

Briefing Paper on the Proposed Amendments

**The Model Toxics Control Act
Cleanup Regulation
Chapter 173-340-WAC**

**Public Participation Grants
Chapter 173-321 WAC**

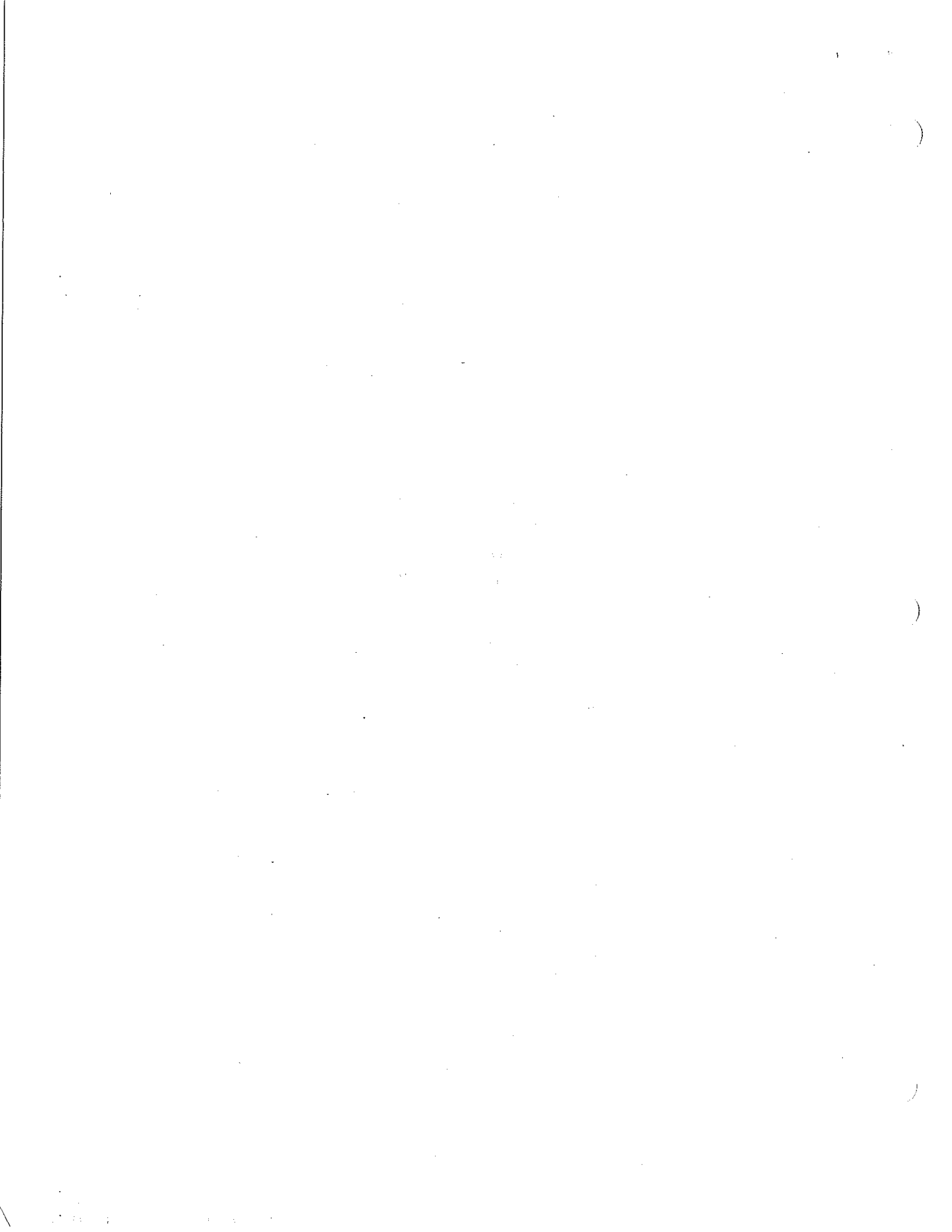
**Remedial Action Grants and Loans
Chapter 173-322 WAC**

Prepared by:

**Washington State Department of Ecology
Toxics Cleanup Program**

August 2000

Pwb NO.00-09-901



Executive Summary

On November 2, 1999, the Washington State Department of Ecology (Ecology) filed with the Office of the Code Reviser proposed amendments to Chapter 173-340 WAC, Model Toxics Control Act Cleanup Regulation; Chapter 173-322 WAC, Remedial Action Grants and Loans; and Chapter 173-321 WAC, Public Participation Grants. These proposed rule amendments were published on November 17, 1999, in the Washington State Register, Issue 99-22.

These proposed rule amendments, along with the Small Business Economic Impact Statement and Draft Environmental Impact Statement, were the subject of a sixty-day public comment period to afford the public a meaningful opportunity to provide input on Ecology's decision-making process. Ecology received public comment on the 1999 proposed rule amendments and accompanying documents from November 17, 1999, through January 15, 2000.

A number of public hearings during the comment period provided the opportunity for people to discuss the proposed rule amendments. Public hearings were held in Vancouver (December 9), Seattle (two on December 14), Spokane (December 15), Yakima (December 16), and Tacoma (January 4, 2000). Comments were received in writing and transcribed from oral testimony given at the public hearings. Ecology received comments from citizens and other interested persons or organizations, including the MTCA Science Advisory Board, the TPH Project Oversight Group, large and small businesses, environmental organizations, and government agencies. Ecology reviewed these comments and identified approximately 1,400 separate comments.

After careful consideration and review of the comments, Ecology filed a notice of withdrawal of these proposed rule amendments with the Office of the Code Reviser on April 18, 2000. Ecology subsequently filed with the Office of the Code Reviser on August 2, 2000, proposed amendments to Chapter 173-340 WAC, Model Toxics Control Act Cleanup Regulation; Chapter 173-322 WAC, Remedial Action Grants and Loans; and Chapter 173-321 WAC, Public Participation Grants. These 2000 proposed rule amendments were published on August 16, 2000 in the Washington State Register, Issue 00-16.

Purpose of this Briefing Paper

The primary purpose of this briefing paper is to highlight and briefly explain both the major changes to the 1999 proposed rule amendments and the major changes suggested by commentators that were considered but not incorporated into the rule. This briefing paper is not a "Concise Explanatory Statement" and is not intended to contain an exhaustive explanation of Ecology's reasons for adopting any of the rule amendments. Rather, it is intended to be a summary to assist readers in reviewing the 2000 proposal.

Major changes to 1999 proposed rule amendments:

- Clarified language in several sections (including remedy selection, definition of remediation levels, developing ground water cleanup levels, terrestrial ecological evaluations and

developing soil cleanup levels that are protective of the ground water) for the purpose of improving the consistency, readability and understanding of the proposed rule amendments. *This is in response to public comments.*

- Revised the section on establishing soil cleanup levels that are protective of the ground water to address several technical issues. *This is in response to public comments and Ecology's evaluation of additional technical information.*
- Adjusted the Method A table values for several hazardous substances, including gasoline and benzene soil cleanup levels for both the protection of human health and terrestrial ecological resources. *This is in response to public comments and Ecology's evaluation of additional technical information.*
- Revised sampling requirements for MTBE (petroleum fuel additive) by now requiring sampling in soil and ground water. *This is because of new information regarding the presence of MTBE in the soils and ground water of the state.*
- Revised language such that a deed restriction will not need to be considered under a terrestrial ecological evaluation when the area of soil contamination is not more than 350 square feet. *This is in response to an issue raised by commentors.*
- Revised language dealing with the determination of when the soil vapor pathway and dermal pathway need to be evaluated. This corrects an internal inconsistency of the previous proposed amendment. *This is in response to an issue raised by commentors.*
- Revised language addressing how to deal with situations involving the establishment of air cleanup levels when the site is already being regulated under OSHA or WISHA requirements. *This is in response to an issue raised by commentors.*
- Eliminated Method A as an option for establishing air cleanup levels. *This is in response to an issue raised by commentors.*
- Revised the language on how the department will recover its costs for implementing the Citizen Technical Advisor pilot program. *This is in response to an issue raised by commentors.*

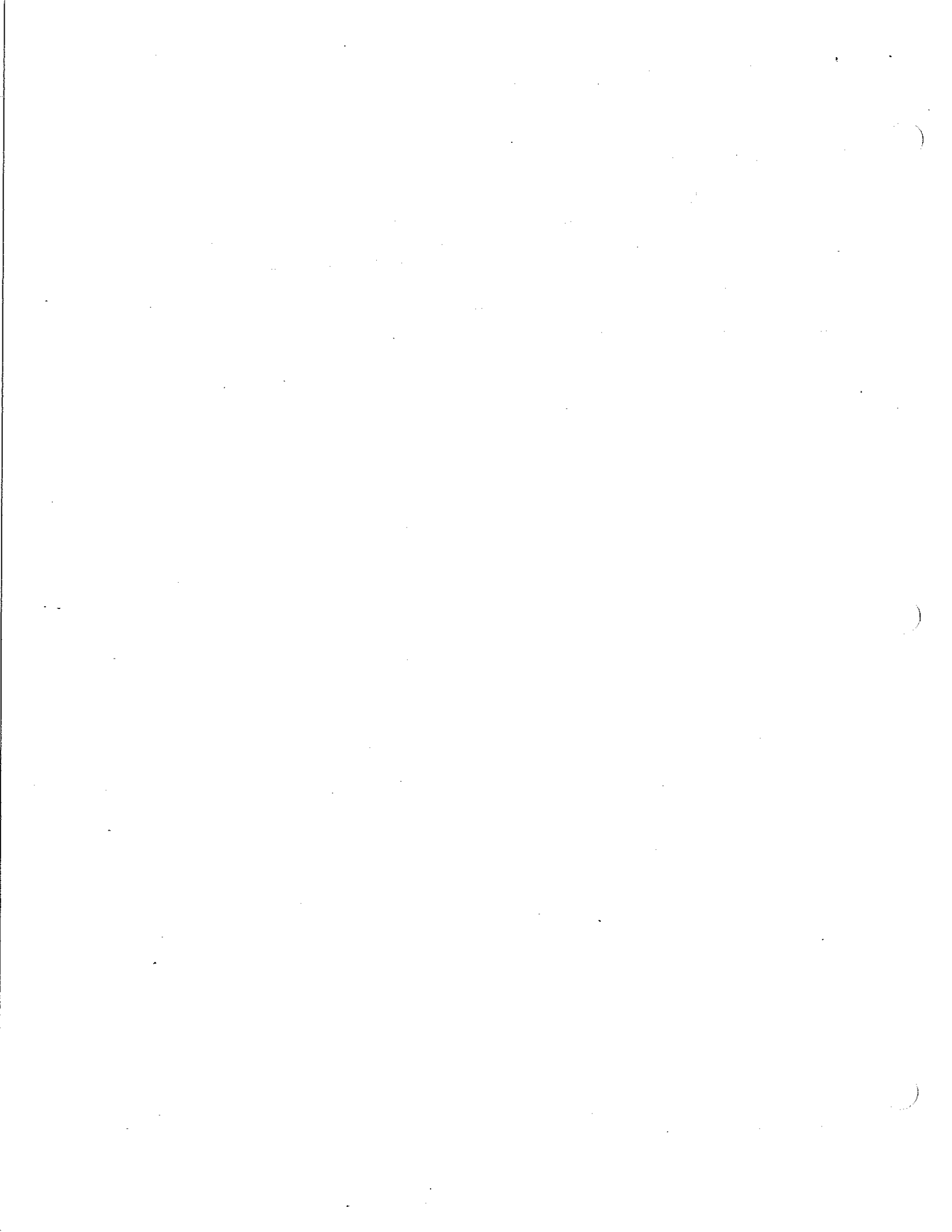
Major changes suggested by commentors that were considered but not incorporated into the rule.

- Remediation levels have not been defined to be the same as cleanup levels.
- The development of cleanup levels for commercial land uses is not allowed; however, land use can be considered in developing remediation levels.
- The "grandfather" clause remains as proposed.
- The use of natural attenuation as a cleanup action is maintained as proposed.
- The public participation requirements for independent remedial actions remain as proposed.

Ecology previously prepared a Draft Environmental Impact Statement (EIS) for the November 1999 proposed rule amendments. Based on the analysis presented in the Draft EIS, Ecology concluded that there were no probable significant adverse environmental impacts that were not mitigated as part of the proposed action. The Draft EIS was subject to a 60-day public review and comment period along with the proposed rule amendments. Ecology has determined that the changes to the November 1999 proposed rule amendments will not result in probable significant adverse environmental impacts. Accordingly, based on the comments received on the Draft EIS,

Ecology is currently developing the Final EIS, which will be published before the final rule amendments are adopted.

Before adopting the final rule amendments, Ecology will prepare a Concise Explanatory Statement that will respond to comments received on both the November 1999 and August 2000 proposed rule amendments. This Statement will also indicate how the final rule amendments reflect agency consideration of the comments. The Final EIS will include responses to comments received on the Draft EIS. Accordingly, comments previously submitted on the 1999 proposed rule amendments and the Draft EIS do not need to be re-submitted by commentors. The Concise Explanatory Statement will be available when the rule is adopted and filed.



Remedy Selection

(1) Reorganization and Clarification of Remedy Selection

Several commentors expressed confusion regarding the overall process for selecting a cleanup action for a site. To clarify the requirements and procedures for selecting cleanup actions and to address the concerns raised by commentors, Ecology has reorganized parts of WAC 173-340-350 and WAC 173-340-360, resulting in the creation of two new sections. Some of the language in these sections has also been revised to provide further clarification. Specifically, Ecology has made the following organizational changes:

- Subsection 350(11) has been moved to create a new section, WAC 173-340-355.
- Subsection 350(12) has been moved to create a new section, WAC 173-340-357.
- Subsections 350(9-10) and (13)(d) have been integrated with WAC 173-340-360.

The following discussion provides a brief overview of these remedy selection provisions:

- WAC 173-340-350 sets forth the requirements and procedures for conducting remedial investigations and feasibility studies.
- WAC 173-340-355 describes the purpose of remediation levels and their relationship to cleanup levels and cleanup standards. This section also sets forth the requirements and procedures for developing a cleanup action alternative, to be evaluated in the feasibility study, that includes remediation levels. Cleanup actions that use remediation levels must meet each of the minimum requirements specified in WAC 173-340-360, just as any other cleanup action.
- WAC 173-340-357 describes the purpose of a quantitative risk assessment and its relationship to selecting a cleanup action. This section also sets forth the requirements and procedures for conducting a quantitative risk assessment of cleanup action alternatives. Specifically, a quantitative site-specific risk assessment may be conducted to help determine whether cleanup action alternatives, including those using a remediation level, engineered control and/or institutional control, are protective of human health and the environment. A determination that a cleanup action alternative evaluated is protective of human health and the environment does not mean that the other minimum requirements specified in WAC 173-340-360 have been met.
- WAC 173-340-360 describes the minimum requirements and procedures for selecting cleanup actions. Specifically, all cleanup actions must meet each of the minimum requirements specified in WAC 173-340-360(2). WAC 173-340-360(3) describes the specific requirements and procedures for determining whether a cleanup action uses permanent solutions to the maximum extent practicable, as required under subsection (2)(b)(i). WAC 173-340-360(4) describes the specific requirements and procedures for determining whether a cleanup action provides for a reasonable restoration time frame, as required under subsection (2)(b)(ii).

(2) **What is the purpose of remediation levels and their relationship to cleanup levels and cleanup standards?**

Pursuant to MTCA Policy Advisory Committee (PAC) recommendations, Ecology formalized the concept of remediation levels for use in the remedy selection process in the 1999 proposed rule amendments. Several commentors, however, expressed confusion regarding the definition and purpose of remediation levels and their relationship to cleanup levels and cleanup standards. Other commentors have expressed the opinion that remediation levels should be equated with cleanup levels. To address these issues, Ecology has clarified the definition of remediation levels in WAC 173-340-200 and has created a new section (WAC 173-340-355) that specifically defines the purpose of remediation levels and the requirements and procedures for developing a cleanup action alternative that includes remediation levels. This new section replaces WAC 173-340-350(11) that was proposed in the 1999 rule amendments. Ecology has also reviewed each occurrence of the term throughout the rule to ensure its use is correctly and consistently applied. The following discussion provides a brief overview of the purpose of remediation levels and their relationship to cleanup levels and cleanup standards.

Definition of Remediation Level

“Remediation level” means a concentration (or other method of identification) of a hazardous substance in soil, water, air, or sediment above which a particular cleanup action component will be required as part of a cleanup action at a site. Other methods of identification include physical appearance or location. A cleanup action selected in accordance with WAC 173-340-350 through 173-340-390 that includes remediation levels constitutes a cleanup action which is protective of human health and the environment.

Relationship to cleanup levels and cleanup standards.

Remediation levels are not the same as cleanup levels. A cleanup level defines the concentration of hazardous substances above which a contaminated media (e.g., soil) must be remediated in some manner (e.g., treatment, containment, institutional controls). A remediation level, on the other hand, defines the concentration (or other method of identification) of a hazardous substance in a particular media above or below which a particular cleanup action component (e.g., soil treatment or containment) will be used. Remediation levels, by definition, exceed cleanup levels.

Cleanup levels must be established for every site. Remediation levels, on the other hand, may not be necessary at a site. Whether remediation levels are necessary depends on the cleanup action selected. For example, remediation levels would not be necessary if the selected cleanup action removes for offsite disposal all soil that exceeds the cleanup level at the applicable points of compliance.

A cleanup action that uses remediation levels must meet each of the minimum requirements specified in WAC 173-340-360, including the requirement that all cleanup actions must comply with cleanup standards. Compliance with cleanup standards requires, in part, that cleanup levels are met at the applicable points of compliance. Where a cleanup action involves containment of soils with hazardous substance concentrations exceeding cleanup levels at the point of

compliance, the cleanup action may be determined to comply with cleanup standards, provided the requirements specified in WAC 173-340-740(6)(f) are met.

(3) How may the process of natural attenuation be considered in the establishment of cleanup levels and in the selection of cleanup actions?

Several commentors expressed confusion as well as various concerns regarding the proper role of natural attenuation in the establishment of cleanup levels and the selection of cleanup actions. "Natural attenuation" means any naturally occurring process that reduces concentrations of contaminants, including such processes as biodegradation, volatilization, and dilution (see WAC 173-340-200 for a complete definition). The following discussion provides a brief overview of the role of natural attenuation in the establishment of cleanup levels and the selection of cleanup actions.

For the establishment of cleanup levels, the process of natural attenuation in the soil column may be considered in the establishment of soil cleanup levels. In fact, Method A soil cleanup levels that are based on protection of ground water (see Tables 740-1 and 745-1) were derived using the equilibrium linear partitioning models that incorporate a default dilution factor. Under Method B and C, these models may also be used to establish soil concentrations that are protective of ground water and the dilution factor associated with those models may be adjusted on a site-specific basis. For gasoline and diesel mixtures, the Method A soil cleanup levels further account for natural attenuation by accounting for the change in the composition of the mixture in soil over time as it "weathers." Other than the dilution factor mentioned above, the process of natural attenuation in other media (e.g., ground water, surface water, and air) was not considered in establishing Method A cleanup levels and may not be considered in establishing Method B and C cleanup levels.

In the selection of cleanup actions, the process of natural attenuation may be considered under certain conditions. All cleanup actions, including those that include natural attenuation as a component, must meet each of the minimum requirements specified in WAC 173-340-360(2). All cleanup actions must, for example, protect human health and the environment; comply with cleanup standards; comply with applicable state and federal laws; provide for compliance monitoring; use permanent solutions to the maximum extent practicable; provide for a reasonable restoration time frame; and consider public concerns. Additionally, cleanup actions shall not rely primarily on dilution and dispersion unless the incremental costs of any active remedial measures over the costs of dilution and dispersion grossly exceed the incremental degree of benefits of active remedial measures over the benefits of dilution and dispersion (see WAC 173-340-360(2)(g)).

Ecology expects that natural attenuation of hazardous substances may be appropriate at sites where:

- (a) Source control has been conducted to the maximum extent practicable;
- (b) Leaving contaminants on-site during the restoration time frame does not pose an unacceptable threat to human health or the environment;

- (c) There is evidence that natural attenuation is occurring and will continue to occur at a reasonable rate at the site; and
- (d) Appropriate monitoring requirements are adopted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.

WAC 173-340-370(7).

(4) Does Ecology intend to develop model remedies, particularly for cleanup of commercial gas stations?

Pursuant to the recommendations of the MTCA Policy Advisory Committee, Ecology included in the 1999 proposed rule amendment language allowing Ecology to develop model remedies for common categories of facilities, types of contamination, types of media and geographic areas. The administrative mechanism for developing model remedies may vary with the circumstances and may be issued as guidance documents or as future rule amendments.

A number of commenters have expressed an interest in having Ecology exercise its authority under the proposed rule amendments to develop such model remedies. Ecology is committed to beginning such work, as resources permit, once the proposed rule amendment are adopted. The first step will be to identify and prioritize the areas for evaluation. One area of key importance is the development of a model remedy for commercial gas stations. Ecology is committed to developing, in cooperation with interested members of the public, a model remedy for commercial gas stations. Ecology will begin work on this subject soon after adoption of the proposed rule amendments.

Public Notice & Participation

(1) Should the public notice and participation requirements applicable to formal oversight sites also apply to independent cleanups?

Under the current rule, the public notice and participation requirements applicable to formal oversight sites are not applicable to independent cleanups. Several commentors suggested that the public notice and participation requirements applicable to formal oversight sites should be applicable to independent cleanups. In particular, some commentors suggested that Ecology require notification of and opportunity to comment on proposed independent remedial actions before a cleanup is conducted. The MTCA Policy Advisory Committee considered this issue and could not reach a consensus or a broad support recommendation to change the current rule. Based on the lack of consensus or broad support for a particular resolution of this issue, Ecology has decided not to require the application of the public notice and participation requirements applicable to formal oversight sites to independent cleanups.

Ecology, though, reaffirms the amendment proposed in 1999 that increases the instances where it will require public notice of emergency or interim actions required by it as a result of an initial investigation (see WAC 173-340-310(6)(a)). This amendment is based on the recommendations of the MTCA Policy Advisory Committee.

Ecology also reaffirms its authority under the current rule to require persons conducting independent cleanups to take additional remedial actions if Ecology determines such actions are necessary to protect human health and the environment (see WAC 173-340-515(3)). If such actions are required by Ecology, then all of the public notice and participation requirements apply (see WAC 173-340-600).

(2) Should the program support costs associated with a citizen technical advisor that are reasonably attributable to an individual site be recoverable from a potentially liable person?

Some commentors suggested that the program support costs associated with a citizen technical advisor that are reasonably attributable to an individual site should not be recoverable from a potentially liable person. However, all commentors agreed that Ecology should provide technical assistance to interested members of the public who do not have a direct responsibility for the remedial action. Ecology remains committed to the principles of providing the services of a citizen technical advisor to interested members of the public and recovering those remedial action costs, including those program support costs associated with a citizen technical advisor, that are reasonably attributable to individual sites from potentially liable persons (see WAC 173-340-550(2)).

Ecology, however, has changed the manner in which it may recover the costs associated with the citizen technical advisor. Rather than include the costs of the citizen technical advisor as a separate multiplier in the formula for computing hourly rates – as proposed in the 1999 rule amendment, Ecology has instead added the costs to the already-existing Program Support Cost Multiplier (see WAC 173-340-550(2)). This change affects the ability of Ecology, as a practical matter, to recover such costs. Under the rule, this multiplier is not allowed to exceed 1.0 (one). Biennial audit results since the establishment of the Program Support Cost Multiplier have not resulted in any adjustments (increases) in the cost multiplier since actual costs are in excess of 1.0. Hence, any program support costs associated with the citizen technical advisor could only be recovered if the cost multiplier became less than 1.0 (one).

Cleanup Standards – Grandfather Clause

Some commentors suggested that the “grandfather clause,” WAC 173-340-702(12), presents new liability for sites cleaned up under the former cleanup standards, because it reserves the right for Ecology to decide on a case-by-case basis whether a prior cleanup is sufficiently protective. Others thought the concept of grandfathering some sites under the former cleanup standards was inconsistent with the need for new, more stringent standards to protect human health and the environment. They suggested the clause be removed. Still others thought Ecology should apply the cleanup standards in effect when the order or decree was issued requiring the RI/FS rather than when the cleanup action plan is issued.

The grandfather clause was not part of the agreement by the MTCA Policy Advisory Committee (PAC), but was included at the request of business representatives. It does not create any new liability. Under MTCA, unless a site is cleaned up under a consent decree that contains a

covenant not to sue, there is no legal limitation on the State's ability to require further cleanup in the future. Thus there is no limit on the State's authority to require further cleanup at independent sites or sites cleaned up under an order. Even for sites cleaned up under a consent decree that contains a covenant not to sue, the law requires that the covenant include a "reopener" that allows the State to require further cleanup if the State discovers factors that were not known at the time the consent decree was entered and that present a previously unknown threat to human health or the environment. RCW 70.105D.040(4)(c). The grandfather clause does not, and legally cannot, change these requirements in the cleanup statute.

The grandfather clause does provide some certainty as to the cleanup standards Ecology will use when evaluating sites that are in the remediation process when the new rules take effect. Ecology believes the rule is beneficial to parties conducting cleanup, and has therefore chosen not to remove the clause. The language reserving Ecology's right to require more cleanup if Ecology determines, on a case-by-case basis, that the prior cleanup is no longer sufficiently protective, is necessary in order for the rule to be consistent with the statute. As noted above, the cleanup law prohibits Ecology from agreeing that it will never require further cleanup at a site. That does not mean that Ecology will or must require more cleanup at all sites where the new standards might apply. For example, a prior cleanup may have resulted in contaminated soil being contained on site. If the new, more stringent cleanup standard is for protection of the direct contact pathway, Ecology may determine that the containment remedy is still protective of that pathway, even if the new cleanup standard is applied. Therefore Ecology would not require any additional cleanup at that site.

Ecology is also retaining the provision that for cleanups overseen by Ecology, the agency will use the cleanup standards in effect on the date of issuance of the final cleanup action plan. Most cleanups are conducted under a consent decree. MTCA requires Ecology to find that a cleanup under a consent decree will be in compliance with cleanup standards. RCW 70.105D.040(4)(a). Ecology believes that approving cleanups under cleanup standards that Ecology knows would not be protective of human health or the environment is inconsistent with the goals of MTCA. Persons conducting cleanups have been aware for some time of many of the proposed changes to the cleanup standards, and some have already attempted to incorporate the proposed new standards into their cleanup process. Further, application of the new standards will not always require that the remedial investigation or feasibility study be redone. Whether additional work will be necessary depends on the facts in any given case.

Cleanup Standards – Land Use

Proposed WAC 173-340-708(3)(d)(ii) allows only residential and industrial land uses to be used as the basis for a reasonable maximum exposure scenario (RME) for purposes of establishing a cleanup level. Other land uses, such as commercial, recreational, and agricultural, may be used to establish a remediation level as part of remedy selection, but not a cleanup level. Several commenters suggested this language was inconsistent with the recommendations of the MTCA Policy Advisory Committee (PAC). Ecology believes its proposal is consistent with the PAC recommendations, based on Ecology's involvement in the PAC process, discussions with other PAC members, and on the language of the PAC Report.

The PAC intended that the parameters that could be modified in developing a cleanup level were those that did not depend on human behavior but could be reliably measured at the site. See PAC Report at pp. 24, C-9, C-10. The PAC Report specifically states:

The use of alternative RME scenarios allows elimination of separate 'commercial site cleanup levels' under the old MTCA. It allows tailoring an appropriate commercial RME scenario, recreational RME scenario, or 'urban residential' RME scenario for calculation of Method B *remediation levels* appropriate to specific sites. (Emphasis added.)

PAC Report at p. 25. This is consistent with the December 10, 1996 memorandum from Pete Kmet (PAC Report at p. C-12-15), which "reflects PAC recommendations on land use considerations within the new requirements outlined in revised MTCA sections -702 and -708." PAC Report at p. 25. Although parts of that memo on issues other than land use were not incorporated into the PAC recommendation (e.g., rule making, level of risk, values in table A), the PAC specifically indicated that the memo reflected its recommendations on land use.

Although they may not be used to set a cleanup level, land uses such as commercial or recreational may be used in remedy selection. For example, if containment is the proposed remedy for contaminated soil at a commercial site, the RME scenario for evaluating the protectiveness of the containment system for the direct contact pathway could be changed from a child living on the site to a maintenance worker or child trespasser. See WAC 173-340-708(3)(d)(ii), (iii).

Cleanup Standards – Method A

(1) Which Method A cleanup levels have changed and what is the basis for those changes?

Some of the Method A cleanup levels for soil and ground water identified in WAC 173-340-900 in Tables 720-1, 740-1, and 745-1 have changed since the 1999 proposed rule amendments. The basis for each of these changes and the resulting cleanup levels are provided in the applicable footnotes located at the end of each Method A table.

The following Method A ground water cleanup levels have changed (see Table 720-1):

- Benzo(a)pyrene
- Lead

The following Method A soil cleanup levels (both for unrestricted land uses and for industrial properties) have changed or been added (see Tables 740-1 and 745-1):

- Benzene
- Benzo(a)pyrene
- Cadmium
- DDT
- Ethylene dibromide (EDB)
- Lindane

- MTBE [NEW]
- Naphthalenes [NEW]
- TPH – Gasoline
- 1,1,1 Trichloroethane

Further explanation of the basis for including MTBE in the Method A tables for soil is provided below. Further explanation of the basis for changing the benzene and gasoline soil cleanup levels is also provided below.

(2) Should MTBE be tested for in soil contaminated with gasoline mixtures? Should soil cleanup levels for MTBE be established where soil has been contaminated with MTBE?

The 2000 proposed rule amendments include Method A cleanup levels for MTBE for both soil and ground water (see Tables 720-1, 740-1 and 745-1 in WAC 173-340-900). The Method A ground water cleanup level is based on the federal drinking water advisory level, as recommended by the Duwamish Coalition's TPH Project Oversight Group (POG). The Method A soil cleanup levels are based on the protection of ground water for drinking water use, using the procedures described in WAC 174-340-747(4).

The 2000 proposed rule amendments also require the analysis of both soil and ground water for MTBE whenever a gasoline mixture is the contaminant (see Table 830-1 in WAC 173-340-900). Ecology expects the cost of the additional analysis to be minimal since samples can be tested for MTBE at the same time as they are tested for benzene.

These amendments are based on the common occurrence of MTBE in gasoline that has been sold in Washington State and the risk that MTBE poses to human health.

MTBE (methyl tertiary-butyl ether) is a fuel blending oxygenate used to raise the octane rating of gasoline and/or to reduce hydrocarbon emissions. The POG has identified MTBE as an "indicator chemical" for TPH. MTBE is a troublesome chemical that has been widely used in gasoline in the United States and has contaminated ground water in numerous places. Because MTBE is very water soluble and stable, gasoline mixtures containing MTBE that are released into the soil can easily contaminate ground water with MTBE. Since gasoline sold in Washington State was not known to include MTBE as an oxygenate (unlike many other states), it was assumed that the State of Washington had little reason to worry about this compound. However, Ecology has recently completed a survey of ground water at sites throughout the state contaminated with gasoline and discovered MTBE. The reasons for this are unclear. However, the presence of MTBE in gasoline sold in Washington State might have resulted from its use as an octane booster or from cross-contamination with gasoline from other states. Ecology anticipates that a report containing the results of this survey will be published this fall.

(3) Why have the Method A soil cleanup levels for benzene and gasoline changed?

The current Method A soil cleanup levels for gasoline (100 mg/kg) and benzene (0.5 mg/kg), a component of gasoline, are based on protection of ground water for drinking water use. These

values were established by multiplying the ground water cleanup level by 100, an approach that Ecology has determined to not be scientifically valid based on a review of new scientific and technical information. Under the 1999 proposed rule amendments, Ecology replaced this methodology with two fate and transport models. For a more complete discussion of the basis for this change, please refer to the discussion below under Soil Cleanup Standards – Soil to Ground Water Exposure Pathway. Use of these models resulted in more stringent Method A soil cleanup levels for gasoline and benzene. Several commentors suggested that these proposed cleanup levels were not justified. Based on the comments received, Ecology conducted a further extensive review of available site data and the models used to derive soil cleanup levels for benzene and gasoline.

That review resulted in the following findings and conclusions:

- The current gasoline TPH soil cleanup level of 100 mg/kg is protective of ground water in situations where the gasoline was released some years ago or has been subject to in-situ treatment processes and is present in the soil in a highly weathered state (benzene and most of the lighter aromatic fractions are no longer present in the soil).
- The proposed gasoline TPH soil cleanup level of 30 mg/kg is protective of ground water for the gasoline compositions seen at most sites (typical benzene soil concentrations of 0.1%)
- The current benzene soil cleanup level of 0.5 mg/kg is not protective of ground water and should be lowered to 0.03 mg/kg. *Please note that this value is lower than the value of 0.1 mg/kg proposed in 1999. The benzene soil cleanup level of 0.1 mg/kg proposed in 1999 is not correct and resulted from an incorrect application of the model.*

In accordance with these findings, Ecology is proposing to establish two separate Method A soil cleanup levels for gasoline (100 mg/kg and 30 mg/kg). In summary, if the gasoline mixture does not contain benzene and consists of no more than 20% aromatic hydrocarbons between EC 8 and EC 16, then the higher value of 100 mg/kg may be used. The lower value of 30 mg/kg can be used at any site. When using this lower value, the soil must also be tested for and meet the benzene soil cleanup level. See Tables 740-1 and 745-1 and the applicable footnotes in WAC 173-340-900 for a more detailed description of the proposed rule provisions.

(4) Has Ecology reviewed and evaluated the findings and conclusions of recent scientific studies regarding the fate and transport of benzene and gasoline?

Ecology has reviewed and evaluated several scientific and technical studies regarding the fate and transport of hazardous substances, including the 1995 study by the Lawrence Livermore National Laboratory (LLNL) and the 1997 study by the Bureau of Economic Geology at the University of Texas. The Lawrence Livermore study evaluated over 1,200 leaking fuel tank sites in California. Since most of those sites did not have ground water monitoring wells defining the full extent of the ground water contamination, the study attempted to predict the movement of benzene into and down gradient with the ground water using modeling. This modeling showed that most sites would have plumes of benzene extending several hundred feet in the ground water beyond the source. Some sites would have more extensive plumes. The California

Environmental Protection Agency (CAL/EPA) then made a policy decision about how many of the tank sites in the state would not require ground water cleanup based on (1) estimated plume lengths, (2) how much degradation of benzene should occur, and (3) the likelihood of a receptor well. This decision was an administrative policy decision made by CAL/EPA, not a technical or scientific judgment made by the Lawrence Livermore National Laboratory.

Ecology has concerns about the reliance by CAL/EPA on (1) a threshold for benzene twice the drinking water standard; (2) an analysis limited to benzene that does not take into account additives like MTBE; (3) the process of degradation; and (4) the assumption that ground water in the vicinity of petroleum contaminated sites will not be used.

Both the Lawrence Livermore National Laboratory and the CAL/EPA have since explained that their work has often been taken out of context and is incomplete. The California Legislature also formed a Scientific Advisory Committee to provide advice on cleanup requirements (see SB 1764 Advisory Committee). In a "Revised January 1997" CAL/EPA Fact Sheet (<http://www.calepa.ca.gov/Publications/FactSheets/1997/ustfs.htm>), CAL/EPA states: "They concluded that the LLNL report unrealistically minimizes the magnitude of the Leaking Underground Fuel Tank (LUFT) problem."

The similar 1997 study by the Bureau of Economic Geology at the University of Texas also shows that benzene will degrade in ground water. However, this study has the same limitations as discussed above for the LLNL study.

Ground Water Cleanup Standards

(1) Presumption of and protection of potable ground water (drinking water beneficial uses)

The 2000 proposed rule amendments retain the approach adopted in the current rule and reaffirmed in the 1999 proposed rule amendments. Under WAC 173-340-720(2), ground water is classified as potable for protection of drinking water beneficial uses unless it can be demonstrated that the ground water is not potable. The requirements and criteria for making that demonstration are provided in WAC 173-340-720(2). If that demonstration cannot be made, then ground water cleanup levels must be established under WAC 173-304-720(3), (4) or (5), as applicable, to protect drinking water beneficial uses. If that demonstration can be made, then ground water cleanup levels may be established under WAC 173-340-720(6) to protect beneficial uses other than drinking water.

As explained in WAC 173-340-720(1), ground water cleanup levels must 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. Ecology is not proposing to change the current rule language stating that at most sites use of ground water as a source of drinking water is the highest beneficial use requiring the highest quality of ground water and that exposure to hazardous substances through ingestion of drinking water represents the reasonable maximum exposure.

Some commentors expressed the opinion that ground water cleanup levels should not be established to protect drinking water beneficial uses at commercial and industrial sites. Ecology disagrees. This is an issue that was discussed during the deliberations of the MTCA Policy Advisory Committee and there was no recommendation made to change the current rule. Further, such a change would not meet MTCA's goals of protecting human health and the environment. Ground water cleanup levels are based on the potential productivity of the aquifer underlying a site, independent of the surface land use. Contrary to the suggestion by some commentors, many commercial and industrial areas throughout the state are underlain by highly productive aquifers. Examples include the Airdustrial Park area in Tumwater, the Nalley Valley in Tacoma, Ponders Corner in Lakewood, the Spokane Valley sole source aquifer, and municipal water supply wells for the Cities of Vancouver, Richland and Union Gap. This is also apparent from the number of public water systems that have become contaminated by nearby industrial and commercial sites. For these reasons, the proposed rule retains the approach adopted in 1991 as part of the current rule.

The MTCA Cleanup Regulation does provide, however, a level of flexibility in establishing ground water cleanup levels by allowing the establishment of cleanup levels to protect beneficial uses other than drinking water if certain conditions are met (see WAC 173-340-720(1-2)). This flexibility and these conditions, however, pertain to the potentially affected ground water, not the surface land use.

Moreover, even if ground water is classified as a potential future source of drinking water under WAC 173-340-720(2), Ecology recognizes that there may be sites where there is an extremely low probability that the ground water will be used for that purpose because of the site's proximity to surface water that is not suitable as a domestic water supply. An example of this situation would be the shallow ground waters in close proximity to marine waters such as on Harbor Island in Seattle. At such sites, Ecology may allow ground water to be classified as nonpotable for the purposes of WAC 173-340-720 if each of the stated conditions can be demonstrated. This scenario is defined in the current rule and has been reaffirmed in the proposed rule amendments (see WAC 173-340-720(2)(d)).

(2) Protection of nonpotable ground water

If the ground water is not classified as potable under WAC 173-340-720(2), then cleanup levels must be established under WAC 173-340-720(6) to protect beneficial uses other than drinking water. Subsection (6) was previously numbered as subsection (7) under the 1999 proposed rule amendments. The language in subsection (6) has also been substantially revised to improve the clarity of the rule.

Under WAC 173-340-720(6), as proposed, cleanup levels must be established in accordance with either of the following:

- the methods specified in WAC 173-340-720(3), (4) or (5), as applicable, for protection of drinking water beneficial uses; or
- a site-specific risk assessment as provided for under WAC 173-340-720(6)(c) for protection of other ground water beneficial uses.

(3) Protection of surface water

WAC 173-340-720 has been reorganized to clarify how the protection of surface water is accounted for in the establishment of ground water cleanup levels. Subsection (6), as proposed in the 1999 rule amendments, has been deleted. The concept of protecting surface water has been incorporated into revised subsections (4-6) (see subsections (4)(b)(ii), (5)(b)(ii), and (6)(c)(I)(E)). Specifically, the amendments provide that ground water cleanup levels must be as stringent as the concentrations established in accordance with the methods specified in WAC 173-340-730 for protecting surface water beneficial uses, unless it can be demonstrated that the hazardous substances are not likely to reach surface water. This demonstration must be based on factors other than implementation of a cleanup action at the site.

Soil Cleanup Standards – Soil to Ground Water Exposure Pathway

(1) How may the soil-to-ground water exposure pathway be evaluated under WAC 173-340-747?

The 1999 proposed rule amendments contained a new section, WAC 173-340-747, that set forth the requirements and procedures for evaluating the soil-to-ground water exposure pathway. Ecology has reviewed and carefully considered comments on these proposed amendments and remains committed to the general proposal set forth in the 1999 proposed rule amendments. However, Ecology has eliminated the distinction between standard and modified methods for evaluating the soil-to-ground water exposure pathway. Hence, any of the methods specified in WAC 173-340-747, as applicable, may be used to make the necessary evaluations.

Ecology has also made several organizational changes and language revisions to the 1999 proposal that are intended to respond to comments requesting further clarification of the requirements and procedures set forth in WAC 173-340-747. The following discussion provides a brief overview of the organizational changes.

WAC 173-340-747(2) sets forth the general requirements (criteria) that soil concentrations must meet for those concentrations to be considered protective of human health. First, the soil concentrations must not cause an exceedance of the ground water cleanup levels established under WAC 173-340-720. To determine if this criterion is met, one of the methodologies specified in subsections (4) through (9) must be used. Second, to ensure that the first criterion is met, the soil concentration must not result in the accumulation of free product on or in ground water. To determine if this criterion is met, one of the methodologies specified in subsection (10) must be used.

WAC 173-340-747(3) provides an overview of the methods specified in subsections (4) through (10) for deriving soil concentrations that meet the criteria specified in subsection (2). Certain methods are tailored for particular types of hazardous substances or sites. Certain methods are more complex than others and certain methods require the use of site-specific data. The specific requirements for deriving a soil concentration under a particular method may also depend on the hazardous substance.

WAC 173-340-747(4) through (10) specifies the procedures and requirements for establishing soil concentrations that meet the criteria specified in subsection (2) under each of the specified methodologies.

(2) Why did Ecology replace the “100 X ground water” methodology with fate and transport models to evaluate the soil-to-ground water exposure pathway?

Evaluation of the soil-to-ground water exposure pathway requires a determination that the soil concentration will not cause an exceedance of the ground water cleanup level established under WAC 173-340-720. Under the current rule, soil concentrations that meet this requirement are determined by multiplying the ground water cleanup level by 100. Under the 1999 proposed rule amendments, Ecology replaced this methodology with fate and transport models. The proposed Method A soil cleanup levels were established by evaluating of each of the exposure pathways, including the soil-to-ground water pathway. The Method A soil cleanup levels that are based on the protection of ground water are identified in the footnotes following Tables 740-1 and 745-1 in WAC 173-340-900.

Several commentors suggested that Ecology retain the old methodology of evaluating the soil-to-ground water exposure pathway by multiplying the ground water cleanup level by 100. Ecology disagrees. The methodology proposed by Ecology more accurately quantifies the risk posed to ground water by hazardous substances within the soil and hence more accurately ensures the protection of human health. This amendment attempts to combine the goals advanced by the MTCA Policy Advisory Committee of creating a rule that achieves a level of simplicity combined with a level of human health and environmental protection consistent with advances in scientific information.

The proposal to replace the old “100 X ground water” model with the more accurate chemical and site-specific fate and transport models is based on an extensive review of new scientific and technical information. Although the 100 X ground water model was based on the best scientific and technical information available at the time, the old model does not adequately account for site or chemical-specific factors that control the movement of hazardous substances from soil into water. The movement of hazardous substances from soil into water is primarily controlled by two factors: the soil properties and the hazardous substance water solubility.

For example, some hazardous substances like benzene are relatively soluble in water. When gasoline is released to the soil, benzene will immediately start to partition from the gasoline into water that is held within the soil pores. The 100 X ground water model does not adequately account for this mobility. All hazardous substances are treated the same, even if some are more mobile than others. Consequently, for hazardous substances that are highly mobile (e.g., benzene, gasoline and chlorinated organics), the 100 X model will predict a soil concentration that is too high and consequently not sufficiently protective of human health. Conversely, for hazardous substances that are less mobile (e.g., PCBs, metals and heavier petroleum products), the 100 X model will predict a soil concentration that is too low.

Based on new scientific and technical information developed since the adoption of the 100 X ground water methodology in 1991, Ecology developed two fate and transport models to account for the way hazardous substances behave when they are released to the soil. These models apply the same principle of equilibrium partitioning used for evaluating the leaching pathway in the ASTM Risk-Based Corrective Action protocol and the U.S. Environmental Protection Agency's Soil Screening Guidance. The 3-phase model accounts for partitioning of hazardous substances between the water, air and solid phases of a soil. The 4-phase model accounts for partitioning between these same phases plus includes a non-aqueous liquid phase, a phase that commonly occurs when organic chemicals such as petroleum products are released to soils. Both of these models were subject to rigorous review by the MTCA Science Advisory Board and its Fate and Transport Subcommittee, which included members from the private consulting community and the University of Washington and Washington State University. Assumptions used in these models include extensive information extracted from the literature as well as information from contaminated sites in Washington State.

Soil Cleanup Standards – Dermal Exposure Pathway

(1) Should the dermal exposure pathway be evaluated when establishing soil cleanup levels?

Several commentors expressed the opinion that the quality of information used to evaluate the dermal exposure pathway is insufficient and that the uncertainties associated with the dermal exposure pathway preclude its use in establishing soil cleanup levels. Ecology disagrees. Over a period of several years, extensive scientific and technical documentation regarding the dermal exposure pathway and the uncertainties associated with its assessment was evaluated by Ecology, the Washington State Department of Health, and the U.S. Environmental Protection Agency. The proposed rule amendments pertaining to the dermal exposure pathway and the documentation supporting those amendments were reviewed by the MTCA Science Advisory Board. This documentation meets the technical standards for peer-reviewed guidance and technical literature.

Exposure from direct contact to contaminants in soil occurs through both the oral and dermal routes. Uncertainties exist when evaluating either of these routes and are associated with both the exposure and toxicity components of any health risk assessment. In considering the uncertainty associated with these components, Ecology evaluated a substantial amount of peer-reviewed guidance and technical literature. Ecology provided this information to the Science Advisory Board through a series of technical memoranda (dated 4/29/98, 1/25/99, 3/26/99, and 1/12/00). Both those memoranda and the supporting documents cited in those memoranda are on file with the Department of Ecology. The uncertainties associated with the assessment of the dermal exposure pathway were well characterized and extensively discussed before the Science Advisory Board. For example, dermal and oral toxicity estimates are associated with adverse systemic effects and do not account for chemical toxicity at the skin surface. The lack of information to characterize or quantitatively evaluate toxic effects at the skin surface results in the underestimation of this type of hazard. The uncertainty associated with the evaluation of the dermal exposure pathway is comparable to the uncertainty associated with the evaluation of other exposure pathways and is technically acceptable.

(2) Under what circumstances must the dermal exposure pathway be evaluated when establishing soil cleanup levels?

Several commentors expressed confusion regarding the circumstances under which the dermal exposure pathway must be evaluated. Under the proposed rule amendments, the dermal exposure pathway must be evaluated concurrently with the ingestion exposure pathway for all sites contaminated with petroleum mixtures. For all other contaminated sites, a concurrent exposure evaluation (dermal + ingestion) must be conducted only if the proposed changes to the default assumptions in the standard Method B or standard Method C equations would result in a significantly higher soil cleanup level than would be calculated without the proposed changes. This amendment attempts to combine the goals advanced by the MTCA Policy Advisory Committee of creating a rule that achieves a level of simplicity combined with a level of human health and environmental protection consistent with advances in scientific information.

Soil Cleanup Standards – Vapor Exposure Pathway

(1) Should the vapor exposure pathway be evaluated when establishing soil cleanup levels?

Several commentors expressed the opinion that the vapor exposure pathway should not be evaluated when establishing soil cleanup levels. Ecology disagrees. Evaluation of the vapor exposure pathway for protection of both ambient and indoor air is already required under certain circumstances under the current rule. See WAC 173-340-740(3)(a)(iv) and (4)(b)(iv) and WAC 173-340-740(3)(b)(iv) and (4)(b)(iv) in the current rule. The amended rule does not change how the pathway is evaluated; rather, the amended rule only changes the circumstances for requiring an evaluation of the pathway. Furthermore, the amended rule does not mandate the use of any particular methodology for evaluating the pathway, if an evaluation is required. The trigger for evaluating the vapor exposure pathway was amended after exhaustive technical reviews and public meetings. This amendment attempts to combine the goals advanced by the MTCA Policy Advisory Committee of creating a rule that achieves a level of simplicity combined with a level of human health and environmental protection consistent with advances in scientific information.

Consideration of the soil vapor exposure pathway was initiated by the Duwamish Coalition's TPH Project Oversight Group (POG) as part of the process to better evaluate petroleum contaminated sites. Prior to engaging in any technical reviews or evaluations, the POG held several public meetings with different stakeholders in April 1996 to help identify relevant issues and advance a better understanding by the public and POG participants of unresolved technical issues. Recognition of the vapor exposure pathway evolved from this process and stimulated additional technical evaluation by the POG participants. After the initial evaluation of the vapor exposure pathway by the POG, Ecology began an evaluation of different types of air/vapor models suitable to determine soil cleanup levels protective of the indoor and ambient air environments. Model evaluation and selection required the involvement of several state and federal agencies, including the U.S. Environmental Protection Agency, the Pollution Liability Insurance Agency, and the Department of Ecology. This effort also included close consultation with several technical experts from the petroleum industry. This process culminated in several

MTCA Science Advisory Board reviews that refined the procedures to evaluate the vapor exposure pathway.

(2) Under what circumstances must the soil vapor exposure pathway be evaluated when establishing soil cleanup levels?

Several commentors expressed confusion regarding the circumstances under which the vapor exposure pathway must be evaluated. During the process of deriving a methodological approach for evaluating the vapor exposure pathway, exhaustive consideration was given to when the vapor pathway should be evaluated. After numerous technical reviews by the MTCA Science Advisory Board and in consultation with representatives from state and federal agencies and the petroleum industry, Ecology developed general criteria for determining when to conduct an evaluation of the vapor exposure pathway. In general, the criteria identify those situations where the vapor exposure pathway, rather than the soil ingestion or the soil-to-ground water exposure pathways, becomes the most significant exposure pathway (the exposure pathway of concern). The following discussion provides an overview of those criteria.

The applicability of the vapor pathway evaluation is defined in WAC 173-340-740(3)(c)(iv)(A) for Method B (soil cleanup levels for unrestricted land use) and in WAC 173-340-745(5)(c)(iv)(A) for Method C (soil cleanup levels for industrial land use). Specifically, these proposed rule amendments provide the following:

The soil to vapor pathway shall be evaluated whenever the proposed changes to the [standard equations] or default values would result in a significantly higher soil cleanup level than would be calculated without the proposed changes. The soil to vapor pathway shall also be evaluated whenever one of the methods specified in WAC 173-340-747(5) through (9) is used to derive a soil concentration that is protective of ground water and that concentration is significantly higher than a concentration derived under the method specified in WAC 173-340-747(4). Evaluation of soil vapors shall also be required under the following specific situations:

- (I) For petroleum distillates containing less than eight percent (8%) volatile constituents by weight (such as diesel range organics), the indoor air pathway shall be evaluated whenever soil cleanup levels exceed 10,000 mg/kg within one foot of: The wall of a structure; bottom slab of a structure; or, conduit that could facilitate transport to a structure.
- (II) When the soil cleanup level for a volatile hazardous substance is based on protection of ground water for nonpotable use and the ground water cleanup level is established using a site-specific risk assessment under WAC 173-340-720(6)(c).

WAC 173-340-740(3)(c)(iv)(A) and 173-340-745(5)(c)(iv)(A).

Soil Cleanup Standards – Terrestrial Ecological Evaluation

The 1999 proposed rule amendments contained new sections that set forth the requirements and procedures for the protection of terrestrial ecological receptors (see WAC 173-340-7490 through 173-340-7494). Ecology has reviewed and carefully considered comments on these proposed amendments and remains committed to the proposal set forth in the 1999 proposed rule amendments. Based on the comments received, however, Ecology has made some changes to the 1999 proposal that are intended to respond to comments requesting further clarification of the requirements and procedures. Ecology has also removed the requirement of institutional controls to end the terrestrial ecological evaluation under WAC 173-340-7492(2)(a)(i) if the area of soil contamination is not more than 350 square feet (see WAC 173-340-7492(3)). This proposed change eliminates the need for a homeowner under this criteria to place an institutional control on a piece of property with a leaking home heating oil tank to protect terrestrial ecological receptors.

Air Cleanup Standards

- (1) **Should air cleanup standards apply to concentrations of hazardous substances in the air originating from an industrial or commercial process or operation? Should air cleanup standards apply to concentrations of hazardous substances in the air originating from an off-site source?**

The 1999 proposed rule amendments provided in WAC 173-340-750(1)(a) that:

This section applies whenever it is necessary to establish air cleanup standards to determine if air emissions at a site pose a threat to human health or the environment. It applies to ambient (outdoor) air and air within any building, utility vault, manhole or other structure large enough for a person to fit into.

Several commentors questioned whether this section applied to air originating from an industrial or commercial process or operation that was already subject to the regulatory provisions of the Occupational Safety and Health Act (OSHA) and the Washington Industrial Safety and Health Act (WISHA) that regulate indoor air for the purpose of protecting occupational health and safety. Other commentors questioned whether this section applied to hazardous substances originating from off-site sources. To address these concerns, Ecology has introduced the following qualifications on the applicability of WAC 173-340-750:

This section does not apply to concentrations of hazardous substances in the air originating from an industrial or commercial process or operation or to hazardous substances in the air originating from an off-site source. This section does apply to concentrations of hazardous substances in the air originating from other contaminated media or a remedial action at the site.

WAC 173-340-750(1)(a). These limitations on the applicability of WAC 173-340-750 recognize a level of contribution by the operating processes of industrial and commercial facilities to an indoor air environment that are regulated by OSHA and WISHA standards. These limitations

also recognize a level of contribution by off-site sources. However, contributions to the indoor air environment from contaminated media and remedial action at the site are recognized and should be addressed under MTCA.

(2) Why has Ecology eliminated Method A as an option for establishing air cleanup levels?

Several commentors noted that the use of Method A to establish air cleanup levels would most often result in the establishment of cleanup levels based on background values or values based on analytical measurements because there are no Method A table values and few ambient air standards established under state and federal law. While this outcome was not an intended result of the rule language, Ecology generally agrees with the conclusion reached by the commentors. Method B and Method C, on the other hand, provide a systematic approach for establishing air cleanup levels that also requires application of any concentrations established under applicable state and federal laws. For these reasons, Ecology is proposing to eliminate Method A as an option for developing air cleanup levels. See WAC 173-340-750(2).