. Environmental Protection Agency (USEPA) has proposed to lower this standard to 5 ug/liter. (54 FR 22062)

(d) Chromium - The National Interim Primary Drinking Water Regulations contains a drinking water standard of 50 ug/liter. The USEPA has issued a proposed MCL of 100 ug/liter. (54 FR 22062).

(e) Copper - Proposed Secondary Maximum Contaminant Level as published in 54 FR 22062.

(f) DDT - Maximum Contaminant Level as published in 40 C.F.R. 141.

(g) 1,2 Dichloroethane - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). A health-based concentration (drinking water ingestion and inhalation of volatilized substances) of 0.5 ug/liter was calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 0.091 (EPA, 1989a). The risk associated with the inhalation of volatilized contaminants was assumed to be equivalent to the risks from ingestion of drinking water. The MCL is 5.0 ug/liter.

(h) Ethylbenzene - Proposed Secondary Maximum Contaminant Level as published in 54 FR 22062. The USEPA has issued a proposed MCL of 700 ug/liter.

(i) Ethylene dibromide - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). A health-based concentration (drinking water ingestion and inhalation of volatilized substances) of 0.5 ug/liter was calculated using the equations in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 85 (EPA, 1989a). The USEPA has issued a proposed MCL of 0.05 ug/liter (54 FR 22062).

(j) Lead - Proposed Maximum Contaminant Level as published in 53 FR 31516. The current MCL is 50 ug/liter.

(k) Lindane - Maximum Contaminant Level as published in 40 C.F.R. 141.

(l) Methylene chloride - Calculated health-based concentration - drinking water ingestion and inhalation of volatilized substances. Calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 0.0075 (EPA, 1989a). The risk associated with the inhalation of volatilized contaminants was assumed to be equivalent to the risk from ingestion of drinking water.

(m) Mercury - Maximum Contaminant Level as published in 40 C.F.R. 141.

(n) PAHs - Based on method detection limit as specified in WAC 173-340-700(5). A health-based concentration (drinking water ingestion only) of 0.01 ug/liter (based upon carcinogenic PAHs (benzo(a)pyrene, benzo(a)anthracene, benzo(a)fluoranthene, chrysene, dibenzo(a,h)anthracene) was calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 11.5 (EPA, 1986).

(o) PCBs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). A health-based concentration (drinking water ingestion only) was calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 7.7 (EPA, 1989a). The USEPA has issued a proposed MCL of 0.5 ug/l.

(p) Pentachlorophenol - Proposed Secondary Maximum Contaminant Level as published in 54 FR 22062. The USEPA has issued a proposed MCL (based

on noncarcinogenic effects) of 200 ug/liter.

(q) Tetrachloroethylene - Calculated health-based concentration - drinking water ingestion and inhalation of volatilized substances. Calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 0.051 (EPA, 1989a). The risk associated with the inhalation of volatilized contaminants was assumed to equivalent to the risk from ingestion of drinking water. The MCL is 5.0 ug/liter.

(r) Toluene - Proposed Secondary Maximum Contaminant Level as published in 54 FR 22062.

(s) 1,1,1 Trichloroethane - Maximum Contaminant Level as published in 40 C.F.R. 141.

(t) Trichloroethylene - Maximum Contaminant Level as published in 40 C.F.R. 141.

(u) Vinyl chloride - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). A health-based concentration (drinking water ingestion and inhalation of volatilized substances) was calculated using the equation in WAC 173-340-720(3)(c) and a carcinogenic potency factor of 2.3 (EPA, 1989a). The MCL is 2.0 ug/liter.

(v) Xylenes - Proposed Secondary Maximum Contaminant Level as published in 54 FR 22062.

(w) Zinc - Proposed Secondary Maximum Contaminant Level as published in 54 FR 22062.

Table A-2

Method A Compliance Cleanup Levels - Marine Waters

Hazardous Substance	CAS Number	Cleanup Level	
Arsenic (V)	7440-38-2	13.0 ug/liter	(a)
Arsenic (III)	7440-38-2	36.0 ug/liter	(a)
Benzene	71-43-2	80.0 ug/liter	(d)
Cadmium	7440-43-9	9.3 ug/liter	(a)(c)
Chromium (VI)	7440-47-3	50.0 ug/liter	(a)(c)
Chromium (III)	16065-83-1	1030.0 ug/liter	(b)
Copper	7440-50-8	2.9 ug/liter	(a)
DDT	50-29-3	0.001 ug/liter	(a)(c)(e)
Ethylbenzene	100-41-4	43.0 ug/liter	(b)
Lead	7439-92-1	5.6 ug/liter	(a)(c)
Lindane	58-89-9	0.016 ug/liter	(b)
Methylene chloride	75-09-2	30.0 ug/liter	(f)
Mercury (inorganic)	7439-97-2	0.025 ug/liter	(a)(c)
PAHs		0.1 ug/liter	(g)
PCB Mixtures		0.1 ug/liter	(h)
Pentachlorophenol (PCP)	87-86-5	7.9 ug/liter	(a)(c)
Tetrachloroethylene	127-18-4	10.0 ug/liter	(i)
Toluene	108-88-3	5000.0 ug/liter	(a)
1,1,1 Trichlorethane	71-55-6	3120.0 ug/liter	(b)
Trichloroethylene	79-01-5	100.0 ug/liter	(j)
Zinc	7440-66-6	86.0 ug/liter	(a)(c)

(a) Ambient water quality criteria - Marine chronic criterion.
(b) Ambient water quality criteria - Marine acute criterion/10.
(c) Surface water quality criteria (WAC 173-201).
(d) Benzene - Health-based concentration based on consumption of fish and shellfish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.029, and a bioconcentration factor of 5.2. Water quality criterion based on consumption of fish and shellfish is 40 ug/liter.
(e) DDT - Health-based concentration based on consumption of fish and shellfish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.34, and a bioconcentration factor of 54,000. The ambient water quality criterion for consumption of fish

and shellfish is 0.000024 ug/liter. Sampling and analysis of fish tissue may be required to supplement water column sampling during compliance monitoring.

(f) Methylene chloride - Health-based concentration based on the consumption of fish and shellfish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.0075, and a bioconcentration factor of 5.

(g) PAHs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). Ambient water quality criterion based on fish and shellfish consumption is 0.031 ug/liter. Sampling and analysis of fish tissue may be required to supplement water column sampling during compliance monitoring.

(h) PCBs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). Health-based concentration based on the consumption of fish and shellfish is calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 7.7, and a bioconcentration factor of 100,000. The ambient water quality criterion based on consumption of fish and shellfish is 0.000079 ug/liter. Sampling and analysis of fish tissue may be required to supplement water column sampling during compliance monitoring.

(i) Tetrachloroethylene - Health-based concentration based on the consumption of fish and shellfish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.051, and a bioconcentration factor of 31. The ambient water quality criterion based on consumption of fish and shellfish is 8.85 ug/liter.

(j) Trichloroethylene - Health-based concentration based on the consumption of fish and shellfish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.011, and a bioconcentration factor of 10.6. The ambient water quality criterion based on consumption of fish and shellfish is 80.7 ug/liter.

Table A-3
Method A Compliance Cleanup Levels - Freshwater

Hazardous Substance	CAS Number	Cleanup Level	
Arsenic (V)	7440-38-2	48.0 ug/liter	(a)
Arsenic (III)	7440-38-2	190.0 ug/liter	(a)
Benzene	71-43-2	80.0 ug/liter	(d)
Cadmium	7440-43-9	1.1 ug/liter	(a)
Chromium (VI)	7440-47-3	11.0 ug/liter	(a)(c)
Chromium (III)	7440-47-3	210.0 ug/liter	(a)
Copper	7440-50-8	12.0 ug/liter	(a)
DDT	50-29-3	0.0001 ug/liter	(e)
Lead	7439-92-1	3.2 ug/liter	(a)
Lindane	58-89-9	0.08 ug/liter	(a)(c)
Methylene chloride	75-09-2	30.0 ug/liter	(f)
Mercury (inorganic)	7439-97-6	0.012 ug/liter	(a)(c)
PAHs		0.1 ug/liter	(g)
PCB mixtures		0.1 ug/liter	(h)
Pentachlorophenol	87-86-5	13.0 ug/liter	(a)
Tetrachloroethylene	127-18-4	10.0 ug/liter	(i)
Toluene	108-88-3	1750.0 ug/liter	(b)
1,1,1 Trichloroethane	71-55-6	1500.0 ug/liter	(j)
Trichloroethylene	79-01-5	100.0 ug/liter	(k)
Zinc	7440-66-6	47.0 ug/liter	(a)

(a) Ambient water quality criterion - Freshwater chronic criterion.
(b) Ambient water quality criterion - Freshwater acute criterion/10.
(c) Surface water quality standards (WAC 173-201) - Freshwater chronic criteria.
(d) Benzene - Health-based concentration based on consumption of fish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.029, and a bioconcentration factor of 5.2. Water quality criterion based on consumption of fish and shellfish is 40 ug/liter.
(e) DDT - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). Health-based concentration of 0.0001 is based upon consumption of fish and was calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.34, and bioconcentration factor of 54,000. The ambient water quality criterion for consumption of fish and shellfish is 0.000024 ug/liter.

Sampling and analysis of fish tissue may be required to supplement water column sampling during compliance monitoring.

(f) Methylene chloride - Health-based concentration based on the consumption of fish. Calculated using the equations in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.0075, and a bioconcentration factor of 5.

(g) PAHs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). Ambient water quality criterion based on fish and shellfish consumption is 0.031 ug/liter. Sampling and analysis of fish tissue analysis may be required to supplement water column sampling during compliance monitoring.

(h) PCBs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). Health-based concentration of 0.00001 ug/liter is based upon the consumption of fish and was calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 7.7, and a bioconcentration factor of 100,000. The ambient water quality criterion based on consumption of fish and shellfish is 0.000079 ug/liter. Sampling and analysis of fish tissue analysis may be required to supplement water column sampling during compliance monitoring.

(i) Tetrachloroethylene - Health-based concentration based on the consumption of fish. Calculated using the equation in WAC 173-340-730(3)(d), a carcinogenic potency factor of 0.051, and a bioconcentration factor of 31. The ambient water quality criterion based on consumption of fish and shellfish is 8.85 ug/liter.

(j) 1,1,1 Trichloroethane - Health-based concentration based on the consumption of fish.

(l) Trichloroethylene - Health-based concentration based on the consumption of fish. Calculated using the equations in WAC 173-340-730, a cancer potency factor of 0.011, and a bioconcentration factor of 10.6. The ambient water quality criterion based on consumption of fish and shellfish is 80.7 ug/liter.

Table A-4
Method A Compliance Cleanup Levels - Soil

Hazardous Substance	CAS Number	Cleanup Level	
Arsenic	7440-38-2	20.0 mg/kg	(a)
Benzene	71-43-2	0.5 mg/kg	(b)
Cadmium	7440-43-9	8.0 mg/kg	(c)
Chromium (VI)	7440-47-3	80.0 mg/kg	(d)
Copper	7440-50-8	500.0 mg/kg	(e)
DDT	50-29-3	3.0 mg/kg	(f)
Ethylbenzene	100-41-4	16.0 mg/kg	(g)
Ethylene dibromide	106-93-4	0.05 mg/kg	(h)
Lead	7439-92-1	500.0 mg/kg	(i)
Lindane	58-89-9	1.0 mg/kg	(j)
Methylene chloride	75-09-2	0.5 mg/kg	(k)
Mercury (inorganic)	7439-97-6	1.0 mg/kg	(l)
PAHs (carcinogenic)		1.0 mg/kg	(m)
PCB Mixtures		1.0 mg/kg	(n)
Pentachlorophenol	87-86-5	10.0 mg/kg	(o)
Tetrachloroethylene	127-18-4	0.1 mg/kg	(p)
Toluene	108-88-3	16.0 mg/kg	(q)
TPH (gasoline)		100.0 mg/kg	(r)
TPH (diesel)		200.0 mg/kg	(s)
1,1,1 Trichloroethane	71-55-6	20.0 mg/kg	(t)
Trichloroethylene	79-01-5	0.5 mg/kg	(u)
Xylenes	1330-20-7	2.0 mg/kg	(v)
Zinc	7440-66-6	500.0 mg/kg	(w)

(a) Arsenic - Natural background concentrations as reported in PTI (1989).
(b) Benzene - Protection of ground water. One hundred times the maximum contaminant level as published in 40 C.F.R. 141.
(c) Cadmium - Protection via direct contact. Calculated using the equation in WAC 173-340-740(3)(c) and a reference dose of 0.0005 mg/kg/day (EPA, 1989a).
(d) Chromium - Protection via direct contact. Calculated using the

equation in WAC 173-340-740(3)(c) and a reference dose of 0.005 mg/kg/day (EPA, 1989a).

(e) Copper - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(f) DDT - Protection via direct contact. Calculated using the equation in WAC 173-340-740(3)(d) and a carcinogenic potency factor of 0.34 (EPA, 1989a).

(g) Ethylbenzene - Protection of ground water. One hundred times the health-based ground water concentration calculated using the equation in WAC 173-340-740(3)(d) and a reference dose of 0.1 (EPA, 1989a).

(h) Ethylene dibromide - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(i) Lead - Protection via direct contact. Based on EPA guidelines for lead contaminated soils (EPA, 1989c).

(j) Lindane - Protection via direct contact. Calculated using the equation in WAC 173-340-740(3)(d) and a carcinogenic potency factor of 1.3 (EPA, 1989a).

(k) Methylene chloride - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(l) Mercury - Protection via direct contact. Calculated using the equation in WAC 173-340-740(3)(c) and a reference dose of 0.003 (EPA, 1989a).

(m) PAHs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). Based on carcinogenic PAHs. A health-based concentration (direct contact) of 0.1 mg/kg was calculated using the equation in WAC 173-340-740(3)(d) and a carcinogenic potency factor of 11.5 (EPA, 1986).

(n) PCBs - Based on method detection limit as specified in WAC 173-340-700(5)(d)(ii). A health-based concentration (protection via direct contact) of 0.4 mg/kg was calculated using the equation in WAC 173-340-740(3)(d), a carcinogenic potency factor of 7.7 (EPA, 1989a), and a 30% absorption rate.

(o) Pentachlorophenol - Protection of ground water. One hundred times a health-based ground water concentration calculated using the equation in 173-340-720(3)(b) and a reference dose of 0.03 (EPA, 1989a) (non-carcinogenic effects only).

(p) Tetrachloroethylene - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(q) Toluene - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(r) TPH (gasoline) - Protection of ground water.

(s) TPH (diesel) - Protection of ground water.

(t) 1,1,1 Trichloroethane - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(u) Trichloroethylene - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(v) Xylenes - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.

(w) Zinc - Protection of ground water. One hundred times the ground water cleanup standard in Table A-1.