Model Toxics Control Act Proposed Rule Amendments

Final Environmental Impact Statement

January 24, 2001

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STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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January 24, 2001

Dear Interested Persons:

The Department of Ecology (Department) has proposed amendments and new sections to the Model Toxics Control Act (MTCA) Cleanup Rule (Chapter 173-340 WAC), the Public Participation Grant Rule (Chapter 173-321 WAC), and the Remedial Action Grant Rule (Chapter 173-322 WAC). A draft Environmental Impact Statement (EIS) was issued in December 1999 for a 60-day comment period. This final EIS reflects departmental consideration of comments received on the draft EIS.

The purpose of this final EIS is to identify key, adverse, environmental issues that may result from these proposed rule amendments. These amendments would apply to sites across the state being cleaned up under the Model Toxics Control Act.

The Department evaluated these amendments and identified four major issue areas for further analysis. These four areas, listed below, appeared to have the potential for probable significant adverse environment impacts.

- Using Site-Specific Risk Assessments (including non-petroleum Method A table changes)
- Dealing with Petroleum Contamination (including petroleum related Method A table changes)
- Evaluating Terrestrial Ecological Risks at Cleanup Sites
- Enhancing the Remedy Selection Process

No additional significant issues pertaining to the three rules were identified as a result of the scoping process or the public comment period for the draft EIS. Therefore, the focus of this final EIS is to analyze the four preceding issues as they pertain to the proposed MTCA rule amendments.

Comments on the draft EIS and departmental response to those comments are provided in Appendix C of this publication. The Department will provide a separate concise explanatory statement, available at the time of rule adoption, for all non-EIS related comments submitted on the proposed rule revision.

The Department appreciates the contributions made by the reviewers of this EIS.

Sincerely,

James J. Pendowski, Manager
Toxics Cleanup Program

FACT SHEET

The State Environmental Policy Act requires that an Environmental Impact Statement be prepared for rulemaking with probable significant adverse impacts to the environment. This fact sheet briefly describes the 1999/2000 proposed amendments to three rules related to the cleanup of contaminated sites under the Model Toxics Control Act Cleanup Rule (MTCA).

Description of Proposal

The proposed action discussed in this document is to adopt amendments to the Model Toxics Control Act Cleanup Rule (Chapter 173-340 WAC), the Public Participation Grant Rule (Chapter 173-321 WAC), and the Remedial Action Grant Rule (Chapter 173-322 WAC). These amendments would apply to sites across the state being cleaned up under the Model Toxics Control Act.

Ecology evaluated these amendments and identified four major issue areas for further analysis that appeared to have the potential for probable significant adverse environment impacts. No additional significant issues pertaining to the three rules were identified as a result of the scoping process. Therefore, the focus of this Environmental Impact Statement is on analysis of issues noted in the scoping notice as they pertain to the proposed MTCA rule amendments.

Alternatives

Four alternatives were evaluated in this Final Environmental Impact Statement:

1) The NO ACTION alternative - (existing MTCA unchanged) The no action alternative would result in no changes to the MTCA rule.

2) The PROPOSED ACTION alternative - MTCA after the proposed amendments are adopted.

3) The POLICY AND GUIDANCE ACTION alternative - Additional MTCA policy and guidance developed based on advisory committee recommendations. (eliminated after limited analysis).

4) The Association of Washington Businesses proposed alternative – Alternatives proposed by the Association of Washington Businesses (eliminated after limited analysis).

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Subsequent Environmental Review:	On cleanup actions for individual sites as required for compliance with SEPA.
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Rule implementation date expected in August, 2001

Bibliographical materials available at address above.

Introduction to Format of Final EIS

In order to produce a readable document and to identify areas where updates were made to the Final EIS from the Draft EIS, changes are reflected in the following manner:

1. Underlined text reflects changes where insertions were made or, insertions and deletions both were made. By eliminating the strike-out (crossed out) text, the document is intended to be more readable. Please refer to the Draft EIS for comparison if desired.

2. Strike-out text, indicating a text deletion, was retained where no insertions were made.

3. Tables indicating value changes reflect both insertions and deletions.

4. Stylistic and grammatical corrections are not highlighted in the text.

5. The responsiveness portion of the document, Appendix C, is newly added and therefore shows no highlighting.

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LIST OF ACRONYMS

ASTM	American Society for Testing Materials
CPF	Cancer Potency Factor
DDT	dichlorodiphenyltrichloroethane
Ecology	Washington State Department of Ecology
EDB	ethylene dibromide
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESHB	Engrossed Substitute House Bill
GI	Gastrointestinal
HEAST	Health Effects Assessment Summary Tables
IRIS	Integrated Risk Information System
mg/kg	milligrams per kilogram (parts per million)
MTBE	methyl tertiary butyl ether
MTCA	Model Toxics Control Act
NAPL	Non-Aqueous Phase Liquid
NCEA	National Center for Environmental Assessment
PAC	Policy Advisory Committee
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
RBCA	Risk-based Corrective Action
RCW	Revised Code of Washington
Rfd	Reference dose
TPH	total petroleum hydrocarbons
ug/l	micrograms per liter (parts per billion)
WAC	Washington Administrative Code
WET	Whole Effluent Toxicity

SUMMARY

PURPOSE AND NEED

The Washington State Department of Ecology (Ecology) is proposing to adopt amendments to the Model Toxics Control Act (MTCA) Cleanup Rule (Chapter 173-340 WAC), the Public Participation Grant Rule (Chapter 173-321 WAC), and the Remedial Action Grant Rule (Chapter 173-322 WAC).

These amendments reflect changes developed through a negotiated rulemaking process that took several years to accomplish. Negotiated rulemaking is an approach that allows interest groups, people who may be affected by the rule, agency staff, and others to work together to make changes to a rule. The purpose of the proposed rule amendments is to make these rules easier to understand, be consistent with new scientific information, and be reflective of departmental policies. Several policy changes recommended by various advisory groups and committees are included.

Ecology has developed these amendments in response to the need to:

- Implement recommendations received from the MTCA Policy Advisory Committee. This committee was mandated by Engrossed Substitute House Bill 1810 from mid-1995 to December 1996.
- Implement recommendations from the MTCA Science Advisory Board.
- Meet the requirement in WAC 173-340-702(3) that Ecology review and, as appropriate, update the rule every five years. This includes updating the rule to reflect changes in other laws and incorporate new scientific information.
- Incorporate existing Department policies into the rule, as required by the Administrative Procedures Act (RCW 34.05.230(8)).
- Clarify and improve the readability of the current rule.
- Respond to public comments on earlier drafts of the proposed amendments.

ROLE OF NON-PROJECT (PROGRAMMATIC EIS)

The State Environmental Protection Act requires that an Environmental Impact Statement (EIS) be prepared for proposed rulemaking or other major action with probable significant adverse impacts on the quality of the environment. This final EIS (FEIS) analyzes the areas that were identified as potentially significant, which, upon

further review were determined not likely to constitute a probable significant adverse environmental impact.

SCOPE

Ecology issued a Determination of Significance and a request for comments on the scope of the EIS in April 1999. In that notice, Ecology identified the rules under amendment and issue areas in the proposed amendment that it intended to review in order to determine whether the changes posed a significant probable adverse environmental threat.

The four changes summarized below were determined to be significant issues and are analyzed in detail:

- Use of Site-Specific Risk Assessments (including non-petroleum Method A table changes).
- A Strategy for Dealing with Petroleum Contamination (including petroleum-related Method A table changes).
- Evaluating Terrestrial Ecological Risks at Cleanup Sites.
- Enhancing the Remedy Selection Process.

ALTERNATIVES

The alternatives evaluated in this Final EIS are:

- No action alternative (existing MTCA unchanged) The no action alternative would result in no changes to the MTCA rule.
- Proposed action (adoption of the proposed rule amendment)
- Policy and Guidance action alternative. Additional policy and guidance developed based on advisory committee recommendations. (eliminated after limited analysis).
- A draft rule submitted by the Association of Washington Businesses in October 2000 (eliminated after limited analysis.)

IMPACTS

In the scoping and evaluation process, Ecology determined the elements of the environment that might be adversely impacted are: soil, ground water, surface water, air, human health, plants and animals, and land and water use.

The analysis of impacts in this EIS concluded that there were no probable significant adverse environmental impacts that were not mitigated as part of the proposed action.

1.0 INTRODUCTION

The Washington State Department of Ecology (Ecology) is proposing to adopt amendments to the Model Toxics Control Act (MTCA) Cleanup rule (Chapter 173-340 WAC), the Public Participation Grant rule (Chapter 173-321 WAC), and the Remedial Action Grant rule (Chapter 173-322 WAC).

These amendments reflect changes developed through a negotiated rulemaking process that has taken several years to accomplish. Negotiated rulemaking is an approach that allows interest groups, people who may be affected by the rules, agency staff, and others to work together to make changes to the rules.

1.1 PURPOSE AND NEED

The purpose of the proposed amendments is to make these rules easier to understand, increase flexibility for using site-specific information in cleanup decisions, be consistent with new scientific information, be reflective of department policies and include several policy changes recommended by various advisory groups and committees. Ecology has developed these amendments to:

- Implement recommendations received from the MTCA Policy Advisory Committee. This committee was mandated by Engrossed Substitute House Bill 1810, and existed from mid-1995 to December 1996.
- Implement recommendations from the MTCA Science Advisory Board.
- Meet the requirement in WAC 173-340-702(3) that Ecology review and, as appropriate, update the rule every five years. This includes updating the rule to reflect changes in other laws and incorporate new scientific information.
- Incorporate existing Department policies into rules, as required by the Administrative Procedure Act (RCW 34.05.230(8)).
- Clarify and improve the readability of the current rules.
- Respond to public comments on earlier drafts of the rule.

In order to avoid duplicative mailings, a copy of the proposed amendments is available by request as noted on the Appendix A page of this Final EIS.

1.2 LEGAL AUTHORITY/MANDATE

The Model Toxics Control Act, passed in 1988 as Initiative 97 and codified as Chapter 70.105D RCW, established basic authorities and requirements for cleaning up hazardous waste sites in Washington State.

In reference to cleanup standards, MTCA directs Ecology to adopt and enforce:

> *"...minimum cleanup standards for remedial actions at least as stringent as the federal cleanup standards under Section 121 of the federal cleanup law, 42 USC 9621, and at least as stringent as all applicable state and federal laws, including health-based standards under state and federal law."*

With respect to selecting remedial actions for individual sites, MTCA specifies that:

> *"[I]n conducting, providing for, or requiring remedial actions, the department shall give preference to permanent solutions to the maximum extent practicable and shall provide for or require adequate monitoring to ensure the effectiveness of the remedial action."*

With respect to periodically updating the cleanup standards, WAC 173-340-702(3) requires that:

> *"The department shall review and, as appropriate, update WAC 173-340-700 through 173-340-760 no less frequently than once every five years."*

With respect to adoption of policy statements, RCW 34.05.230 states that:

> *"An agency is encouraged to advise the public of its current opinion, approaches and likely courses of action by means of interpretive or policy statements. Current interpretive and policy statements are advisory only. To better inform and involve the public, an agency is encouraged to convert long-standing interpretive and policy statements into rules."*

In addition, with respect to policy statements, Governor Locke's Executive Order number 97-02 states that agencies shall review their rules and:

"As part of its regulatory review, each agency shall review its existing policy and interpretive statements or similar documents to determine whether or not they must, by law, be adopted as rules."

The MTCA Statute also requires the Department of Ecology to consult with a Science Advisory Board on rule revisions. Specifically, RCW 70.105D.030(4) requires that:

"The department shall establish a scientific advisory board to render advice to the department with respect to the hazard ranking system, cleanup standards, remedial actions, deadlines for remedial actions, monitoring, ..."

With respect to the Public Participation Grant rule and the Remedial Action Grants and Loans rule, RCW 70.105D.070 requires a portion of the money collected under the tax imposed on hazardous substances under RCW 82.21.030 be deposited in the Local Toxics Control Account and used for remedial actions and other purposes. In addition, one percent of the money deposited in the State and Local Toxics Control Accounts is to be allocated for public participation grants. Ecology is authorized under RCW 70.105D.070(7) to *"...adopt rules for grant or loan issuance and performance."*

1.2.1 Role of Advisory Committees

In 1995, the Washington State Legislature passed Engrossed Substitute House Bill 1810 (ESHB 1810). The bill required formation of a Policy Advisory Committee (PAC) to review, provide advice, and develop recommendations to improve the Model Toxics Control Act (MTCA) Program.

From mid-1995 through 1996, the PAC met regularly to deliberate proposed changes to MTCA and a broad range of related issues, including:

- Cleanup standards and cleanup levels, including the use of site-specific risk assessment.
- Policies, rules, and procedures; including the use of cost, current, and future land use and, other criteria in the selection of cleanup remedies.
- Ecology's policies used to implement the cleanup program in practice, including training and accountability for cleanup decisions and their implementation.
- Improvements in the cleanup process to provide additional incentives to potentially liable persons for full and expeditious funding of cleanups.

- The need for adoption of recommended levels for ecologically-based cleanup standards.
- The effectiveness of independent cleanups.

The PAC evaluated many alternatives during approximately one and a-half years of deliberations. In December of 1996, the PAC issued its final report to the legislature and Ecology. The specific recommendations made by the committee were presented to the legislature in the "Final Report of the Model Toxics Control Act Policy Advisory Committee" dated December 15, 1996. Many of the recommendations in that report called for revisions to the MTCA rule and form the basis for numerous proposed rule amendments.

After issuance of the final report, Ecology invited many members of the PAC to participate in a Rule Advisory Committee. The Rule Advisory Committee met numerous times and individuals on that Committee have also been routinely consulted by Ecology during the period starting early in 1997 to the present time. Many of the amendments reflect changes concurred with by this advisory committee.

In addition to the Rule Advisory Committee, Ecology has routinely sought the advice of the MTCA Science Advisory Board, as required by statute, throughout preparation of these amendments. Several of the amendments are in response to advice provided by that Board.

In addition to the Rule Advisory Committee and the Science Advisory Board, Ecology has consulted with the Duwamish Coalition TPH Project Oversight Group. This is a committee consisting of representatives from the Port of Seattle, King County, the USEPA, and the Cities of Seattle and Tukwila, several ex-officio representatives from petroleum companies, and the US Navy. The focus of this committee was on developing a framework for establishing site-specific petroleum cleanup levels. Again, several of the proposed rule amendments reflect recommendations made by that group.

While Ecology strove to incorporate the recommendations of these various groups, the final product does not necessarily represent a consensus document. At times, these various groups provided conflicting advice. However, Ecology does believe most of the concerns of these various groups have been addressed by these amendments to the extent possible within the legal and administrative constraints under which Ecology must operate.

Ecology considers the review by these various advisory committees and Ecology staff to have met the MTCA rule 5-year review requirement.

1.3 PURPOSE AND SCOPE OF THIS DOCUMENT

The State Environmental Policy Act requires that an Environmental Impact Statement be prepared for proposed rulemaking with probable significant adverse effects on the quality of the environment (WAC 197-11-330). The original MTCA rule (WAC 173-340) was adopted in two parts: the process portion in 1990 and the technical cleanup standards portion in 1991. Ecology issued a determination of non-significance for the process portion of the MTCA rule, adopted in 1990. As the original MTCA rule was amended to include the cleanup standards (adopted in 1991), Ecology determined that the regulatory amendments could potentially affect the quality of the environment, and prepared an Environmental Impact Statement in 1991.

For this rulemaking, Ecology initially identified four key areas of the proposed MTCA rule amendments that had the potential to cause significant adverse impacts on the environment. However, after further analysis of these areas, Ecology has concluded there are no probable significant adverse environmental impacts that are not mitigated as a part of the proposal. Typically, an Environmental Impact Statement would not be prepared under these circumstances. However, Ecology believes the additional information and the State Environmental Policy Act review process will be helpful in explaining the proposed amendments and the issues considered by the Department in making its determination. Therefore, instead of withdrawing the Determination of Significance, Ecology has chosen to present this information in the form of an Environmental Impact Statement.

A primary purpose of this document is to describe the potential adverse impacts of the proposed MTCA rule amendments that were considered by Ecology in its determination of non-significance. Consequently, the content of this document differs from that of a typical Environmental Impact Statement. However, it has been prepared using the Environmental Impact Statement format and does compare the probable adverse impacts of the two alternatives considered here.

The scope of this analysis covers four major areas in the proposed amendments:

- Use of Site-Specific Risk Assessments.
- Petroleum Contamination Cleanup Standards.
- Evaluating Terrestrial Ecological Risks at Cleanup Sites.

- Procedures and Requirements for Choosing the Method of Cleanup at Sites (Remedy Selection).

In selecting these areas, in April 1999, Ecology issued a request for comments on the scope of the Environmental Impact Statement and a Determination of Significance. In this notice, Ecology identified the four issue areas in the proposed amendments that it intended to review in order to determine whether the amendments posed a probable significant adverse environmental impact. Two substantive comments were received in response to the scoping notice.

Two commentors requested that sediment impacts be assessed as part of the EIS evaluation. Sediment impacts are considered in this EIS as part of the surface water impacts analysis.

Another commentor requested that the Lawrence Livermore National Laboratory's recommendations related to California's leaking underground fuel tank program be considered in the EIS. That report was considered by Ecology as part of the Duwamish Coalition TPH Project Oversight Group review process. Ecology concluded that the approach recommended in that report was not entirely consistent with MTCA. The impacts of petroleum contamination documented in that report are considered as part of the analysis in this EIS.

With respect to the Public Participation Grant rule and the Remedial Action Grants and Loans rule, no significant issues were identified as a result of the scoping process. Therefore, the focus of this Environmental Impact Statement is on analysis of the proposed MTCA rule amendments.

In addition to the EIS scoping process, this EIS was issued in draft form in December 1999. Comments received during the comment periods resulted in several revisions to the final EIS. These comments are responded to in Appendix C.

1.4 DESCRIPTION OF PROPOSAL

The proposed action consists of amending the following rules: the State Model Toxics Control Act Rule, Chapter 173-340 WAC, the Public Participation Grant Rule, Chapter 173-321 WAC, and the Remedial Action Grants and Loan Rule, Chapter 173-322 WAC. The proposed amendments would affect several portions of the current rule. The areas of the amendments evaluated in detail in this Environmental Impact Statement are:

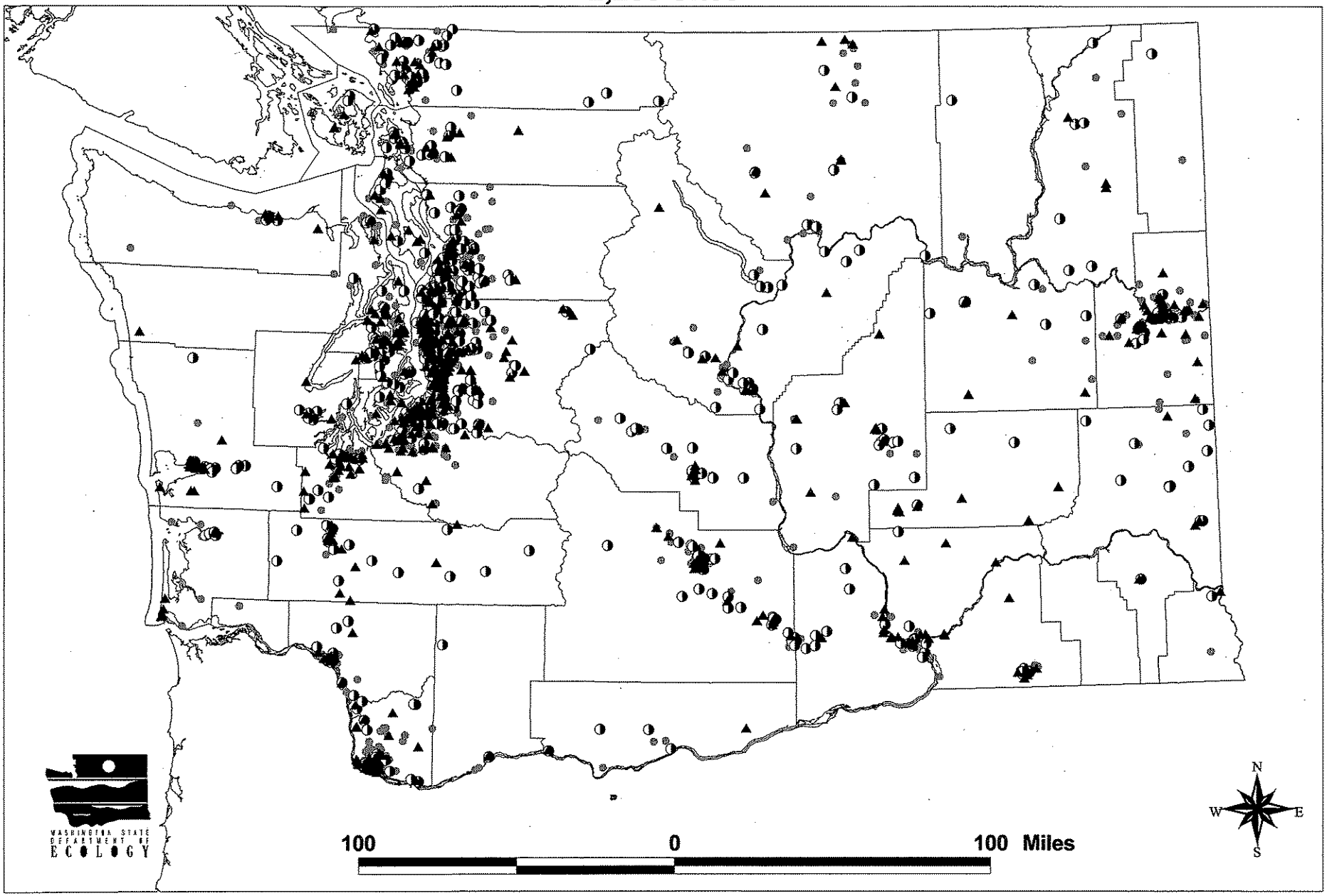
- Use of Site-Specific Risk Assessment: Amendments are proposed that describe how site-specific conditions and risk assessment can be used to establish cleanup levels and evaluate the protectiveness of remedies. This topic includes the procedures when deriving soil concentrations that are protective of ground water, using models and methods that take into account chemical properties and site-specific conditions. The amendments would also allow an area-wide point of compliance for area-wide ground water contamination.
- Method A Values: Amendments are proposed to several values in the tables for Method A cleanup levels. These are evaluated as part of the risk assessment and petroleum cleanup discussions.
- Petroleum Cleanups: There are new methods proposed for deriving cleanup levels for petroleum cleanups. The new methods, along with information about the site and type of petroleum compounds, would be used to develop site-specific cleanup levels under Methods B and C.
- Remedy Selection: Changes related to the use of natural attenuation and dilution/dispersion as methods for cleanup.
- Terrestrial Ecological Evaluation Procedure: The proposal includes a procedure for evaluating potential threats from soil contamination to plants and animals and for establishing protective cleanup levels. The process includes a procedure for determining whether these cleanup levels apply to a site. For industrial and commercial properties, the cleanup levels are based on protection of wildlife (birds and mammals). For all other land uses, they are based on protection of birds, mammals, plants, and ecologically important functions of soil biota that affect plants or wildlife.

See Chapter 2 of this Environmental Impact Statement for a more detailed description of the proposed amendments.

1.5 AFFECTED ENVIRONMENT

There are currently over 8,200 contaminated sites identified in Washington State. The location of a subset of these sites with available longitude/latitude coordinates is illustrated in Figure 1.1. These sites have become contaminated by a wide range of human activity – mining, pesticide use in agricultural areas, chemical spills and dumping at small and large businesses such as dry cleaners, gas stations, plating facilities, wood

Toxics Cleanup Program
Status
2,255 Sites



Sites in-process
Sites pending
NFA Sites
County

Map prepared by Barb Huether

October 1999

Figure 1.1

treating plants, smelters, machine shops, car repair facilities, petroleum refineries and tank farms, and landfills. By far, the largest number of contaminated sites are a result of leaking underground petroleum storage tanks and dispensing systems, primarily commercial gas stations and heating oil tanks.

Since the November 1988 passage of the Model Toxics Control Act by the voters (as Initiative I-97), substantial progress has been made in the identification and cleanup of these contaminated sites. As illustrated by Figure 1.2, cleanup is in progress at 2,966 sites (36 percent), cleanup is pending at 1,483 sites (18 percent) and cleanup is complete and no further action is needed at 3,757 (46 percent) sites.

The proposed amendments to the MTCA rule will affect areas throughout Washington. The elements of the environment that are expected to be affected by these amendments are listed below:

Physical Environment:

- Ground water
- Surface water, including marine water and sediments
- Soil
- Air

Biological Environment:

- Human health
- Plants and animals

Man-made Environment:

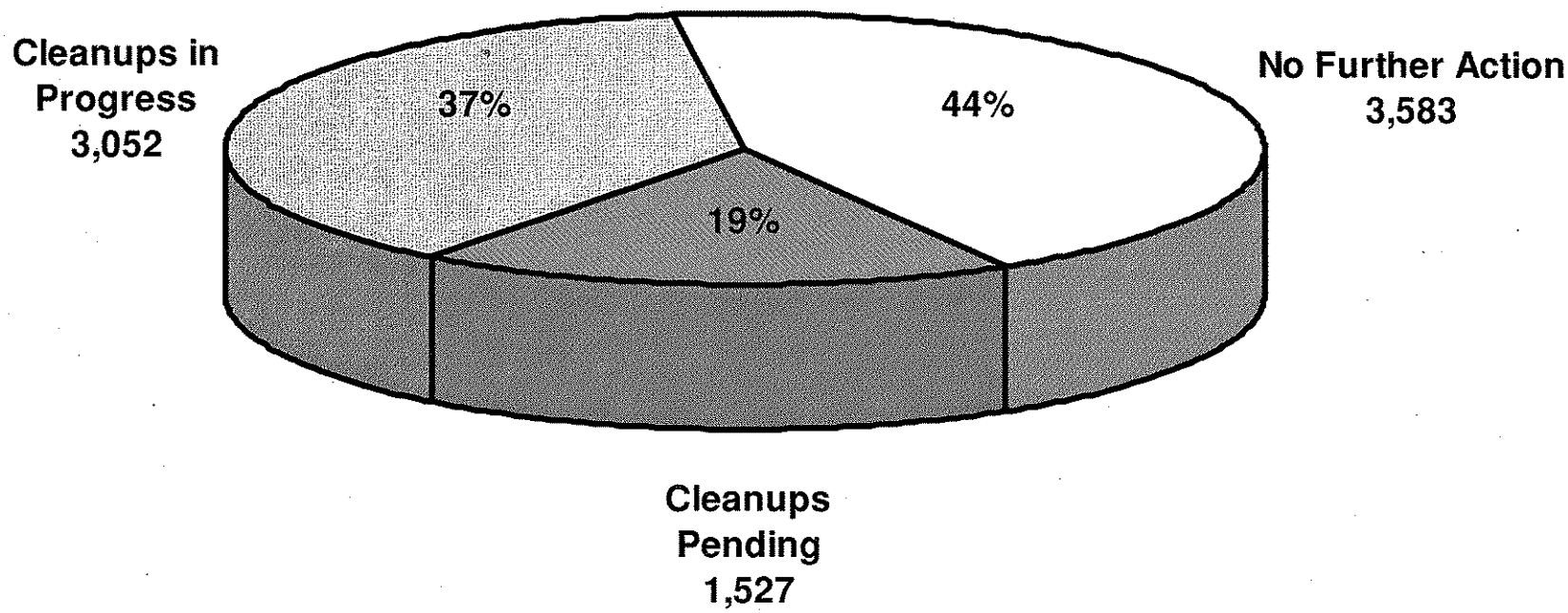
- Land and water use

Information on the affected environment corresponding to each of these elements is discussed in the 1991 Environmental Impact Statement and is incorporated into this document by reference.

1.6 SUMMARY OF IMPACTS

Analyzing the environmental impacts of the proposed rule amendments is very difficult to do because the actual impacts at a particular site are heavily dependent on the site-specific conditions present at that site. Thus, the analysis in this Environmental Impact

Figure 1.2
Known and Suspected Contaminated Sites
Status as of October 15, 1999
Total Sites: 8,162



Statement is necessarily qualitative. The criteria Ecology used to determine whether significant impacts were likely are as follows:

- Whether the alternative would delay cleanup long enough to result in significant spreading of contamination or significant additional exposure;
- Whether the level of contamination left on site after cleanup (residual contamination) would result in more than a moderate impact to plants and animals or a human health risk above the levels of risk in the current MTCA rule;
- Whether the alternative would result in land or resource use restrictions beyond what would normally occur due to natural conditions or beyond what would be required by other laws.

Based on this analysis, there are several potential adverse impacts that could result from the proposed action. However, these impacts are addressed through various other provisions of the proposed rule amendments. Thus, Ecology has concluded that the proposed action does not have a probable significant adverse impact on the environment.

The proposed amendments to the MTCA cleanup rule are summarized in Chapter 2. The following is a summary of the anticipated environmental impacts of those amendments.

1.6.1 Site-Specific Risk Assessment

Adoption of the proposed amendments would result in easier use of site-specific risk assessment for establishing site cleanup levels and for selecting cleanup remedies. Site-specific risk assessment, as used in this Environmental Impact Statement, includes a broad range of proposed rule amendments that allow a person doing a cleanup to take into account the conditions present at a site when using risk assessment to set cleanup levels and assess the protectiveness of remedies. Anyone using this approach would need to gather site-specific data that demonstrates that their proposal provides the same level of protection to human health and the environment as a cleanup level developed using the default levels established in the rule. Site-specific risk assessment could also be used to assist in evaluating remediation levels that would be used in remedy selection.

Currently, data from Ecology's Voluntary Cleanup Program and Ecology oversight cleanups indicate that more than 75 percent of site cleanups meet Method A or standardized Method B cleanup levels. The remaining 25 percent of sites tend to be the

larger, complex sites with extensive contamination. It is not economically or technically feasible to completely clean up these remaining sites. It is these types of sites where site-specific information is often used to evaluate the protectiveness of alternative remedies such as containment to address the contamination remaining behind after cleanup. Although impossible to quantify on a statewide basis, it is expected that the percentage of sites that will use site-specific risk assessment methods will increase.

Because the MTCA requirements for acceptable level of risk are not increased by the proposed rule amendment, the theoretical calculated risk to human health will not increase as a result of these proposed amendments. However, these calculations are heavily dependent on the exposure assumptions and assumed toxicity (see Chapter 7). If inappropriate changes are made to these assumptions, there is a potential for underestimating the risk to human health. In addition, based on Ecology's experience with the use of site-specific risk assessment under the current rule, increased use of site-specific risk assessment can result in more delays and increased concentrations of contamination remaining at sites after cleanup.

Potential impacts were evaluated and determined not to pose probable significant adverse impacts due to the many mitigation measures contained in the proposal. The mitigation measures include the addition of criteria for evaluating new scientific information, limitations on when new information can be submitted to minimize delays, enhanced public involvement, the addition of a technical advisor to assist the public in the evaluation of a site-specific risk assessment, and, enhanced requirements for institutional controls including financial assistance - while retaining department authority to require interim cleanup actions when a delay resulting from the use of a site-specific risk assessment can result in a threat to human health or the environment. Additionally, Ecology can require that a review of the site be conducted periodically after cleanup (generally every 5 years) where changes to the default methods would significantly increase residual concentrations.

New Method A soil cleanup values are proposed for several non-petroleum related substances, primarily as a result of the application of the new proposed soil leaching models. Five values would increase from the current Method A numbers (residential and industrial Chromium III, residential and industrial mercury and residential DDT), four would remain the same (residential and industrial lead, residential cadmium and arsenic). Several other values would decrease, primarily for chlorinated organics. Values that remain the same or decrease are not expected to result in significant adverse environmental impacts. Values that increase are also not expected to have significant adverse environmental impacts, since these new values are derived

specifically to protect human health, including drinking water supplies. These new values are not expected to cause environmental impacts since sites using these values must also complete a Terrestrial Ecological Evaluation.

1.6.2 Petroleum Cleanups

For the purposes of this Final Environmental Impact Statement, the term "petroleum cleanups" is used to describe those parts of the proposed rule amendment specifically relating to petroleum cleanup levels or methods needed to perform site-specific risk assessments at petroleum-contaminated sites. Note that the term "site-specific" as it pertains to petroleum-contaminated sites includes site-specific petroleum composition analysis.

New Method A values are proposed for both the ground water and soil for several petroleum-related constituents. Several of these values are higher than the current Method A cleanup levels, and thus, will result in higher levels of contamination being left at sites after cleanup. While these values are expected to be protective of human health and the environment, some taste and odor impacts to ground water and odor impacts to soil could result from these increased concentrations. Where these impacts are an issue at a site, more stringent concentrations can be required on a site-specific basis thus, significant adverse impacts are not expected.

The proposed rule amendment provides methods for calculating site-specific petroleum cleanup levels using the composition of the petroleum release at a site. These methods are based on the ASTM Risk-Based Corrective Action (RBCA) model, modified to make it compatible with the existing MTCA framework, and incorporate the concept of using petroleum fractions first put forth by the TPH criteria working group to evaluate the toxicity of TPH components as well as to evaluate their fate and transport characteristics in the environment. It is expected that larger, more complex sites will use these methods. These methods, similar to other site-specific risk assessments, will likely result in higher levels of petroleum contamination being left at sites and some delays in cleanups. There may also be taste and odor impacts resulting from these higher concentrations, similar to the higher Method A values discussed above. Ecology has determined that the adverse impacts from these delays and the increased concentrations are not significant when considered in light of other mitigation measures contained within the proposal.

1.6.3 Remedy Selection and Permanence

With the exception of natural attenuation and dilution/dispersion, as discussed below, for the most part, the proposed amendments relating to the selection of cleanup remedies are intended to clarify the existing rule and Ecology policies, without introducing policy changes. The process used for evaluating and selecting the method

of cleanup or cleanup remedy at a contaminated site is a critical step in assuring an effective cleanup. MTCA requires the method of cleanup used at a site to be "permanent to the maximum extent practicable". This is a process that involves the balancing of a number of factors, including the cost and benefits of cleanup at the site. As noted earlier, it is estimated that more than 75 percent of sites are restored to Method A or standardized Method B cleanup levels. It is at the remaining 25 percent where this balancing comes into play in determining, for example, how much soil to treat or remove versus how much to cap, contain, and use institutional controls to limit exposure.

Two provisions relating to remedy selection were evaluated in detail for possible impacts: a statement on the use of natural attenuation, and a change in the allowance of use of dilution/dispersion as a remedy. Both of these provisions could result in higher concentrations of contamination being left at sites, delay in site cleanups and more restrictions on land and ground water use. However, in light of other mitigation measures contained within the proposal it is unlikely that significant adverse impacts would result. The increase in restrictions on future land and ground water is not expected to significantly alter use of these properties beyond what would normally occur due to site constraints, or other laws and regulations (such as zoning).

1.6.4 Terrestrial Ecological Evaluation

MTCA requires that a cleanup of contaminated soil must be protective of the environment, which includes plants and animals. However, the current rule provides few details for evaluating potential threats from contaminated soil to plants and animals or for establishing protective cleanup standards. On both issues, the proposed amendments will provide a clear framework for use in site cleanups. To the extent that the lack of consistent policies on these issues has caused delays in site cleanups, the proposed amendments are expected to have a beneficial environmental impact by reducing the duration of exposure prior to cleanup.

The Terrestrial Ecological Evaluation procedure included in the proposed amendments is intended to ensure that site cleanups will reduce potential threats to plants and animals to an acceptable level. It is not intended to eliminate potential threats. However, any remaining, or residual, impacts are not expected to be significant.

Residual impacts that were considered in this analysis can be characterized in different ways. For example, impacts from smaller sites with up to 1.5 acres of undeveloped land are considered acceptable, and these sites qualify for a "simple exclusion" from further

consideration in a Terrestrial Ecological Evaluation. For soil contaminated with certain substances that are persistent and that may bioaccumulate, only sites with less than 0.5 acres of undeveloped land qualify for this simple exclusion. Moreover, these exclusion areas apply only to sites in developed areas, where the potential for ecological exposure is expected to be limited. The exclusion does not apply if there are 1.5 acres of undeveloped land within 500 feet of the site. Any potential residual impacts are also mitigated by other considerations. For example, the proposed amendments allow Ecology to require further evaluation of a site when the Department determines that such measures are necessary to protect the environment. In addition, the cleanup of smaller sites based on cleanup levels for the protection of human health, ground water, and surface water should reduce any residual impacts on plants and animals.

As another example of residual impacts considered in this analysis, some adverse health effects on wildlife need not be considered in developing cleanup levels. Only health effects relating to reproduction, growth, or survival need be considered. Other health effects are not considered significant because they do not have population-level relevance. For threatened or endangered species, health effects that must be considered are taken from the federal regulation implementing the Endangered Species Act.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Four alternatives were considered in this evaluation:

- No Action alternative (existing MTCA rule unchanged).
- Proposed action alternative (adoption of the proposed rule amendments).
- Policy and Guidance alternative (publishing of policies and guidance in lieu of the proposed rule amendments)
- Proposed Association of Washington Businesses alternative (adopting proposal as written by the Association of Washington Businesses)

The following is a brief description of each alternative. A more detailed description of the proposed action can also be found in the chapters discussing the environmental impacts.

2.1 NO ACTION ALTERNATIVE (CURRENT MTCA RULE)

The no action alternative consists of keeping the current MTCA rule and the Department's approach to implementing that rule unchanged.

The MTCA rule (Chapter 173-340 WAC) describes the legal requirements and process for the investigation, study, and cleanup of contaminated sites. The basic steps in the process are:

Site Discovery
Initial Investigation
Site Hazard Assessment
Hazard Ranking and Site Listing
Remedial Investigation and Feasibility Study
Cleanup Action Plan
Cleanup Action (site cleanup)
Monitoring (as necessary to confirm a successful cleanup has been conducted)

A brief description of the major steps in the cleanup process are provided in Figure 2.1.

Except for some limited circumstances described in the current MTCA rule, anyone who wishes to conduct a cleanup has the option of doing so without direction and oversight from Ecology. Cleanups completed in this manner are called "independent remedial actions." Most cleanups are completed this way. Ecology can provide technical assistance, including issuing "no further action" letters, to persons conducting independent cleanups. Cleanups done under Ecology oversight go through a more

Figure 1.2

CLEANUP PROCESS FOR SITES CLEANED UP UNDER DEPARTMENT OVERSIGHT

1. Site Discovery. Sites where contamination is found must be reported to the department's Toxics Cleanup Program within 90 days of discovery, unless it involves a release of hazardous materials from an underground storage tank system. In that case the site discovery must be reported to the department with 24 hours. At this point, potentially liable persons may choose to conduct an independent cleanup without assistance from the department. However, cleanup results must be reported to the department.

↓

2. Initial Investigation. The department is required to conduct an initial investigation of the site within 90 days of receiving a site discovery report. Based on information obtained about the site, a decision must be made within 30 days to determine if the site requires additional investigation, emergency cleanup or no further action. If further action is required under the Model Toxics Control Act, the department sends early notice letters to owners, operators and other potentially liable persons inviting them to work cooperatively with the department.

↓

3. Site Hazard Assessment. A site hazard assessment is conducted to confirm the presence of hazardous substances and to determine the relative risk the site poses to human health and the environment. Ecology will work closely with liable persons to identify hazardous substances and characterize the contaminated area.

↓

4. Hazard Ranking. The Model Toxics Control Act requires that sites be ranked according to the relative health and environmental risk each site poses. Working with the Science Advisory Board, the department created the Washington Ranking Method to categorize sites using data from site hazard assessments. Sites are ranked on a scale of 1 to 5. A score of 1 represents the highest level of risk and 5 the lowest. Ranked sites are placed on the state Hazardous Sites List.

↓

5. Remedial Investigation/Feasibility Study. A remedial investigation and feasibility study is necessary to define the extent and magnitude of contamination at a site. All potential impacts on the environment and alternative cleanup technologies are evaluated in this study. A 30-day public review period is provided for the reports completed in this phase.

↓

6. Selection of Cleanup Action. Using information gathered during the study, a cleanup action plan is developed. The plan identifies preferred cleanup methods and specifies cleanup standards and other requirements at the site.

↓

7. Site Cleanup. Actual cleanup begins when the cleanup action plan is implemented. This includes design, construction, operation and monitoring of cleanup actions. A site may be taken off the Hazardous Sites List after cleanup is completed and the department determines cleanup standards have been met.

formal process and include formal written agreements called a "consent decree" or "agreed order." The Department also has the authority to issue orders requiring site owners and operators to conduct cleanups. Sites with cleanups conducted under Ecology oversight are required to notify the public potentially affected by the site and to seek public input on the cleanup work.

To complete a cleanup, one needs to know the level of acceptable risk at the site. Eliminating all risks at a contaminated site may not always be possible, even after cleanup. And since any level of exposure to a hazardous substance is assumed to result in some risk, "clean" generally means that a site is cleaned up in a manner so as to be protective of human health and the environment. The MTCA cleanup rules provide three options for establishing cleanup levels:

Method A. This method is designed for cleanups that are relatively straightforward and involve a few hazardous substances. Under this Method, standards available in other state and federal laws, and in tables published as part of the rule, are used to set cleanup levels.

Method B. Method B is designed for use at all types of sites. It consists of using risk assessment and available standards in other state and federal laws to establish cleanup levels. Specific formulas and standard assumptions are provided for calculating cleanup levels for several media and exposure pathways. The rule constrains the changes that can be made to the assumptions when doing risk assessment calculations. The acceptable level of risk for individual carcinogens is one in one million (1×10^{-6}) and for noncarcinogens is a hazard quotient of one (1). If there is more than one hazardous substance or exposure pathway at a site, the total site risk cannot exceed one in one hundred thousand (1×10^{-5}) for carcinogens and a hazard index of one (1) for noncarcinogens.

Method C. Method C can only be used for soil at industrial properties and in a limited number of other situations. Method C is similar to Method B. The main difference is that the acceptable level of risk for individual carcinogens is set at one in one hundred thousand (1×10^{-5}) for both individual carcinogens and for total site risk.

In addition to knowing what level has to be met, a person conducting a cleanup needs to know *where* that level must be met, or the "point of compliance". Generally, the point of compliance is the entire site. Technological limitations, environmental factors and cost may make it impossible to meet the cleanup level throughout a site. For example, attaining cleanup levels at an industrial landfill would require excavation of tons of

wastes, possibly causing more harm than good. In such cases, Ecology can establish *conditional points of compliance.* This requires cleanup levels to be met in specified areas of the site, usually as close to the area of contamination as possible. Any contaminants left on the site must be contained within a specified area in a way that protects humans and plants and animals from exposure to the contaminants.

Once the cleanup level has been established, the method of cleanup must be determined. The process for doing this is called *remedy selection.* State law requires the use of cleanup methods that are "permanent to the maximum extent practicable". This is intended to result in the preference for destruction of contamination to avoid having to re-do cleanups in future years. The term "practicable" in the statute recognizes that permanent cleanups are not always feasible. The rule reflects this practicality, and allows consideration of the costs and benefits of cleanups when deciding how much permanent cleanup should be done at a site while requiring that a threshold level of protectiveness be maintained. Alternatives to permanent cleanup include "containment" (e.g., covering contaminated soil with a layer of clean soil) and institutional controls to prevent exposure. An example of institutional controls is restrictions on the future uses of a site that are attached to the property deed.

2.2 PROPOSED ACTION ALTERNATIVE (Proposed Rule Amendment)

The proposed amendments affect many sections of the MTCA rule and also add new sections. Many of these amendments are intended to clarify and update the existing rule, and the proposal is not intended to change the basic framework for the cleanup of contaminated sites in Washington State.

A brief description of these issues follows, with more detail in subsequent chapters. The full text of the proposed amended rule is available as noted in Appendix A.

2.2.1 Use of Site-Specific Risk Assessments

How site-specific conditions and risk assessment can be used to establish cleanup standards is a key issue being addressed in this rule amendment. The MTCA rule currently requires cleanup standards to be based on risk assessments that use "reasonable maximum exposure" assumptions, a method that assures more sensitive individuals (such as children) are considered when establishing cleanup standards at most sites. This is similar to methods used by the federal Environmental Protection Agency. Although more flexibility is built into the amended rule for using site-specific risk assessment for setting cleanup levels and selecting remedies, the cleanup

standards will continue to be based on reasonable maximum exposures. The proposed rule amendment describes procedures for conducting risk assessments in more detail than the current rule, as well as the limitations and constraints on site-specific adjustments to the standard methods provided in the rule. The framework for site-specific risk assessment is described in Section 708 of the rule. Also, the requirements for use of new science to change the standard approaches to risk assessment described in the rule are contained in Section 702 of the rule. This framework is then used as the basis for the amendments to each of the media-specific sections of the rule (Sections 720-750) as well as the risk-related amendments to the remedy selection provisions (Section 350).

In addition to the Policy Advisory Committee-related amendments, the Science Advisory Board advised Ecology that the current method of calculating soil cleanup levels that will protect ground water (multiplying the ground water standard by 100) is not scientifically sound and should be replaced with more up-to-date methods. Accordingly, the draft rule amendments propose two different models and leaching tests as standardized methods for making this calculation (Section 747). The proposed models and methods take into account the chemical properties and site conditions that affect the mobility of contaminants. These new methods are then used to update the Method A soil cleanup levels for several contaminants.

An additional category of amendments relates to ground water cleanup standards. Under the proposed amendments, the section of the rule discussing these standards (Section 720) will be reorganized to more clearly describe the two types of ground water recognized under MTCA – drinking water aquifers and non-potable ground water. As part of these amendments, more specific directions are provided for determining cleanup levels for non-potable groundwater and when site-specific conditions indicate hazardous substances could reach surface water. In addition, the procedures for establishing a point of compliance for ground water have been revised to incorporate the Policy Advisory Committee recommendations.

2.2.2 Petroleum Contamination

Petroleum is one of the contaminants most commonly found at sites. The Policy Advisory Committee recommended that Ecology modify the rule to incorporate recommendations from another advisory committee, the Duwamish Coalition's TPH Project Oversight Group. The proposed amendments are based on recommendations made by that group and advice provided to Ecology by the Science Advisory Board.

The proposed amendments provide for the use of "surrogate compounds" to represent the toxicity and mobility of various fractions of petroleum mixtures. These compounds would be used, along with site-specific petroleum analyses, to derive site-specific Method B and C cleanup levels using new equations and procedures provided in the draft rule amendments. The term "site-specific" as it applies to petroleum-contaminated sites is meant to include use of site-specific petroleum analysis.

This method, along with several assumed product compositions, was also used in updating the Method A petroleum cleanup levels.

2.2.3 Remedy Selection

The Policy Advisory Committee found the existing rule did not describe the remedy selection process clearly and that the process was not well understood by the general public and many liable persons. That Committee made a number of recommendations to simplify and clarify the process for selecting cleanup remedies at MTCA sites.

The proposed amendments relating to remedy selection are intended to (1) clarify the remedy selection process and criteria, (2) ensure long-term protectiveness of cleanups and, (3) simplify remedy selection for some sites through use of model remedies. Most of these remedy selection-related amendments reflect practices that are already allowed under the current rule or are procedural changes and are not environmentally significant. Thus, most of these remedy selection-related amendments are not intended to make any changes to the intended outcome of the process. The amendments proposed to the remedy selection provisions include the following:

- Treatment hierarchy. The proposed rule amendments change the current list of technologies ("hierarchy") from a separate requirement that emphasizes treatment to a guide for use in evaluating which technologies have greater long-term cleanup effectiveness. This change does not affect the obligation to meet the statutory requirement to use cleanup methods that are "permanent to the maximum extent practicable".

- Institutional controls. The proposed rule amendment calls for increased evaluation of the effectiveness of institutional controls during a cleanup feasibility study. This is intended to ensure that institutional controls will actually provide long-term effectiveness at sites.

- Financial assurances. The Policy Advisory Committee report called for increased use of financial assurances. The existing rule allows Ecology to require financial assurances in certain situations. Under the proposed rule amendment, Ecology will require the use of financial assurances at more sites. This is intended to help provide long-term effectiveness at sites where there will be ongoing maintenance and operation.

- Model remedies. Language has been added giving Ecology the authority to develop model remedies (similar to EPA's presumptive remedies). These could be developed for common types of sites, chemicals or facilities. They are intended to streamline the remedy selection process, by either limiting the number of alternatives that must be evaluated or in selecting a remedial alternative or component for use in a site cleanup.

- Substantial and disproportionate. The proposed rule amends the standard in the current rule for cost/benefit evaluations from "substantial and disproportionate" to "disproportionate". This change was made because the meaning of the word "substantial" as originally defined in the rule is subsumed in the word "disproportionate" in the proposed rule amendments.

- Project costs. Language has been added describing the costs that should be considered in the evaluation of each alternative and the determination of "permanent to the maximum extent practicable". This language has been added to ensure that lifetime costs of the project are considered and not just first-time capital costs, reflecting current practice.

- Free product removal. To reflect decisions that Ecology has made under the current rule and a Policy Advisory Committee recommendation, free product removal using normally accepted engineering practices (e.g., skimmer pumps, etc.) will be required at all sites <u>to the extent practicable,</u> not just underground storage tank sites. This reflects current practice.

- Process clarification. Requirements for the contents of a cleanup action feasibility study have been consolidated in Section 350 to clarify the remedy selection process. For example, submittal requirements and discussion of the scope of the feasibility study have been consolidated in Section 350. Also, language has been added concerning appropriate scoping activities prior to the feasibility study, and the screening and selection of appropriate alternatives for detailed evaluation later in the study.

- Remediation levels. The proposed rule amendments explicitly recognize the term "remediation level." This is a concept that is already used at many MTCA cleanup sites. The term was formerly referred to as "cleanup action level", but had never been expressly defined in the rule. A "remediation level" is the concentration above which a particular cleanup method or technology will be required at a site. The amendments clarify that, in certain circumstances, Ecology can approve a cleanup that does not completely remove or treat all contamination and that uses other methods for limiting risks from contamination that remains above the cleanup levels, provided that the required threshold level of protection is met. The protectiveness of remediation levels can be evaluated by qualitative or quantitative site-specific risk assessment methods.

- Natural attenuation. The appropriate role of natural attenuation as a method for cleaning up contamination is defined in Section 370 of the proposed rule amendments. The language describes the following approach: use of source control to the maximum extent practicable; use of natural attenuation where there is no unacceptable threat during the time that natural attenuation would occur; use of natural attenuation where the site conditions indicate that this process is occurring and will continue to occur; and, monitoring of the process to ensure that it is occurring at rate that will provide for a reasonable restoration timeframe. This is intended to streamline the feasibility study by providing guidelines on the appropriate use of natural attenuation at sites.

- Dilution/dispersion. The proposed rule amendment allows for the use of dilution/dispersion as a primary method of remediation in certain situations. The cost of alternatives, compared to the benefits of cleanup, could be used to justify dilution/dispersion as a primary method of cleanup. Under the current rule, dilution/dispersion may not be used as the primary method of remediation where any other technique exists, regardless of cost.

2.2.4 Terrestrial Ecological Evaluation

MTCA requires that cleanups be ecologically protective in addition to protecting human health. The proposed amendments establish procedures for evaluating potential threats from soil contamination to plants and animals and for deriving ecologically protective cleanup levels. In keeping with the Policy Advisory Committee recommendation for a tiered approach, the proposed terrestrial ecological evaluation procedure has three

steps ("tiers"), described below. The details were developed in consultation with the MTCA Science Advisory Board and with review and comment from interested persons.

- Simple Exclusions – Provides simple criteria for demonstrating that potential threats to terrestrial plants and animals are minimal and do not need to be considered any further in developing cleanup plans. Most sites are expected to qualify for a Simple Exclusion. A site that qualifies for a Simple Exclusion may still need to be evaluated for other pathways, such as potential threats to aquatic species from hazardous substances originating in upland soil.

- Simplified Evaluation – Provides further criteria for determining if a site requires a more detailed site-specific analysis. For a site that does not require a site-specific evaluation, a potentially liable person has several options which include, eliminating the exposure pathway; remediating the site using the soil concentrations provided in the proposed rule amendment; developing alternative standards based on biological testing; or, conducting a Site-Specific Evaluation. This alternative approach does not apply to more ecologically sensitive sites.

- Site-Specific Evaluation – The Site-specific Evaluation section incorporates requirements that Ecology will follow on a variety of issues to maintain a consistent level of protection at all sites where the procedure is used. Although any potentially liable person may use this procedure at any site, it is required for ecologically sensitive sites. Compared to the Simplified Evaluation, this procedure is less prescriptive but more conservative and requires more expertise in ecological risk assessment. However, the increased flexibility may allow the use of cleanup levels that are higher than the soil concentrations provided for use in a Simplified Evaluation, if found to be ecologically protective based on site-specific studies.

2.3 POLICY AND GUIDANCE ALTERNATIVE

The proposed rule amendments are the product of over three years of work, which included seeking advice from the Policy Advisory Committee, the MTCA Science Advisory Board, the Duwamish Coalition's TPH Project Oversight Group, the Rule Advisory Committee, and numerous public meetings. During this process, many alternatives were considered and rejected for a variety of reasons.

However, as previously noted, many of the proposed amendments are primarily intended to clarify what can be done under the current rule. One alternative to a rule

amendment would be to prepare policies and guidance to implement the recommendations from the various advisory committees. These would be targeted to those persons who use MTCA the most – consultants, contractors, lawyers, potentially liable persons, and Ecology's own staff – as well as being made available to the general public.

Under this alternative, a series of policies and guidance documents would be created and provided to the above groups to explain how the MTCA rule can be used in its current form to address many of the concerns raised by the Policy Advisory Committee and Science Advisory Board. In addition, Ecology would engage in an extensive education and outreach program to explain application of the current rule to various site situations.

Not all aspects of the Policy Advisory Committee and Science Advisory Board recommendations can be addressed using this approach, since changes to requirements in the rule cannot be enforced through policy and guidance documents. For this reason, this alternative was rejected as not being responsive and eliminated from further analysis.

2.4 ASSOCIATION OF WASHINGTON BUSINESSES PROPOSED ALTERNATIVE

During the public comment period it was recommended that the draft rule proposal prepared by the Association of Washington Business (AWB) be considered as an alternative to the proposed rule amendments prepared by Ecology. Ecology conducted a comprehensive review of the draft rule proposal prepared by the AWB. As part of that review, Ecology considered whether the amendments, taken as a whole or separately, would achieve, or as effectively achieve, the general goals and specific objectives of the Model Toxics Control Act. Based on that review, Ecology determined the AWB draft rule proposal is unacceptable as a stand-alone alternative because several of the suggested amendments do not meet the general goals and specific objectives of MTCA. Furthermore, some of the suggested amendments are beyond the scope of the current rulemaking action and even include the elimination of existing regulatory requirements or authority. In making these determinations, Ecology considered whether the amendments suggested by AWB were consistent with the following:

- The goals and objectives of MTCA;
- The recommendations of the MTCA Policy Advisory Committee;
- The recommendations of the MTCA Science Advisory Board;
- The recommendations of the TPH Project Oversight Group;

- Applicable state and federal laws; and
- New scientific and technical information.

Significantly, however, several of the individual amendments suggested by the AWB have been incorporated, as appropriate, into the proposed rule amendments. A more thorough discussion of the AWB draft rule proposal may be found in the rulemaking file as part of the report summarizing the analysis of whether the proposed rule amendments are the least burdensome alternatives that will achieve the general goals and specific objectives of MTCA.

3.0 SOIL

Information on soils contaminated by hazardous substances throughout Washington State is described in the 1991 Environmental Impact Statement. It is difficult to characterize these soils in general, because there are many soil types and sites with contaminated soil that occur at a wide range of locations. Based on current data from Ecology's contaminated site data base, it is estimated that 90 percent of contaminated sites have soil contamination. Soils currently most affected by contamination are in those areas where the majority of the contaminated sites are located, particularly in the Puget Sound region and in Clark, Yakima and Spokane counties (see Figure 2.1).

3.1 ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

For the purposes of this analysis, an alternative that delays cleanups or results in soil contamination above natural background remaining after cleanup (residual soil contamination), will be considered to have the potential for adverse impacts on soils. Whether the alternative would result in *probable significant adverse impacts* depends on: (1) whether the delay in cleaning up the site would be long enough to result in significant spreading of contamination or significant additional exposure; or (2) whether the residual contamination would have more than a moderate impact on plants and animals, or increase human health risk above the acceptable levels of risk in the current MTCA rule. Related impacts on ground water, surface water, air, human health, terrestrial ecological health and land and water use are addressed in Chapters 4 through 9.

3.2 RISK ASSESSMENT

3.2.1 No Action Alternative (Current Rule)

The current rule provides procedures for developing soil cleanup levels which include the use of applicable state and federal laws, Method A table values, and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. The current rule does not include any specific language about how risk assessment can be used in the remedy selection process.

Under Methods B and C, specific procedures are provided for evaluating two soil exposure pathways – soil ingestion and contaminants leaching to ground water. Ecology can also require that other potential exposure pathways be evaluated on a case-by-case basis. For soil ingestion, formulas and default assumptions are provided to facilitate the calculation of cleanup levels. The current rule constrains what changes can be made to these defaults. For leaching, a default method for deriving soil cleanup levels protective of ground water is provided by multiplying the ground water cleanup level by 100 to obtain a soil cleanup level. Alternative methods for demonstrating soil contaminant levels that will not cause exceedance of ground water cleanup levels are allowed but no specific methods are provided.

The environmental impacts of these current provisions were analyzed in the 1991 Environmental Impact Statement. Since adoption of the current rule, new scientific information has revealed that several of the Method A soil cleanup levels, as well as soil cleanup levels for the more mobile contaminants derived under the default approach in the current rule [100 times ground water cleanup level], can result in soil contaminant levels that have the potential to cause adverse impacts to the ground water at sites after cleanup. In addition, new methods have been developed for evaluating the dermal and vapor exposure pathways. Since these pathways are not currently being quantitatively evaluated at sites, there is a potential, depending on site-specific conditions, for significant adverse impacts to human health through exposure via these pathways under the current rule. The proposed amendments discussed in the following parts of this chapter are intended to address these concerns.

3.2.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendments provide a framework similar to the current rule for developing soil cleanup levels – applicable state and federal laws, Method A table values, and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C.

Table 3.2.a compares the use of risk assessment for developing soil cleanup levels and selecting remedies under the current rule and proposed rule amendments. While several provisions remain the same, there are also several changes. For example, new formulas and default assumptions are added to address the leaching pathway and greater emphasis is placed on evaluating potential dermal and vapor exposure when a site-specific risk assessment leads to significantly higher soil cleanup levels. Also of note is that when evaluating the direct contact pathway, commercial and recreational

land uses can be considered when demonstrating the protectiveness of a remedy but not when setting cleanup levels.

Table 3.2.a Comparison of Risk Assessment for Soil Cleanup Standards and Remedy Selection Under the Current Rule and Proposed Amendments.

Risk Issue	Current Rule	Proposed Amendment
Soil Ingestion Pathway: Body weight, lifetime, soil ingestion rate, and frequency of exposure	Default values provided. Cannot change for cleanup levels. Changes to evaluate remedies not directly addressed.	Default values provided. Cannot change for cleanup level calculation. Can change as part of a quantitative site-specific risk assessment to demonstrate protectiveness of a remedy that does not achieve the soil cleanup level.
GI Absorption Rate	Default value provided. Can change with site-specific information.	Same as current rule.
Reference Dose & Cancer Potency Factor	Default is IRIS database. Can change with clear & convincing information.	Default is IRIS, HEAST, and NCEA databases. Can change with clear and convincing information.
Soil Leaching Pathway	Uses 100 X ground water cleanup level as default method. Alternative methods may be proposed.	Uses 3-phase model, 4-phase model or leaching tests. Can change some model assumptions with site-specific information. Alternative methods may be proposed.
Dermal Contact Pathway	Not directly addressed. Ecology can require evaluation on a site-by-site basis.	Dermal required to be evaluated for TPH always and for other substances when site-specific changes to other pathways result in <u>significantly higher soil cleanup levels.</u>
Body weight, lifetime, exposure frequency and duration, dermal surface area, & averaging time	Not addressed	Default values provided. Cannot change for cleanup level calculation. Can change as part of a quantitative site-specific risk assessment to demonstrate protectiveness of a remedy that does not achieve the cleanup level.
Adherence factor	Not addressed	Default values provided. Can change with site-specific information.
Absorption fraction	Not addressed	Default values provided. Can change with site-specific information.
Vapors from soil	Ecology can require to be evaluated on a site-specific basis.	Required to be evaluated when site-specific changes to other pathways result in significantly <u>higher soil cleanup levels.</u>

Risk Issue	Current Rule	Proposed Amendment
Toxicity Equivalency Factors	Not addressed	Can be used for dibenzo-p-dioxins, chlorinated dibenzofurans and carcinogenic PAHs.
Other exposure pathways (e.g., food, dust)	Ecology can require to be evaluated on a site by site basis.	Same as current rule.
New science modifications to any of the above items	Allowed. Criteria for evaluation not provided.	Allowed, and criteria for evaluation of new science are provided.
Land Use	Residential land use assumed for most sites. Can also set cleanup levels for industrial, commercial and other non-residential land uses under limited circumstances.	Residential land use assumed for most sites. Can also set cleanup levels for industrial land uses. Other land uses can be considered in remedy selection process.
Point of Compliance	15-foot depth for direct contact (soil ingestion) throughout soil for ground water protection. Vapors and ecological exposure not addressed.	15-foot depth for direct contact (soil ingestion and dermal). Throughout the soil for ground water. Above the water table for vapors. For ecological pathway, 15-foot depth or 6-foot depth with institutional controls.
Compliance Evaluation	Statistically, site mean after cleanup is compared to standard using statistical tests.	Same as current rule. May also use direct comparison of individual sample results to cleanup levels, subject to certain conditions. Changes how measurements below the practical quantification limit are to be handled in statistical analyses.
Site-specific petroleum cleanup levels	Allowed for soil leaching. Other pathways not addressed.	Specific methods provided for soil leaching and soil ingestion and dermal pathways.

Site-specific Risk Assessment – General Discussion

Changes allowed when using Methods B and C under the current and the proposed rule amendment are similar in many ways. However, the proposed rule amendment adds several provisions that more clearly describe the available options for changing default assumptions used in calculating cleanup levels and assessing remedies for the soil ingestion and soil leaching pathways. By clarifying the available options, it is expected that changes will be proposed to the default assumptions at more sites.

A concern expressed during the Policy Advisory Committee process was that the proposed amendments would result in less protective cleanups and significant adverse impacts to human health and the environment. Because the MTCA requirements for acceptable level of risk are not increased by the proposed rule amendment, the theoretical calculated risk to human health will not increase as a result of these proposed amendments. However, these calculations are heavily dependent on the exposure assumptions and assumed toxicity (see Chapter 7). If inappropriate changes are made to these assumptions, there is a potential for underestimating the risk to human health. Ecology does not believe these amendments will result in significant adverse impacts since most of the changes related to site-specific risk assessment can already be made under the current rule (as shown in Table 3.2.a) and the use of site-specific risk assessment does not necessarily always result in higher soil cleanup levels. Also, several safeguards are built into the rule amendments. For example, if Ecology is overseeing a site cleanup, any proposed changes to the default approach must be reviewed and approved by the agency. This includes evaluation of the dermal and vapor exposure pathways if the proposed changes would significantly increase residual contamination at a site. Public comment must also be solicited where a site-specific risk assessment is proposed and citizens will have access to a "citizen technical advisor" within Ecology to facilitate their understanding and ability to comment on the risk assessment. Ecology can require that a review of the site be conducted periodically after cleanup (generally every 5 years) where changes to the default methods would significantly increase residual concentrations. For sites involving cleanups not overseen by Ecology, the agency is authorized to provide technical assistance. Also, persons doing cleanups at sites receiving technical assistance are required to submit a report documenting the cleanup to Ecology. If Ecology disagrees with the cleanup level used or should significant adverse impacts become evident, Ecology has the authority to order further cleanup at these sites.

Changing default methods proposed at sites could also delay site cleanups while the studies justifying alternative values or methods are completed. Such delays have the

potential to result in adverse impacts from continued exposure to the contamination or through the spreading of contamination while an evaluation is being conducted. While some minor impacts may result from these delays, the possibility that such a delay will lead to significant adverse impacts under the proposed amendments is not likely for three reasons: (1) reviews are to be facilitated by the addition of new methods and criteria for conducting and evaluating site-specific risk assessments and new scientific information; (2) limitations have been placed on when new information can be submitted in order to minimize delays, and (3) Ecology can order that interim actions be taken so as to prevent a delay that may increase the likelihood of exposure or spread the contamination.

Land Use

The change in how land use is considered in setting cleanup levels and evaluating the protectiveness of a remedy is not expected to result in increased residual soil contamination or significant delays. The current direct contact Method C soil cleanup level provisions for commercial and other land uses have been rarely used. At most sites the soil leaching pathway, not the direct contact pathway, controls the soil cleanup levels, and land use is irrelevant in setting the soil cleanup level. However, direct contact may be the controlling exposure pathway in certain situations where ground water contamination is unlikely due to the low mobility of the contaminants, or at sites with very dry climatic conditions and without irrigation or storm water infiltration, or at sites where the underlying groundwater is non-potable and surface water impacts are not of concern. In these situations land uses other than residential and industrial can still be considered during the remedy selection process.

Soil Leaching

The soil leaching pathway is an important exposure pathway since the potential for leaching of contaminants to ground water or surface water often determines the soil cleanup level. The proposed amendments replace the 100 times multiplier with two models that incorporate a chemical's ability to be absorbed onto soils and predict the resultant ground water concentration assuming certain site conditions are present. In addition, two leaching tests are proposed as an alternative to the models for metals. This may result in higher or lower soil cleanup levels than under the existing rule depending on the properties of the contaminant and the soil.

Table 3.2.b illustrates the effect of the three phase model on the soil cleanup levels for selected non-petroleum related contaminants, assuming the concern is protection of

ground water for potential drinking water use and using the default assumption in the proposed rule amendments. As can be seen from this table, Method B or C cleanup levels are more stringent for several of the more mobile contaminants under the proposed amendments, while several of the lower mobility contaminants are less stringent. It should be noted that the proposed rule amendment allows the use of site-specific measurements of certain parameters in the models (such as the fraction of organic carbon in the soil and the soil partitioning coefficient). This could result in considerably higher Method B or C cleanup levels than shown in this table.

Table 3.2.b. Comparison of Leaching Pathway Soil Cleanup Levels for Methods B and C Under the Current and Proposed Rules.

Parameter	No Action Alternative [100 X Ground Water Soil Cleanup Level] (mg/kg)	Proposed Amendments [3-Phase Model Soil Cleanup Level] (mg/kg)
DDT	0.03	4.0 ~~1~~
Lead	~~0~~ 1.5	~~1~~ 3,000
Methylene Chloride	0.5	0.02
Mercury	0.2	2.0 ~~1~~
PCBs	0.01	0.2 to 2
Tetrachloroethylene	0.5	0.05
1,1,1 Trichloroethylene	20	1.2 ~~3~~
Trichloroethylene	0.5	0.03

The proposed amendments relating to the calculation of soil cleanup levels may result in higher residual concentrations of some contaminants in the soil at sites after cleanup. However, these methods reflect the substitution of more scientifically sound methods for deriving soil cleanup levels protective of ground water. Thus, they are not expected to have significant adverse impacts on human health or the environment.

Delays in cleanups could occur where a potentially liable person decides to develop a site-specific soil cleanup level that will be protective of ground water. The cleanup could be delayed, for example, due to the need for additional time to gather field data and for evaluation of a proposed alternative method (such as a different model) to calculate a soil cleanup level. However, the option to develop a site-specific cleanup level is also available under the current rule, although less clearly described. Therefore, this rule

could result in less delay than in the current rule because it clarifies the process. Moreover, some of the site-specific measurements, such as the fraction of organic carbon in the soil, can be determined at the same time other studies are underway and thus should not markedly delay cleanups.

Toxicity Equivalency Factors

Under the current rule all polycyclic aromatic hydrocarbons (PAHs) are considered as toxic as benzo(a)pyrene, the most toxic PAH. However, this is not consistent with the current toxicological information. A common PAH like chrysene, for example, is thought to be at least 100 times less toxic to humans than benzo(a)pyrene (CalEPA, 1994). Toxicity equivalency factors provide a way for adjusting the cancer potency factor for chrysene and other PAHs to more realistically reflect their actual toxicity. The proposed rule amendment allows the use of the equivalency factors developed by the USEPA for dibenzo-p-dioxins and chlorinated dibenzofurans and the California EPA for carcinogenic PAHs. The use of these factors will result in higher residual soil concentrations for these chemical mixtures. These increased concentrations are not expected to result in probable significant adverse impacts to human health since the acceptable level of risk is not changed by this amendment and the result should be a better estimate of the risk posed by these chemical mixtures. Any potential ecological impacts are required to be separately evaluated under another part of the proposed rule amendment.

Dermal Exposure Pathway

The proposed rule amendment requires evaluation of the dermal pathway whenever a site-specific risk assessment results in significantly higher soil cleanup levels based on the direct contact exposure pathway. This is because dermal absorption (absorption of contaminants through the skin) can be an important exposure pathway (Zartarian, 1998 and DOH, 1997). The need to evaluate the dermal exposure pathway will be determined on a site-specific basis. A direct contact concentrations comparison was made between ingestion-only and ingestion-plus-dermal contact for several of the more commonly occurring contaminants found at sites in Washington State in order to provide an indication of the potential impact of this pathway on soil. As can be seen in Table 3.2.c, inclusion of the dermal pathway has more impact on cleanup levels derived for direct contact under Section 745, since the default assumption of incidental soil ingestion is 25% of that under Section 740. For industrial land use, including the dermal pathway decreases the soil concentration more, although the amount of difference varies considerably between chemicals. It should be noted that dermal contact, like soil ingestion, would not affect soil cleanup levels when the leaching pathway required a lower cleanup level than direct contact. Since leaching controls the soil cleanup level for most contaminants, most sites would not be affected by this change. In any case, no significant adverse impacts are expected as a result of this change, since this change does not increase soil cleanup levels.

Table 3.2.c. Comparison of Soil Direct Contact Values for Several Non-Petroleum-Related Compounds Under the Current and Proposed Rules.

Parameter	Soil Concentration for soil ingestion only (mg/kg)*	Soil Concentration for ingestion + dermal (mg/kg)*
Arsenic	0.7/90	0.6/40
Cadmium	80/3,500	70/1,500
DDT	3/390	3/160
Lindane	0.8/100	0.6/30
Methylene Chloride	130/17,500	130/10,000
Mercury	20/1,000	20/250
PAHs (carcinogenic)	0.1/20	0.1/4
PCB Mixtures	0.5/70	0.4/20
Tetrachloroethylene	20/2,600	20/1,100
Trichloroethylene	90/12,000	80/5,100

* First value for unrestricted (residential) land use, second value for industrial properties. The values are calculated using the default formulas in the rule. All values are rounded. PAHs are expressed in the proposed rule as a cleanup level for benzo (a) pyrene to enable use of toxicity equivalency factors for PAH mixtures.

Non-Petroleum Method A Amendments

Factoring in the issues discussed in this Chapter into the Method A soil cleanup levels results in the changes for non-petroleum related parameters illustrated in Table 3.2.d. As can be seen from this table, four of the proposed values remain unchanged (residential arsenic and cadmium, and residential and industrial lead), five go up (residential and industrial Chromium III and mercury, and residential DDT) and several decrease. No significant adverse impacts to the soil are anticipated for values that remain unchanged or decrease from the current Method A values. Four of the values that increase – residential and industrial Chromium II, ~~DDT~~ and mercury – were derived using the proposed three phase leaching model. Since this model provides a better estimate of potential ground water impacts and these values are more stringent than those addressing the direct contact pathway no adverse impacts to human health are anticipated as a result of these amendments. Sites using these values are required to conduct a terrestrial ecological evaluation as described in Chapter 8.

Table 3.2.d Comparison of Method A Soil Cleanup Levels for Non-Petroleum-Related Compounds for Current and Proposed Rules.

Parameter	Current Method A Soil Cleanup Level (mg/kg)*	Proposed Method A Soil Cleanup Level (mg/kg)*
Arsenic	20/200	20
Cadmium	2/10	2/2 ~~1~~
Total Chromium	100/500	none
Chromium III	None	2000
Chromium VI	None	19
DDT	1/5	3/4 ~~2~~
Lead	250/1000	250/1000
Lindane	1/5	0.01 ~~2~~
Methylene Chloride	0.5	0.02
Mercury	1	2
Tetrachloroethylene	0.5	0.05
1,1,1 Trichloroethane	20	2 ~~1~~
Trichloroethylene	0.5	0.03

* First value for unrestricted land use (residential), second value for industrial properties. Where only one value is shown, that values applies to both unrestricted and industrial land uses. NOTE: The lead and arsenic values are planned for further review in a future rule amendment.

Other Provisions

The other proposed revisions described in Table 3.2.a are not expected to increase cleanup levels or residual soil contamination and thus are not expected to have significant adverse environmental impacts.

3.3 PETROLEUM CLEANUPS

3.3.1 No Action Alternative (Current Rule)

The no action alternative (current rule) provides Method A values for soil cleanup levels for total petroleum hydrocarbons (TPH) and individual contaminants contained in

various petroleum products. Under Methods B and C, the soil cleanup levels for individual contaminants are determined as described in Section 3.2. However, no specific methods are provided for calculating soil cleanup levels for the entire petroleum mixture (total TPH). The result is that the current Method A values have been the only practical alternative available for determining soil cleanup levels at petroleum-contaminated sites. Recently, the Department published an "Interim TPH Policy" describing alternative methods for calculating TPH soil cleanup levels for petroleum mixtures, however this policy has only limited uses.

The environmental impacts of the current rule were analyzed in the 1991 Environmental Impact Statement. Since adoption of the current rule, more up-to-date scientific information indicates that the current Method A soil cleanup levels for some substances, including benzene, ethylbenzene, toluene, xylene and total gasoline, have the potential to migrate from soil into ground water more readily than had previously been assumed. The use of current Method A cleanup levels for these substances may, therefore, not be protective of ground water, depending on conditions present at a site. Although the current rule does allow Ecology to set more stringent values on a site-specific basis as necessary, this is not practical for the large number of petroleum-contaminated sites in the State. In addition, naphthalene (a significant diesel fuel component) and MTBE (an additive that has recently received a lot of attention due to groundwater contamination) are not included in the current Method A tables. Under the current Method A if these substances were found at a site they would have to be cleaned up to the practical quantation limit or natural background, whichever is greater, or Method B would have to be used to establish cleanup levels at the site. The proposed amendments are intended to address these concerns.

3.3.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments to the current petroleum-related Method A soil cleanup levels are shown in Table 3.3.

Table 3.3 Comparison of Method A Soil Cleanup Levels for Petroleum Related Compounds for Current and Proposed Rules.

Parameter	Current Method A Soil Cleanup Level (mg/kg)*	Proposed Method A Soil Cleanup Level (mg/kg)*
Benzene	0.5	0.03 ~~1~~
Ethylbenzene	20	6
Toluene	40	7
Xylenes	20	9
TPH Gasoline without benzene	100	~~30~~ 100
TPH Gasoline, with benzene	100	30
TPH Diesel	200	2000
TPH Heavy Oil	200	2000
TPH Mineral Oil	200	4000
EDB	0.001	0.005 ~~1~~
MTBE	none	0.1
Naphthalene	none	5
PAHs (carcinogenic)	1/20	0.1/2
PCBs	1/10	1/10

* First value for unrestricted land use, second value for industrial properties. Where only one value is shown, that values applies to both unrestricted and industrial land uses. PAHs are expressed in the proposed rule as a cleanup level for benzo (a) pyrene to enable use of toxicity equivalency factors for PAH mixtures.

As can be seen from Table 3.3, under the proposed amendments, the revised Method A cleanup levels for soil are lower for benzene, ethylbenzene, toluene, xylene, total gasoline and ~~industrial site~~ PAHs. The total TPH soil values are higher for diesel, heavy oils and mineral oil. The values would not change for several other contaminants typically found at petroleum-contaminated sites.

No significant impacts to the soil are anticipated for values that remain unchanged or decrease from the current Method A values. For cleanups of diesel, heavy oil and mineral oil contaminated sites, the changes to the total TPH cleanup levels will result in increased residual levels of petroleum contamination after cleanup at sites using the Method A soil cleanup levels. However, these values were derived from new scientific information on petroleum leachability and human health effects, thereby providing a

more accurate estimate. Because these values fall within the acceptable level of risk in the current MTCA rule no adverse impacts to human health are anticipated as a result of these changes. The potential impacts of these proposed values on plants and animals are discussed in Chapter 8.

The proposed amendments add new provisions for determining petroleum soil cleanup levels using site-specific risk assessment under Methods B and C. The proposed amendments provide for the use of various compounds to be used as surrogates to represent the TPH mixture. These surrogates can be used to calculate cleanup levels that address the soil ingestion, dermal contact, and leaching to ground water exposure pathways. The proposed surrogate approach is based on an approach that is gaining acceptance nationally for calculating cleanup levels for petroleum mixtures. The use of this method is not expected to result in significant adverse impacts to human health, since this method is specifically tailored to derive soil cleanup levels that meet the levels of risk in the current MTCA rule.

Increased aesthetic impacts due to petroleum odors may result from the increased Method A petroleum soil cleanup levels for diesel and heavy oil, as well as the increased petroleum soil cleanup levels under Methods B and C. None of these methods factor this impact into the derivation of the cleanup values. Cleanups based on these increased cleanup levels may leave soil that is undesirable for certain land uses where petroleum odors are likely to be a concern. At most sites, these impacts should be minor, since they are commercial and industrial properties and most commercial and industrial uses should not be impaired. For other land uses, the proposed rule amendment provides that Ecology can require more stringent cleanup levels be used if the residual contamination causes odors that threaten human health or the environment at a site. Ecology could also require more stringent soil cleanup levels to address petroleum odors on a site-specific basis using authority under the State Environmental Policy Act, if necessary.

3.4 REMEDY SELECTION AND PERMANENCE

3.4.1 No Action Alternative (Current Rule)

The current rule establishes numerous criteria and requirements for selecting remedies. Two key requirements are that selected remedies must be protective of human health and the environment and be permanent to the maximum extent practicable. The concept of cleanup action levels (remediation levels), while not explicitly described in

the current rule, is used at sites to specify the application of different cleanup methods. It is also used where it is not practical to restore a site to cleanup levels, for example, distinguishing between areas that will be cleaned up versus those areas using containment. To be protective, cleanups that use containment must also use other methods for eliminating risks from remaining contamination above the cleanup levels.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since that analysis, experience to date has found that under the current rule, 75 percent of all sites achieve Method A or Method B soil cleanup levels throughout the site. For smaller sites the ability to achieve complete cleanups is even greater. This is confirmed by Voluntary Cleanup Program data that indicates that 90 percent of those sites achieve cleanup levels or better. Contaminated soils are often treated using a variety of processes including vapor extraction, biological processes or thermal treatment. However, excavation and off-site treatment or disposal at an off-site landfill remains a common remedy. For example, this is the remedy of choice at two-thirds of voluntary cleanup sites. At sites with more extensive contamination, these technologies are typically used to address the more contaminated areas, with caps of clean soil or other materials and institutional controls used to minimize contact with residual soil contamination. What type of treatment should be used, and how extensive the actual cleanup should be versus, how much soil should be contained at a given site, can be difficult time-consuming decisions. One purpose of the proposed amendments is to clarify this process.

3.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments are intended to (1) clarify the remedy selection process and criteria, (2) ensure long-term protectiveness of cleanup, and (3) simplify remedy selection for some sites through use of model remedies. Key elements of the changes, described in more detail in Chapter 2, can be summarized as follows:

- The current list of technologies ("hierarchy") is changed from a separate requirement that emphasizes treatment to a guide for determining the long-term effectiveness of different cleanup methods.
- Increased evaluation of the effectiveness of institutional controls.
- Increased use of financial assurances at containment sites.
- A framework for future development of model remedies.
- A better description of costs that need to be considered when evaluating alternatives.
- A requirement for free product removal <u>to the extent practicable</u> at all sites.

- Several procedural clarifications.
- Clarification of the concept of using "remediation levels" in remedy selection. This includes adding a framework for use of quantitative risk assessment in assessing the protectiveness of remedies such as containment that will not permanently eliminate contamination above the cleanup levels.
- Expectations for the use of natural attenuation.
- Allowance for use of dilution/dispersion under some limited circumstances.

As discussed in Chapter 2, most of these amendments reflect practices that are already allowed under the current rule or are procedural and are not environmentally significant. However, two of the amendments, those relating to natural attenuation and dilution/dispersion, may have the potential for adverse impacts, as discussed below:

Natural Attenuation

The appropriate role of natural attenuation as a method for cleaning up contamination is defined in the expectations portion of the proposed rule amendments. The language describes the following approach: use of source control to the maximum extent practicable; use of natural attenuation where there is no unacceptable threat during the time that natural attenuation would occur; use of natural attenuation where the site conditions indicate that this process is occurring and will continue to occur; and, monitoring of the process to ensure that it is occurring at rate that will provide for a reasonable restoration timeframe. This is intended to streamline the feasibility study by providing guidelines on the appropriate use of natural attenuation at sites.

Natural attenuation processes could have some temporary adverse effects on plant growth and animals that live in the soil. It could also preclude some uses of the land. To avoid these effects, conditions for allowing the use of natural attenuation emphasize the need for source control measures (such as removal of the most contaminated soil) and monitoring. Natural attenuation is already used as a remedy at some sites, especially petroleum-contaminated sites. Requiring such remedies to demonstrate that natural attenuation is actually occurring and to incorporate source control measures such as removal of areas of highly contaminated soil should speed the degradation process and lessen the impacts on the soils at these sites than is occurring under the current rule. Thus, significant adverse impacts are not expected as a result of these proposed provisions.

Dilution/Dispersion

The proposed change pertaining to the use of dilution/dispersion as a primary means of remediation is specifically intended to allow soil mixing as an option for sites with widespread, low-level soil contamination, where the cost of active remedial measures grossly exceed the benefits of cleanup. This change is expected to speed up remediation at these types of sites by providing another cleanup option. This proposed change could result in increased volumes of contaminated soil being left at qualifying sites. However, while this proposed change is less stringent than the current rule, which prohibits the use of dilution/dispersion, the standard of "costs grossly exceeding benefits" should minimize the number of sites eligible to use dilution/dispersion. In addition, the diluted concentrations would still need to meet the acceptable level of risk. Also, an ecological evaluation would need to be completed. Some temporary impacts could also be expected during a soil mixing operation. But, the impacts should not exceed those that would otherwise occur with other remedial options such as treatment or excavation. For these reasons, no significant adverse impacts are expected as a result of this provision.

3.5 TERRESTRIAL ECOLOGICAL EVALUATION

3.5.1 No Action Alternative (Current Rule)

Under the no action alternative, potential terrestrial ecological impacts of contamination would continue to be evaluated on a site-by-site basis. See Chapter 8 of this Environmental Impact Statement for an evaluation of this alternative.

3.5.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments to the terrestrial ecological evaluation process and their impacts are described in Chapter 8. They are not expected to result in higher levels of residual soil contamination since soil cleanup levels are typically controlled by leaching considerations (protection of groundwater) rather than by terrestrial ecological effects. When terrestrial ecological impacts are of concern, the evaluation process provided is expected to facilitate cleanups with respect to evaluation of terrestrial ecological impacts by providing a clear and consistent process for ensuring that potential ecological threats from soil contamination are considered in site cleanups. Thus, no probable significant adverse impacts are expected as a result of this proposal.

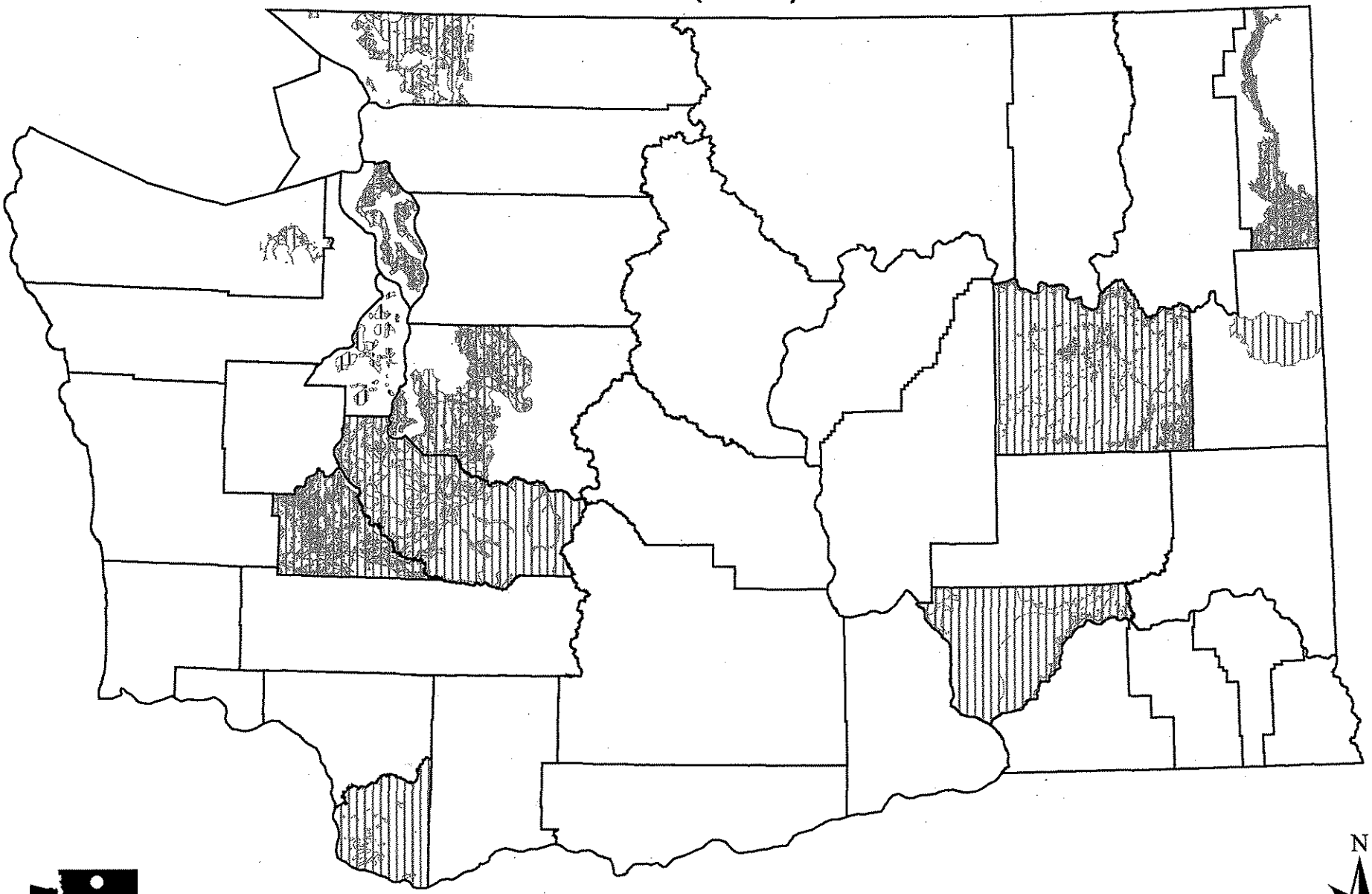
4.0 GROUND WATER

Information on the ground water of Washington State is contained in the 1991 Environmental Impact Statement. Based on current data from Ecology's contaminated site database, an estimated 60 percent of sites have contaminated ground water and 12 percent of sites have contaminated public or private water supply wells. Most at risk are those ground waters that underlie areas with large numbers of contaminated sites (see Figure 2.1). This includes ground water in the Puget Sound region, especially along the Seattle-Olympia corridor, and ground water in Clark, Spokane, and Yakima counties. Many of these ground waters are aquifers that are highly productive, supplying water to numerous private wells and public water supply system wells. The importance of these aquifers is illustrated by Figures 4.0.a and 4.0.b which show available data on designated critical aquifer recharge areas and wellhead protection areas. Also at risk are sole-source drinking water aquifers underlying the Spokane Valley, Lewiston Basin in Asotin County, eastern Columbia Plateau, central Pierce County, Cedar Valley in King County, Vashon and Maury Islands in King County, the Cross Valley and Newberg areas in Snohomish County, Marrowstone Island in Jefferson County, and Whidbey, Guemes, and Camano Islands in Island County (see Figure 4.0.c).

4.1 ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

For the purposes of this analysis, an alternative that delays cleanups or results in ground water contamination remaining above natural background after cleanup (residual ground water contamination), will be considered to have the potential for adverse impacts on ground water. Whether the alternative would result in *probable significant adverse impacts* depends on: (a) whether the delay would be long enough to result in significant spreading of contamination or significant additional exposure; or (b) whether the residual ground water contamination would pose more than a moderate impact to plants and animals, or increase human health risk above the levels of risk under the current MTCA rule. Related impacts on soil, surface water, air, human health, terrestrial ecological health and land and water use are addressed in Chapters 3 and 5 through 9.

Critical Aquifer Recharge Areas
(CARA)



Note: This map represents only those counties that have adopted a Critical Areas Ordinance (CAO), (the first step under the Growth Management Act). and where electronic data is available.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

N W E S

Map prepared by Barb Huether

October 1999

Figure 4.0a

Wellhead Protection Zones

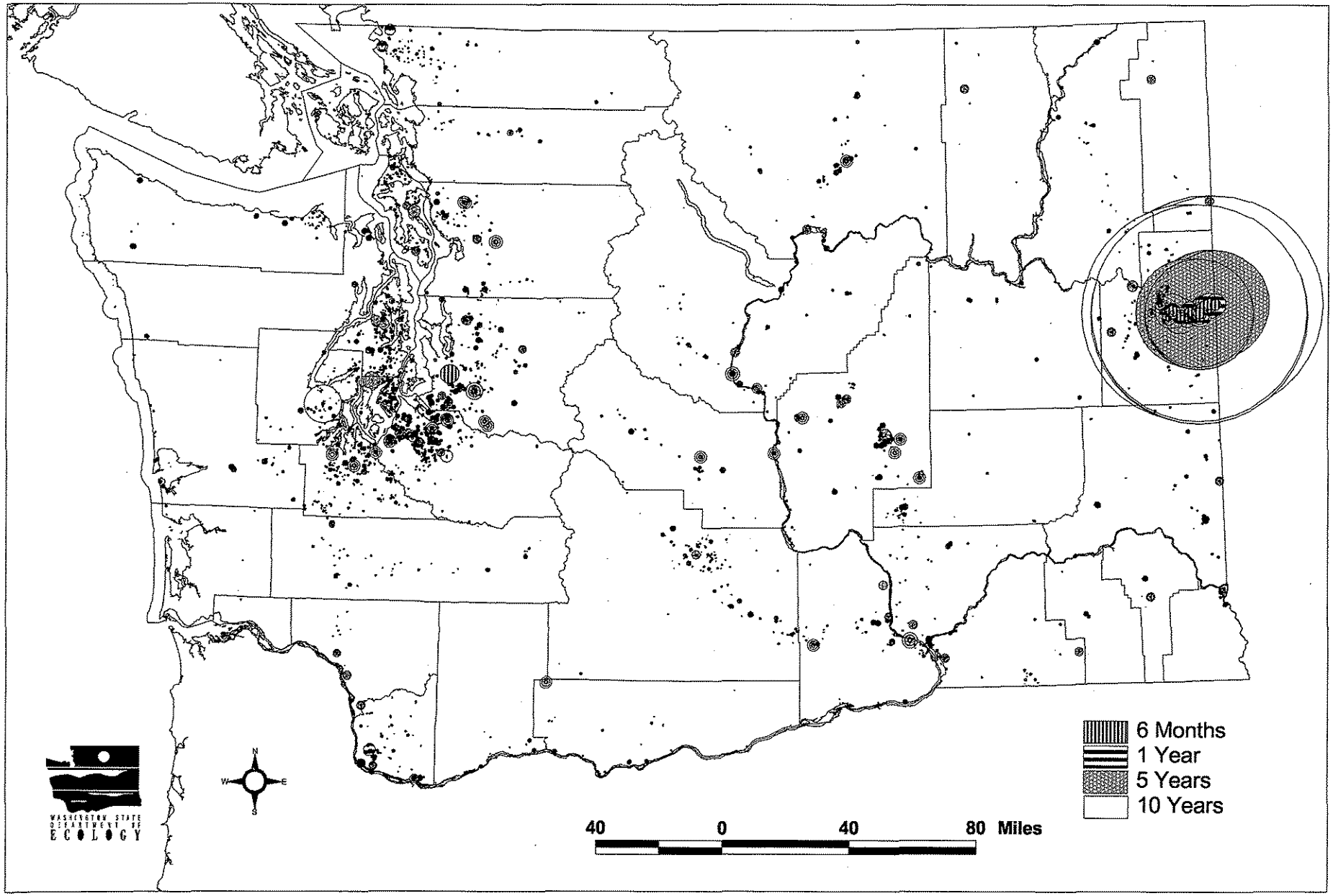


Figure 4.0b

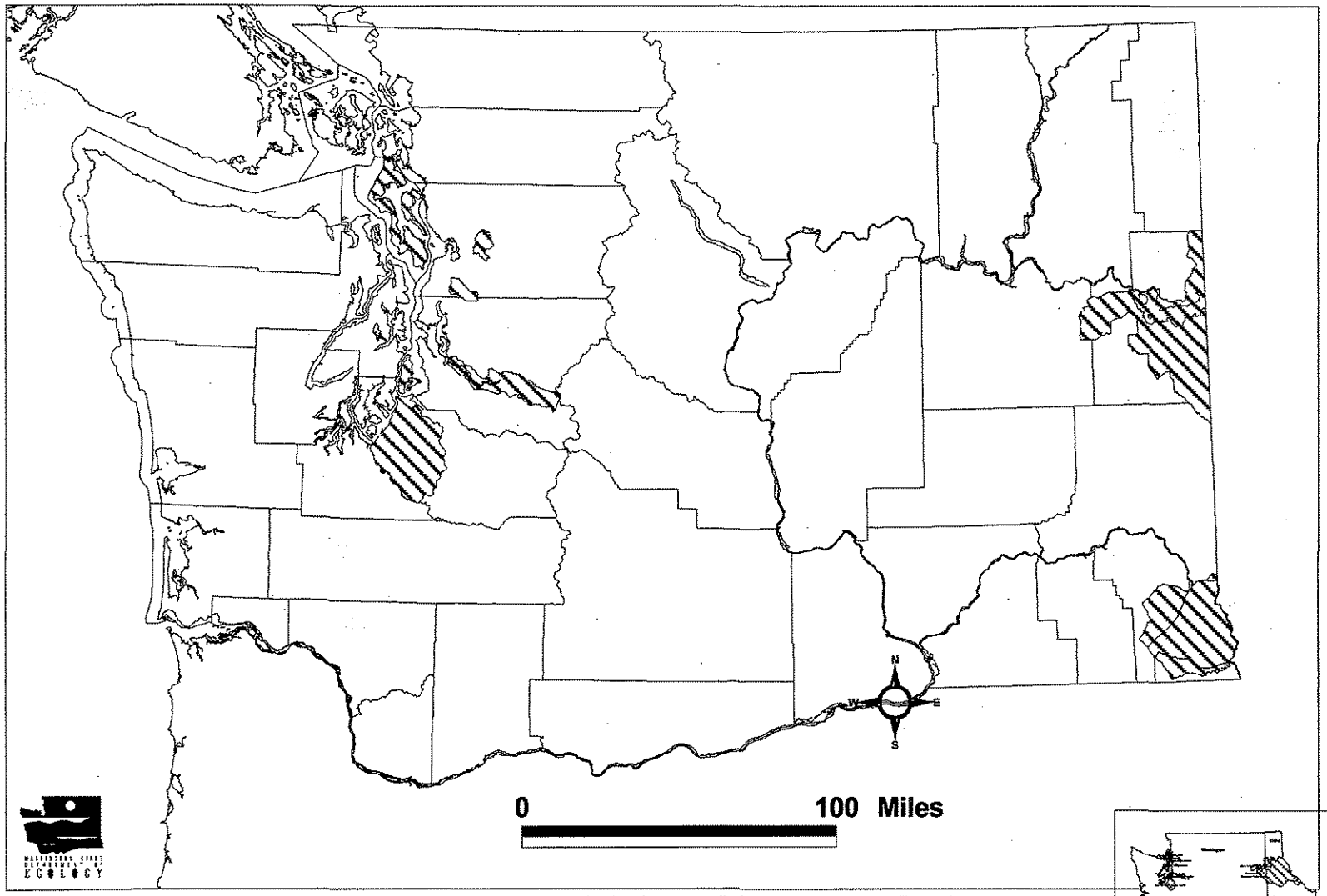
Originator: WSDOT (Pub. 1997)

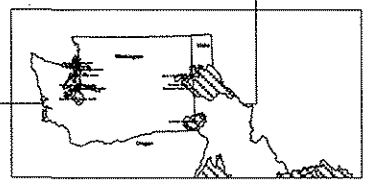
Map prepared by Barb Huether
Toxics Cleanup Program, Oct 1999

Wellhead protection zones for Washington state containing four region subclasses, one each for 6-month, 1-year, 5-year and 10-year time-of-travel zones. Purpose is to prevent adverse impacts to groundwater.

Only 3,002 of 5,922 wells had radius information from which to generate wellhead protection zones.

Washington State
Sole Source Aquifers





Washington/Idaho
Shared Sole Source Aquifers

Map prepared by Barb Huether
Toxics Cleanup Program Aug '99

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Figure 4.0c

4.2 RISK ASSESSMENT

4.2.1 No Action Alternative (Current Rule)

The current rule provides procedures for developing ground water cleanup levels for drinking water aquifers, including the use of applicable state and federal laws, Method A table values, and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. The current rule constrains what changes can be made to the assumptions in the Method B and C calculations. Also addressed are cleanup levels for ground waters adjacent to non-potable surface water. Other beneficial uses are addressed on a case-by-case basis. The current rule does not include any specific language about how risk assessments can be used in the remedy selection process. The current rule provides that the point of compliance for ground water is throughout the site but that a conditional point of compliance can be established up to the property boundary. A conditional point of compliance may also be established in surface water where the ground water flows into surface water adjacent to the property, subject to several conditions.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. During the various advisory committee meetings, several concerns were raised regarding provisions addressing ground water that flows into surface water and non-potable ground water, and how the point of compliance should be applied at sites. The proposed amendments are intended to address many of these concerns.

4.2.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendment provides a framework similar to the current rule for developing ground water cleanup levels. For drinking water aquifers, the proposed rule amendment includes the use of applicable state and federal laws, Method A table values, and formulas and default assumptions for using risk assessment to calculate cleanup levels for drinking water aquifers under Methods B and C. A general framework is provided for using risk assessment to assess remedies.

Table 4.2 compares the use of risk assessment for developing ground water cleanup levels and selecting remedies under the current rule and proposed rule amendments. While several provisions remain the same, there are also several changes. For example, the proposed rule amendments provide more specific directions for developing ground water cleanup levels for ground water with contamination that is

likely to reach nearby surface water and for non-potable ground water. Also, there are new provisions allowing the point of compliance to be moved to within surface water for sites not adjacent to surface water and allowing for an area-wide point of compliance for multiple sites with overlapping plumes of contamination.

Table 4.2 Comparison of Risk Assessment for Ground Water Cleanup Standards and Remedy Selection Under the Current Rule and Proposed Amendments.

Risk Issue	Current Rule	Proposed Amendments
Ground Water Ingestion Pathway: Body weight, ingestion rate, Drinking water fraction	Default values provided. Cannot change for cleanup levels. Changes to evaluate remedies not addressed.	Default values provided. Cannot change for cleanup level calculation. Can change as part of a quantitative site-specific risk assessment to demonstrate the protectiveness of a remedy that does not achieve the ground water cleanup level.
Inhalation correction factor	Default values provided. Can change with chemical specific information.	Same as current rule.
Fraction of drinking water obtained from site	Not addressed (assumes 100%)	Assumes 100%. Cannot change for cleanup level calculation. Can change as part of a quantitative site-specific risk assessment to demonstrate the protectiveness of a remedy that does not achieve the ground water cleanup level.
Reference Dose & Cancer potency factor	Default is IRIS database. Can change with clear & convincing information.	Default is IRIS, HEAST, and NCEA databases. Can change with clear and convincing information.
Inhalation reference dose (Rfd) and cancer potency factor (CPF)	Can use *inhalation* Rfd and CPF in place of *oral* Rfd or CPF, when available (for evaluation of inhalation of vapors from water).	Same as current rule.
Toxicity Equivalency Factors	Not addressed	Can be used for dibenzo-p-dioxins, dibenzofurans and carcinogenic PAHs.
New science modifications to any of the above	Allowed	Allowed. Criteria for evaluation of new science provided.

Risk Issue	Current Rule	Proposed Amendments
Free product	Must remove free product at regulated leaking underground storage tank sites. Otherwise, not addressed.	Must remove free product at all sites. Risk assessment cannot result in a cleanup level that causes the formation of free product in or on the ground water.
Drinking Water Aquifers	Defined by criteria. Most sites fall into this category.	Same as current rule.
Ground water discharging to surface water	Standard must protect surface water. See surface water discussion.	Same as current rule. More directly addressed by the proposed rule amendment language.
Non potable ground water	Case-by-case basis.	Case-by-case basis. Limitations on using risk assessment for these situations are specified.
Point of Compliance (for most ground water)	Throughout the site. Can move out to property boundary.	Same as current rule.
Area-wide Point of Compliance	Not addressed	Can use at sites with overlapping plumes, subject to several conditions.
Point of Compliance for ground water discharging to surface water	Throughout the site. For sites adjacent to surface water, can move out into surface water, subject to several conditions.	Same as current rule but also can move out into surface water for sites not immediately adjacent to surface water, subject to several conditions. Can also use upland monitoring wells to demonstrate compliance.
Compliance Evaluation	Mean of each monitoring point after cleanup is compared to cleanup level using statistical tests.	Same as current rule. Changes how measurements below the practical quantification limit are to be handled in statistical analyses.
Site-specific petroleum cleanup levels	Not addressed	Formula and default assumptions provided for drinking water ingestion.

Site-specific Risk Assessment – General Discussion

While the changes allowed under the current and proposed rule amendments are similar in many ways, the proposed rule amendment adds several provisions that more clearly describe the available options for making changes to the default assumptions used in calculating cleanup levels for drinking water aquifers. In addition, the options for setting cleanup levels for ground water where the contamination is likely to reach surface water and non-potable aquifers are more clearly described, as is the use of risk assessment for assessing remedies. By clarifying these options, it is expected changes will be proposed to the default assumptions or that beneficial uses other than drinking water will be proposed at more sites.

A concern expressed during the Policy Advisory Committee process was that this will result in less protective cleanups and significant adverse impacts to human health and the environment. Ecology does not believe this will be the case, for the same reasons discussed under site-specific risk assessment for soils in Section 3.2. In addition, cleanups would still need to demonstrate compliance with applicable water quality standards for ground water, placing an upper limit on site-specific modifications to the cleanup levels and, in some cases, remediation levels. For potable ground water, these standards would be the drinking water maximum contaminant levels. For ground water flowing into nearby surface water, the state and federal surface water quality standards must be met when the contaminants are likely to reach the surface water.

Toxicity Equivalency Factors

The use of toxicity equivalency factors for dibenzo-p-dioxins, chlorinated dibenzofurans and carcinogenic PAHs will result in higher residual ground water concentrations for these chemical mixtures. As explained in Section 3.2, these increased concentrations are not expected to result in probable significant adverse impacts to human health since this method takes into account the varying toxicity of the compounds making up these mixtures. Any potential ecological impacts must be separately evaluated under another part of the proposed rule amendment.

Point of Compliance

The amendments expand the provision for establishing a conditional point of compliance in the surface water to include sites where the ground water contamination has reached surface water but the property is not adjacent to the surface water. Because of the added dilution resulting from measuring compliance further from the

source, this will result in increased residual ground water contamination at sites that take advantage of this provision, as well as residual ground water contamination beneath property not owned by the potentially liable person. To address these concerns there are a number of conditions that such sites must meet. This option is only available if the potentially liable person can demonstrate it is not practicable to meet the ground water cleanup level prior to entry into the surface water and institutional controls are put into place to prevent exposure to the contaminated ground water. Surface water and sediment cleanup levels may not be exceeded, and the affected landowners must agree to the conditional point of compliance. In addition, the conditional point of compliance cannot be located beyond where the ground water contamination exceeds cleanup levels. Notice of a proposal to use this option must be provided to the Natural Resource Trustees, Washington State Department of Natural Resources, and the U.S. Army Corps of Engineers, so that any potential adverse impacts can be identified and avoided. For these reasons, this amendment is not expected to result in significant spreading of contamination, significant increased exposure, or exceedance of the MTCA acceptable levels of human health risks or significant adverse ecological effects.

The proposed amendments also include an allowance for an area-wide point of compliance where more than one site contributes to a contaminated plume of ground water. In these cases, the cleanup level could be applied outside the boundaries of the properties that are the source of the contamination. This will result in increased residual ground water contamination at some sites (i.e., higher levels of contamination being left in the ground water after cleanup at the sites, or a larger volume of ground water with residual contamination). This could also result in residual ground water contamination beneath property not owned by the potentially liable person. At sites with higher residual ground water contamination and shallow aquifers, there could be greater exposure for utility or site development workers. To address these concerns, the amendments require that notice and an opportunity to comment be provided to affected property owners, tribes, local governments and water purveyors. In addition, it must be demonstrated that there is a water system with sufficient capacity to serve future development in the affected area. Also required is the establishment of institutional controls to limit or prohibit activities that may interfere with the cleanup action or may result in exposure to the contaminated ground water. For these reasons this provision is not expected to result in probable significant adverse impacts.

Cross-Media Impacts

To the extent any of these changes result in a higher ground water cleanup level, they can also result in higher residual soil concentrations where the soil leaching pathway determines the soil cleanup level. This is because the higher ground water cleanup level would be used in the soil leaching calculations. See Section 3.2.2 for a discussion of soil impacts caused by increased residual soil concentrations.

Other Provisions

The limitation on free product accumulation is not expected to result in adverse impacts on the ground water. This is because, in effect, this provision places an upper limit on the cleanup levels that can be derived using site-specific risk assessment methods.

The other proposed amendments described in Table 4.2 are not expected to increase cleanup levels or residual soil contamination and thus are not expected to have significant adverse environmental impacts.

4.3 PETROLEUM CLEANUPS

4.3.1 No Action Alternative (Current Rule)

The current rule provides Method A ground water cleanup levels for total petroleum hydrocarbons and individual contaminants contained in the various petroleum products. Under Methods B and C, the ground water cleanup levels for individual contaminants are determined as described in Section 4.2. However, individual contaminants make up only a small portion of petroleum mixtures and no specific methods are provided for calculating a total petroleum hydrocarbon ground water cleanup level. The result of this approach is that the Method A values are the only practical alternative available for determining ground water cleanup levels for petroleum mixtures.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since adoption of the current rule, more up-to-date scientific information indicates that the current Method A ground water cleanup level for total petroleum hydrocarbons of 1000 µg/l is not protective for all petroleum products if the water is used as a source of drinking water. Thus, the current Method A value could result in probable significant adverse impacts depending on the site-specific conditions present at a site. Although the current rule does allow Ecology to set more stringent

values on a site-specific basis as necessary, this is not practical for the large number of petroleum-contaminated sites in the state.

In addition, there are new federal and state drinking water standards for ethyl benzene, toluene and xylene. Also, because naphthalene and methyl tertiary butyl ether (MTBE) are now recognized as components of many petroleum mixtures, there is a need for a Method A cleanup level for these substances.

The proposed amendments are intended to address these concerns.

4.3.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments to the current petroleum-related Method A ground water cleanup levels are shown in Table 4.3.

Table 4.3 Comparison of Current and Proposed Method A Ground Water Petroleum-Related Cleanup Levels.

Parameter	Current Method A Ground Water Cleanup Level (ug/l)	Proposed Method A Ground Water Cleanup Level (ug/l)
Ethylbenzene	30	700
Toluene	40	1000
Xylenes	20	1000
Naphthalenes	None	160
MTBE	None	20
TPH Gasoline	1000	800 (with benzene)
	1000	1000 (without benzene)
TPH Diesel	1000	500
TPH Heavy Oil	1000	500
TPH Mineral Oil	1000	~~1000~~ 500
No change to the following:		
Benzene	5	5
Ethylene Dibromide (EDB)	0.01	0.01
1,2 Dichloroethane (EDC)	5	5
PAHs (carcinogenic)	0.1	0.1
PCBs	0.1	0.1

As can be seen from Table 4.3, under the proposed amendments, the Method A cleanup level for ground water would become lower for TPH gasoline (if benzene is present in the water sample), TPH diesel, TPH heavy oil and TPH mineral oil. New values are proposed for naphthalenes and MTBE. The cleanup levels for ethylbenzene, toluene, and xylene would become higher. The values for several other contaminants that are typically found at petroleum-contaminated sites would not change.

The proposed amendments also include new provisions for determining total petroleum cleanup levels using site-specific risk assessment under the standard and modified Methods B and C. Specifically, new equations have been provided that, when coupled with surrogate compounds representing the TPH fractions, can be used to calculate total TPH ground water cleanup levels using site-specific petroleum composition data. Allowing site-specific Method B or C cleanup levels for petroleum cleanups will provide more flexibility in the cleanup process, but can result in less stringent cleanup levels at some sites as compared to the current and proposed Method A cleanup levels for total TPH. This would lead to higher residual petroleum contamination in ground water and a corresponding increase in potential adverse impacts to the ground water.

Cleanup based on some of the proposed Method A ground water cleanup levels or a site-specific Method B or C cleanup level could potentially leave adverse taste or odor problems that render the ground water unsuitable for drinking water use at some sites. This applies to the Method A ground water values for ethylbenzene, toluene, naphthalene, and the "total TPH" values. In addition, many of the organic substances in petroleum releases are biodegradable. The microorganisms that break down these substances may deplete the oxygen in the ground water. If this occurs, naturally occurring metals (such as iron and manganese) can dissolve out of the soil and into the ground water, also rendering the water unsuitable for drinking water or other uses. To address these concerns, the amendments retain the current rule requirement that site meet secondary drinking water standards which addresses these metals. In addition, Ecology can require more stringent cleanup levels if these petroleum cleanup levels result in odors that threaten human health or the environment at a site. Ecology could also require more stringent ground water cleanup levels to address petroleum taste and odors on a site-specific basis using authority under the State Environmental Policy Act, if necessary.

For these reasons, and those discussed above in Section 4.2, Ecology believes it is unlikely that these changes will result in significant adverse impacts.

4.4 REMEDY SELECTION AND PERMANENCE

4.4.1 No Action Alternative (Current Rule)

The current rule establishes numerous criteria and requirements for selecting remedies. Two key requirements are that selected remedies must be protective of human health and the environment and that they be permanent to the maximum extent practicable. The concept of cleanup action levels (remediation levels), while not explicitly described in the current rule, is used at many of the sites where it is not practical to restore a site to cleanup levels.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since that analysis, experience under the current rule indicates a majority of sites attain Method A or B drinking water cleanup levels. This is achieved at smaller sites by excavating contaminated soil above and sometimes below the water table, preventing ground water contamination and effectively restoring impacted ground water to cleanup levels. At sites with more extensive ground water contamination, ground water pump and treat systems, barrier systems, air sparging and bioremediation are commonly used ground water remediation methods. Depending on the contaminant and site conditions, it may not be practical to achieve a cleanup level throughout the site and instead the selected remedy typically focuses on achieving the cleanup level at the property boundary to minimize adverse impacts on adjoining properties. At sites adjoining surface water, the surface water standard is typically used as the ground water cleanup level. Where the residual contamination exceeds cleanup levels, institutional controls that restrict use of the ground water, and long-term monitoring, are common.

4.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments, described in Chapter 2, are intended to 1) clarify the remedy selection process and criteria, 2) ensure long-term protectiveness of cleanup, and 3) simplify remedy selection for some sites through use of model remedies. Most of the remedy selection related amendments reflect practices that are already allowed under the current rule or are procedural changes and are not environmentally significant. Two amendments that have the potential for adverse impacts are those pertaining to natural attenuation and dilution/dispersion.

Natural Attenuation

By design, a remedy that uses natural attenuation will temporarily degrade the ground water quality until the attenuation processes are complete. For example, a naturally degrading petroleum plume can be expected to have depressed dissolved oxygen levels and be elevated in iron and manganese, nitrogen compounds, and sometimes other metals and sulfur compounds.

Natural attenuation is already used at some sites especially at petroleum-contaminated sites. The amendments require such remedies to demonstrate that natural attenuation is actually occurring and to incorporate source control measures such as removal of the most contaminated soil and free product. In addition, use of natural attenuation is not allowed where there is an unacceptable threat while degradation is occurring, and follow-up monitoring is required. This should speed the degradation process and lessen impacts on the soils at these sites beyond what occurs under the current rule. Follow-up monitoring is also required. In addition, use of natural attenuation is not allowed if there is an unacceptable threat present while degradation is occurring. Thus, while some minor impacts to the ground water could result from this amendment, significant adverse impacts are not expected.

Dilution/Dispersion

The proposed amendments pertaining to the use of dilution/dispersion, have the potential to impact ground water by allowing sites to use dilution/dispersion as the primary means to address ground water contamination in some limited situations. The impacts of this provision can be expected to parallel those of the natural attenuation changes, since dilution/dispersion are elements of natural attenuation.

4.5 TERRESTRIAL ECOLOGICAL EVALUATION

The no action alternative (current rule) and the proposal action alternative related to the terrestrial ecological evaluation process are not expected to have a significant adverse impact on ground water resources of the state. Even though exclusion of some sites under the terrestrial ecological evaluation may result in small hot spots of soil contamination, these hot spots would still be subject to an evaluation for the potential to adversely affect ground water. In cases where ground water may discharge as a spring or into surface water, existing state water quality standards and surface water cleanup standards apply.

5.0 SURFACE WATER (Freshwater and Marine Waters)

Information on surface waters of Washington State can be found in the 1991 Environmental Impact Statement. Based on current data from Ecology's contaminated site database, it is estimated that approximately 30 percent of the sites in the state have affected surface water. The surface waters most affected by contaminated sites are those in urbanized areas where a majority of contaminated sites are located (see Figure 2.1). These include freshwater surface waters near Bellingham; the mouth of the Snohomish River near Everett; Lake Union and Lake Washington near Seattle; rivers in King, Pierce and Thurston counties that pass through the Seattle-Olympia urban corridor; the Columbia River below Vancouver; the Yakima River near Yakima; and the Spokane River near Spokane.

Marine waters located near contaminated sites, and therefore most at risk of contamination, are Bellingham Bay, Everett Harbor, Elliott Bay, Commencement Bay, Budd Inlet, Dyes Inlet, Sinclair Inlet, Eagle Harbor, Port Angeles Harbor, and Grays Harbor. Contaminated marine sediments also have the potential to adversely affect marine water quality. The Washington State Sediment Management Standards, and any proposed amendments, are subject to separate State Environmental Policy Act review, and are therefore not considered in this Environmental Impact Statement.

5.1 ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

For the purposes of this analysis, an alternative that delays cleanups or results in surface water contamination above natural background remaining after cleanup (residual surface water contamination), will be considered to have the potential to cause adverse impacts on the surface water. Whether these impacts would result in *probable significant adverse impacts* depends on: (a) whether the delay would be long enough to result in significant spreading of contamination or significant additional exposure; or (b) whether the residual surface water contamination would pose more than a moderate impact to aquatic life or increase human health risk above the levels of risk under the current MTCA rule. Related impacts on soil, ground water, air, human health, terrestrial ecological health, and land and water use are addressed in Chapters 3, 4, and 6 through 9, respectively.

5.2 RISK ASSESSMENT

5.2.1 No Action Alternative (Current Rule)

The current rule relies primarily on existing federal and state surface water standards to set surface water cleanup levels. For contaminants that do not have a quantitative surface water standard, the current rule provides formulas and default assumptions for using risk assessment to calculate surface water cleanup levels under Methods B and C. These equations use pre-determined assumptions that are based on protection of human health while eating fish or shellfish from the contaminated sites. The current rule constrains what changes can be made to the assumptions used in this calculation. In addition, surface water cleanup levels cannot have adverse impacts on the protection and propagation of wildlife, fish and other aquatic life. The current rule does not include any specific language about how risk assessments can be used in the remedy selection process.

The environmental impacts of these current provisions were analyzed in the 1991 Environmental Impact Statement. In the process of discussing the petroleum-related amendments with the TPH Project Oversight Group, it became evident that the current rule does not adequately address surface water cleanup levels for petroleum releases and how to evaluate aquatic effects of chemicals without established numeric water quality standards. The proposed amendments are intended to address these concerns.

5.2.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendment provides a framework similar to the current rule for developing surface water cleanup levels – applicable State and Federal laws, and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. A general framework is provided for using risk assessment to assess remedies.

Table 5.2 compares the use of risk assessment for developing surface water cleanup levels and selecting remedies under the current rule and proposed rule amendments. While several provisions remain the same, there are also several changes. For example, whole effluent toxicity testing has been added as an acceptable method for making a demonstration that a proposed cleanup level is protective of aquatic life when there is no quantitative standard. Also, the requirement that a risk assessment cannot result in a cleanup level that causes the formation of non-aqueous phase liquid (NAPL) in or on the surface water is added.

Table 5.2 Comparison of Risk Assessment for Surface Water Cleanup Standards and Remedy Selection Under the Current Rule and Proposed Amendments.

Risk Issue	Current Rule	Proposed Amendments
Fish and shellfish ingestion: Average body weight, consumption rate, life time, & diet fraction.	Default values provided. Cannot change for cleanup levels. Changes to evaluate remedies not addressed.	Default values provided. Cannot change for cleanup level calculation. Can change as part of a quantitative site-specific risk assessment to demonstrate protectiveness of a remedy that does not achieve cleanup level.
Bioconcentration factor	USEPA values are defaults. Can change with "clear and convincing" information.	USEPA values are defaults. Can change with "adequate" information. Other sources may be used when EPA has not published a value.
National Toxics Rule	New applicable law. Not listed in rule.	Added as a law that cleanup standards must comply with.
Toxicity Equivalency Factors	Not addressed	Can be used for dibenzo-p-dioxins, chlorinated dibenzofurans and carcinogenic PAHs where not overridden by water quality standard.
Reference Dose & Cancer potency factor	Default is IRIS database. Can change with clear & convincing information.	Default is IRIS, HEAST, and NCEA databases. Can change with clear and convincing information.
New science modifications to any of the above	Allowed.	Allowed. Criteria for evaluation of new science provided.
Free product/NAPL	Not directly addressed. Surface water quality standards prohibit oil and grease accumulation in or on surface water.	Risk assessment cannot result in a cleanup level that causes the formation of NAPL in or on the surface water.
Protection of Aquatic Life	No specific methods specified for chemicals without a State or Federal law.	Whole effluent toxicity testing or other bioassay methods may be used to make this demonstration.
Point of Compliance	Throughout the surface water.	Same as current rule.
Compliance Evaluation	Mean of each monitoring point after cleanup is compared to cleanup level using statistical tests.	Same as current rule. Changes how measurements below the practical quantification limit are to be handled in statistical analyses. (Eliminates ½ PQL presumption)

Risk Issue	Current Rule	Proposed Amendments
Site-specific petroleum cleanup levels	Not addressed	Can develop, but specific methods not provided.

Site-specific Risk Assessment – General Discussion

The effect of these proposed amendments depends on whether there is an existing, sufficiently protective, quantitative state or federal surface water quality standard available for the contaminants of concern at a site. If there is such a standard, that standard is used as the cleanup level and remediation level, and these changes would not affect these levels.

For contaminants with no such standard, the cleanup level would be determined using Methods B or C. While the procedures for setting these standards are similar under the current and proposed rule amendments, the proposed rule amendment more clearly describes the available options for changes to these procedures, including the changing of default assumptions for setting cleanup levels and evaluating remedies. It is expected that site-specific changes to the default methods will be proposed at more sites. For the same reasons discussed in Sections 3.2.2 and 4.2.2, Ecology believes such modifications are not expected to have significant adverse impacts on the environment.

Toxicity Equivalency Factors

The effect of allowing for the use of toxicity equivalency factors similarly depends on whether a sufficiently protective water quality standard exists for the chemical of concern. There are federal water quality standards for carcinogenic polycyclic aromatic hydrocarbons and dioxins and those standards would override any concentration derived using toxicity equivalency factors. Thus, no significant adverse impacts to human health are expected in these situations. For chlorinated dibenzofurans, the toxicity equivalency factor language could be used, resulting in higher cleanup levels than are developed under the current rule. These increased concentrations are not expected to result in probable significant adverse impacts to human health, since the acceptable level of risk is not changed by this amendment and the result should be a better estimate of the risk posed by these chemical mixtures. See the discussion on whole effluent toxicity testing in this chapter for a discussion of potential environmental impacts of toxicity equivalency factors.

Whole Effluent Toxicity Testing

In addition to addressing human health risks, surface water cleanup levels must be protective of aquatic life. Ecologically-based water quality standards include both numerical concentrations for some substances and a narrative standard for toxicity. For those substances where a numerical value has not been established, the proposed rule

amendments allow the use of whole effluent toxicity tests adopted by Ecology in water quality regulations as an acceptable method for demonstrating compliance with the narrative standard. It should be noted that these tests focus only on the protection of aquatic life. They do not address risks to animals from drinking contaminated water. However, Ecology can require an evaluation to consider such risks when setting a surface water cleanup level, should that be an issue at a site. Because of these considerations, no adverse environmental impacts are anticipated from allowing the use of whole effluent toxicity testing and the use of toxicity equivalency factors.

Free Product

The limitations on free product/NAPL accumulation are not expected to result in adverse impacts on the surface water since this tends to cap cleanup levels, and parallels requirements that already exist in federal and state water quality law. This, and the other provisions discussed earlier in Sections 3.2.2 and 4.2.2 are intended to provide safeguards that ensure appropriate use of site-specific risk assessment.

Cross Media Impacts

To the extent any of the changes described in this chapter result in a higher surface water cleanup level, they can also result in a higher residual ground water and soil concentrations where the soil and ground water cleanup levels are based on protection of surface water. This is because the higher surface water cleanup level may be used as the ground water standard or in the soil leaching calculations. See Chapters 3 and 4 for a discussion of soil and ground water impacts caused by increased residual concentrations in these media.

As described in Chapters 3 and 4, higher Method A soil and ground water cleanup levels and the use of site-specific risk assessment under the amendments could result in higher cleanup levels for soil or ground water at some sites than under the present rule. This could potentially result in more contamination reaching surface waters and associated adverse impacts. In addition, the amendments expanding the application of the point of compliance for ground water discharging to surface water could result in more contamination reaching surface water at some sites. While some minor impacts could result, significant adverse impacts to surface waters are not anticipated since the surface water quality standards must still be met and for the reasons discussed in Section 3.2.2 relating to site-specific risk assessment.

5.3 PETROLEUM CLEANUPS

5.3.1 No Action Alternative (Current Rule)

Petroleum surface water cleanup levels are established when there is a discharge from a pump and treat system or to establish a standard for ground water seeping into surface water. The current rule provides no specific procedures for determining petroleum cleanup levels for protection of surface water. In general, Ecology has relied on federal or state water quality standards for specific petroleum components and set limitations on total oil and grease similar to technology-based standards established for discharges from oil/water separators.

The environmental impacts of the current rule were analyzed in the 1991 Environmental Impact Statement. Since adoption of the current rule, the lack of specific procedures for determining surface water cleanup levels for petroleum releases has resulted in delay and uncertainty on the appropriate standard to use at sites where this is an issue. The proposed amendments are intended to address this concern.

5.3.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments include a provision describing how to derive surface water cleanup levels protective of human health for petroleum mixtures. Specific equations for calculating cleanup levels are not provided in the proposed rule amendment. However, Ecology expects to publish future guidance addressing this topic. Method A drinking water standards for TPH mixtures are identified in the proposed amendments as an acceptable alternative for a Method B or C cleanup level addressing the human health impacts of petroleum mixtures on surface water. Effects on aquatic life can be evaluated using whole effluent toxicity methods or other bioassay methods. These methods would supplement the current use of water quality numerical standards and technology-based standards for oil/water separators.

These methods are not expected to result in increased levels of petroleum products being released to surface waters. The stipulation of Method A values should expedite the setting of standards. Thus no increased adverse impacts are expected as a result of these amendments.

5.4 REMEDY SELECTION AND PERMANENCE

5.4.1 No Action Alternative (Current Rule)

The current rule, described in Chapter 2, establishes numerous criteria and requirements for selecting remedies. Surface water differs somewhat from soil and ground water in that cleanup action levels (remediation levels) are generally not used within surface waters, since most contaminants have water quality standards that must be met.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since that analysis, experience to date has found that under the current rule, most sites achieve surface water quality standards or Method B surface water cleanup levels through treatment or removal of source areas or by the use of cover or ground water barrier systems to prevent discharge of contaminants to nearby surface water. Sediment impacts are generally addressed under the current Sediment Management Standards (WAC 173-204).

5.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments, described in Chapter 2, are intended to 1) clarify the remedy selection process and criteria; 2) ensure long-term protectiveness of cleanup, and; 3) simplify remedy selection for some sites through use of model remedies. Most of the remedy selection related amendments reflect practices that are already allowed under the current rule or are procedural changes and are not environmentally significant.

Unlike soil and ground water, the provisions allowing for the use of natural attenuation and dilution/dispersion are not expected to affect remedy decisions related to surface water. That is because decisions related to use of natural attenuation or dilution/dispersion in surface water are governed by state and federal water quality law that cannot be overridden by these provisions. In addition, the use of mixing zones, a form of dilution, is specifically prohibited by the MTCA rule for ground water seepage into surface water. Sediment impacts would continue to be addressed under the Sediment Management Standards (WAC 173-204).

5.5 TERRESTRIAL ECOLOGICAL EVALUATION

Both the no action alternative (existing rule) and the proposed terrestrial ecological evaluation amendments are not expected to have a significant impact on surface water resources of the state. Even though exclusion of some sites under the terrestrial ecological evaluation may result in small hot spots of soil contamination, the localized contaminated soils are still subject to an evaluation of their potential to adversely affect surface water. Threats from contaminated water to fish and other aquatic species are evaluated under WAC 173-340-730 to establish surface water cleanup standards. These standards use the numerical state water quality standards, and in some cases, biological testing of water samples (e.g., Whole Effluent Toxicity [WET] tests) to evaluate compliance with the narrative state water quality standard for toxicity.

The proposed amendments also do not apply where there are threats to wildlife (birds and mammals) from drinking contaminated water, or to contaminated wetlands. Ecology will continue to evaluate these situations on a case-by-case basis.

6.0 AIR

Information on air quality in Washington State is contained in the 1991 Environmental Impact Statement. Based on current data from Ecology's contaminated site database, it is estimated that approximately 10 percent of sites have affected air quality. The areas of Washington State with the greatest potential for air quality impacts are those urbanized areas with large numbers of contaminated sites (see Figure 2.1).

6.1 ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

Air contamination from a contaminated site can result from volatilization of organic contaminants (particularly lower molecular weight compounds) and through wind erosion (dust). For the purposes of this analysis, an alternative that delays cleanups or results in air contamination remaining above natural background after cleanup (residual air contamination), will be considered to have the potential for adverse impacts on the air. Whether the alternative would result in *probable significant adverse impacts* depends on: (a) whether the delay would be long enough to result in significant spreading of contamination or significant additional exposure; or (b) whether the residual air contamination would pose more than a moderate impact to plants and animals, or increase human health risk above the levels of risk under the current MTCA rule. Both indoor air and outdoor (ambient) air are addressed by this analysis. Related impacts to soil, ground water, surface water, human health, terrestrial ecological health, and land and water use are addressed in Chapters 3 through 5 and 7 through 9, respectively.

6.2 RISK ASSESSMENT

6.2.1 No Action Alternative (Current Rule)

The current rule provides procedures for developing air cleanup levels for outdoor (ambient) air. It provides procedures for developing air cleanup levels that include the use of applicable state and federal laws, and formulas and default assumptions for calculating a cleanup level under Methods B and C, assuming a person is breathing the contaminated air. No Method A table of air cleanup levels is provided. The current rule constrains what changes can be made to the assumptions in the Methods B and C calculations. No specific procedures are provided for developing cleanup levels for indoor air or providing for the use of risk assessment in evaluating remedies. Except for

industrial sites, the point of compliance is throughout the site. For industrial properties the point of compliance can be moved to the property boundary.

The environmental impacts of these current provisions were analyzed in the 1991 Environmental Impact Statement. Since adoption of the current rule, it has become evident that there is a need for indoor air standards to evaluate sites. The lack of methods for setting standards for indoor air at sites has resulted in this exposure pathway not being addressed at all but a few sites. This may be resulting in significant adverse impacts that are not being adequately addressed by current cleanups. Also, the provisions allowing the point of compliance to be moved to the property boundary for industrial properties (which uses adult industrial worker exposure assumptions) may result in workers or the nearby residents and businesses being exposed to concentrations that are much higher than would otherwise be allowed. This situation is inconsistent the basic statutory requirement that human health be protected and with statutory amendments for industrial property cleanup standards that require such standards to not pose a threat to off-site non-industrial areas. The proposed amendments are intended to address these concerns.

6.2.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendment provides a framework similar to the current rule for developing air cleanup levels – applicable state and federal laws and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. No Method A table of values is provided in the proposed rule amendment.

Table 6.2 compares the use of risk assessment for developing air cleanup levels and selecting remedies under the current rule and proposed amendments. While the current and the proposed rule amendment are similar in many ways, there are some changes. The framework for setting air cleanup levels in Section 750 of the rule is proposed to be changed to address both interior air as well as outdoor (ambient) air quality. Also, an upper limit of 10 percent of the lower explosive limit has been placed on cleanup levels. This, and the other provisions discussed earlier in Section 3.2.2, are intended to provide safeguards that insure appropriate use of site-specific risk assessment.

Table 6.2 Comparison of Risk Assessment for Air Cleanup Standards and Remedy Selection Under the Current Rule and Proposed Amendments.

Risk Issue	Current Rule	Proposed Amendments
Breathing air exposure: Average body weight, breathing rate & lifetime	Default values provided. Cannot change for cleanup levels. Changes to evaluate remedies not addressed.	Default values provided. Cannot change for cleanup level calculation. Can change as part of a quantitative site-specific risk assessment to demonstrate protectiveness of a remedy that does not achieve cleanup level.
Inhalation Absorption Percentage	Default value provided. Can Change with site-specific information.	Same as current rule.
Toxicity Equivalency Factors	Not addressed	Can be used for dibenzo-p-dioxins, chlorinated dibenzofurans and carcinogenic PAHs.
Reference Dose & Cancer potency factor	Default is IRIS database. Can change with clear & convincing information.	Default is IRIS, HEAST, and NCEA databases. Can change with clear and convincing information.
New science modifications to any of the above	Allowed	Allowed. Criteria for evaluation of new science provided.
Lower Explosive Limit	Not addressed	Risk assessment cannot result in a cleanup level that is greater than 10% of the lower explosive limit.
Point of Compliance	Throughout the air for all sites except industrial properties, which may establish point of compliance up to the property boundary.	Same as current rule with a statement added that a land point of compliance can not pose a threat to human health or the environment to emphasize this statutory requirement.
Compliance Evaluation	Mean of each monitoring point after cleanup is compared to cleanup level using statistical tests.	Same as current rule. ~~Changes how measurements below the practical quantification limit are to be handled in statistical analyses.~~
Site-specific petroleum cleanup levels	Not addressed	Can develop but specific methods not provided.

Air cleanup levels have rarely been established at contaminated sites since cleanups that address contaminated soil and ground water also usually address air contamination. Under the proposed amendments, air quality impacts may become an issue of greater importance since the amendments could result in increased residual contamination of soil and water. Any air quality impacts should be greatly diminished compared to these other media due to incomplete volatilization and dilution and mixing in the air. In addition, the amendments provide for specific consideration of the vapor exposure pathway in site-specific risk assessments in Section 720 (for non-potable aquifers), and for soils in Sections 740 and 745 of the proposed rule amendment. Addressing indoor air under Section 750 of the proposed rule amendment will provide additional protection for indoor air as well as ambient air. Therefore, these amendments are not expected to have probable significant adverse impacts on air quality.

6.3 PETROLEUM CLEANUPS

6.3.1 No Action Alternative (Current Rule)

The current rule provides no specific procedures for determining total petroleum hydrocarbon cleanup levels for protection of air quality. It also does not directly address how to establish standards for indoor air quality. Without specific air quality standards there is no quantitative way to assess the hazard posed by sites. In general, air quality due to petroleum releases is not addressed at sites unless an explosive hazard exists. However, air quality impacts are often indirectly addressed through the cleanup of contaminated soil and ground water at a site.

6.3.2 Proposed Action Alternative (Proposed Rule Amendments)

In general, the amendments related to petroleum cleanup are not expected to have adverse impacts on air quality for the same reasons noted above in Section 6.2.2. One exception is for soil, specifically where the increased Method A TPH cleanup levels for diesel and heavy oils are expected to result in odor impacts on the soil and the nearby air whenever the soil is exposed, for example, during excavation. Similar impacts could also be expected as a result of the amendments to the Method B and C soil cleanup levels. Again, these impacts should be diminished for the same reasons noted above in Section 6.2.2. However, if significant impacts are experienced at a particular site, Ecology has the authority under MTCA to require additional evaluation and cleanup if there is a threat to human health or the environment. Ecology can also require more stringent air cleanup levels to address petroleum odors on a site-specific basis using

authority under the State Environmental Policy Act, if necessary. Therefore, the amendments are not expected to have probable significant adverse impacts on air quality.

6.4 REMEDY SELECTION AND PERMANENCE

6.4.1 No Action Alternative (Current Rule)

The current rule establishes numerous criteria and requirements for selecting remedies. Two key requirements are that selected remedies must be protective of human health and the environment and be permanent to the maximum extent practicable. The concept of cleanup action levels (remediation levels) for air is generally not applied to sites.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since that analysis, experience to date has shown, as noted earlier in this chapter, that most air contamination problems are addressed through remediation of the soil or ground water. Two common types of sites where air quality sometimes needs to be separately addressed are at petroleum spills (especially gasoline vapors) and landfills (landfill gas). At these sites, gas or vapor extraction systems are the remedy of choice.

6.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments, described in Chapter 2, are intended to 1) clarify the remedy selection process and criteria; 2) ensure long-term protectiveness of cleanup, and; 3) simplify remedy selection for some sites through use of model remedies. Most of the remedy selection related amendments reflect practices that are already allowed under the current rule or are procedural changes and are not environmentally significant. The two provisions with the potential for adverse impacts on air are those pertaining to the use of natural attenuation and dilution/dispersion.

<u>Natural Attenuation</u>

To the extent the provisions pertaining to natural attenuation result in higher residual contamination in the soil and ground water, this could also affect air quality. Any impacts should be greatly diminished compared to these other media for the same reasons cited in Section 6.2.2, and because air quality impacts, including the

requirement to meet the acceptable levels of risk in the MTCA rule, would need to be considered as part of the natural attenuation proposal, and thus significant adverse impacts to air quality are not expected.

Dilution/Dispersion

The impacts of the provision pertaining to dilution/dispersion, are expected to parallel those for natural attenuation.

6.5 TERRESTRIAL ECOLOGICAL EVALUATION

Both the no action alternative (existing rule) and proposed amendments associated with terrestrial ecological evaluations are not expected to significantly adversely impact air resources of the state. For any contaminants not addressed by the terrestrial ecological evaluation, air impacts must still be evaluated under other provisions in the proposed rule amendment.

7.0 IMPACTS ON HUMAN HEALTH

The protection of human health is one of the primary goals of MTCA. For the purposes of regulatory action and risk assessment, adverse health effects from hazardous substances are typically divided into chemicals that cause cancer (carcinogens) and chemicals that cause health effects other than cancer (noncarcinogens). The scientific basis for this division is the presumption that there is no threshold level for carcinogenic effects and, therefore, even a very low dose of a carcinogen is associated with some degree of risk. Noncarcinogenic substances are thought to have a threshold or safe dose, below which no adverse health effects occur. (U.S. EPA 1989)

For carcinogens, all residual levels of contamination are believed to pose some degree of risk. Establishing cleanup levels for carcinogens requires a decision on what level of risk is acceptable. The level of risk means the amount of increase in the chance that a person will get cancer as a result of exposure to a chemical. For most sites, the existing MTCA rule defines an acceptable level of cancer risk as one in one million (1×10^{-6}) for an individual chemical and one in one hundred thousand (1×10^{-5}) for the cumulative risk (i.e., the total risk posed by multiple chemicals and all exposure pathways) at a site. For Method C cleanups, MTCA uses a one in one hundred thousand (1×10^{-5}) for both an individual chemical risk and cumulative risk.

For chemicals that may result in noncarcinogenic health effects, risk is expressed in terms that compare the amount of a chemical exposure to the amount that is thought to be safe. For individual chemicals, this ratio is called the *hazard quotient* and for cumulative risk the term *hazard index* is used. The existing MTCA rule defines an acceptable level of risk for individual noncarcinogens as not exceeding a hazard quotient of 1 and for cumulative risk, not exceeding a hazard index of 1. These limits apply to all sites, including Method C cleanups. This means that the amount of chemical exposure at sites cannot exceed a level that would cause any adverse noncancer health effects.

Readers interested in a more detailed explanation for these levels of risk should refer to the 1991 Cleanup Rule Responsiveness Summary.

The above levels of risk are dependent on two factors – how toxic a chemical is (*toxicity*) and how much a person is exposed to that chemical (*exposure*). The *toxicity* of a chemical is generally determined through controlled laboratory experiments or by studying past human exposures. *Exposure* to these chemicals at contaminated sites

may arise from a variety of human activities. Examples of the exposure routes of statewide importance described in the 1991 Environmental Impact Statement are:

- Drinking or washing with contaminated ground water
- Drinking or swimming in contaminated surface water
- Breathing air contaminated by vapors or dust (both indoors and outdoors)
- Eating contaminated food such as fish and shellfish, meat and game, dairy products, eggs, and fruits/vegetables
- Skin contact with, or unintentional ingestion of, contaminated dirt or sediment

How much actual exposure occurs depends not only on the concentration of a contaminant a person is exposed to, but also on how often (*frequency*) and how long (*duration*) a person is exposed to the contamination and the type of activity they are engaged in. Residential populations typically have the greatest exposure and thus are of primary concern at most hazardous waste sites. For example, a child living on a contaminated site and playing in the yard could be expected to be exposed to more contamination than an adult office worker on the same site. Persons living or working near a site or visiting a site may also become exposed to contaminants at the site.

In addition, exposure may occur during construction and operation of cleanup measures. Cleanup activities often involve extensive physical disturbance of contaminants in soil or tanks. This increases the potential for direct contact with these chemicals and inhalation of volatile substances or particulate matter generated during construction. Soil and ground water treatment processes such as vapor extraction, air stripping, water treatment or thermal treatment may result in exposure to vapors or contaminated waters. Hauling of soil and waste materials to an off-site treatment or disposal site can increase the exposure of site workers and others due to traffic accidents.

The process for determining the toxicity of a chemical and estimating the ways people are exposed to contamination and the amount of exposure that occurs at a site is called "risk assessment". Both the current and the proposed rule amendment specify requirements for using risk assessment to establish cleanup levels or assess the protectiveness of remedies that leave contamination behind after cleanup.

7.1 ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

For the purposes of this analysis, an alternative that delays cleanups or results in residual contamination in any medium above natural background after cleanup (residual contamination) will be considered to have the potential for causing adverse human health impacts. Whether these impacts would result in *probable significant adverse impacts* depends on: (a) whether the delay would be long enough to result in significant additional exposure; or (b) whether the residual contamination results in an increase in the levels of risk under the current MTCA rule to persons living or working on or near contaminated sites.

7.2 RISK ASSESSMENT

7.2.1 No Action Alternative (Current Rule)

As described in the preceding chapters of this Environmental Impact Statement, the current rule provides procedures for developing cleanup levels for ground water, soil, surface water and ambient air. In general, these procedures use applicable state and federal laws, Method A tables (for soil and ground water) and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. The current rule does not include any specific language about how risk assessments can be used in the remedy selection process.

The human health impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Also, see the media-specific discussions in Chapters 3, 4, 5 and 6 of this document.

7.2.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendment provides a framework similar to the current rule for developing cleanup levels for ground water, soil, surface water and air – applicable state and federal laws, Method A tables (for soil and ground water) and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. The air provisions are expanded to address indoor air as well as outdoor ambient air. A general framework is provided for the use of risk assessment in the remedy selection process.

Site-specific Risk Assessment – General Discussion

As described in the previous chapters of this Environmental Impact Statement, the proposed rule amendments add several provisions that more clearly describe the available options for changing default assumptions used in establishing cleanup levels and assessing the protectiveness of alternative cleanup plans. For sites choosing these options, this can result in delayed site cleanups (while additional studies are conducted) and more residual contamination being left at sites after cleanup.

Because the MTCA requirements for acceptable level of risk are not changed by the proposed rule amendment, the theoretical calculated risk to human health will not increase as a result of these proposed amendments. However, as noted earlier, these calculations are heavily dependent on the exposure assumptions used in the equations. Just like the current rule, the equations provided in the proposed rule amendment generally use conservative ("reasonable maximum exposure") default assumptions. If inappropriate changes are made to these assumptions, there is a potential for underestimating risks to human health. However, as discussed in Section 3.2.2, there are several safeguards built into the proposed amendments. For the reasons discussed in that chapter, Ecology believes it is unlikely that inappropriate changes will be made or that any probable significant adverse impacts to human health would result.

Land Use

As discussed in Section 3.2.2, under the proposed rule amendments, commercial and other non-residential land uses could only be considered during the remedy selection process, not when setting soil cleanup levels. This will result in some commercial and non-residential sites using a factor of 1×10^{-6} risk instead of a 1×10^{-5} risk, as would be allowed under the current rule. This is expected to affect very few sites, since Method C is seldom used to set soil cleanup levels at commercial and non-residential sites. This change would result in more protective cleanup levels and less potential for human health impacts at these sites. No other changes are proposed in the acceptable levels of risk described in Section 7.0, above.

Human Health Risks During Cleanup

To the extent that any of the proposed amendments result in lower cleanup levels, one result could be increased risk to workers conducting the cleanup work or to the general public through the need for additional offsite transport, treatment or disposal. This could occur through a variety of exposure pathways, as noted in the opening paragraphs of

this chapter. Ecology does not believe this added potential for exposure will result in risks exceeding the levels of risk under the current MTCA rule for several reasons, as discussed below.

On-site exposures are relatively short-term and persons conducting site cleanups are required to limit public access to the site during cleanup and meet strict worker safety requirements. These requirements include preparation and following of a safety plan, meeting training standards, use of personal protection equipment to limit exposures, and participation in a medical monitoring program.

Off-site transportation risks are also not expected to pose significant adverse impacts to human health. While it is theoretically possible that off-site transport could increase risks due to accidents as described in the 1991 Environmental Impact Statement, actual experience with site cleanups has not found transport accidents to be a significant problem in over 15 years of contaminated site cleanup in Washington State.

7.3 PETROLEUM CLEANUPS

7.3.1 No Action Alternative (Current Rule)

The current rule provides Method A values for ground water and soil cleanup levels for TPH and individual contaminants contained in the various petroleum products. As noted earlier, this method is the only practical alternative available for determining ground water and soil cleanup levels for petroleum mixtures. Discharge limits for oil/water separators are often used for surface water cleanup levels.

The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since adoption of the current rule, more up-to-date scientific information indicates that the current Method A ground water TPH cleanup level and several of the petroleum-related soil cleanup levels may not be protective at all sites. Sites that leave this level of contamination behind at these levels could, for some petroleum products, cause adverse impacts to human health, especially if affected ground water is actually used for drinking water purposes. In addition, the current use of discharge limits for oil/water separators may not adequately address the dissolved phase contaminants typically found at contaminated sites. The proposed amendments are intended to address these concerns.

7.3.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed changes to the current petroleum-related rule provisions are described in the preceding chapters of this Environmental Impact Statement. In general terms, these amendments include changes to several of the Method A soil and ground water values, as well as changes to allow the calculation of site-specific petroleum cleanup levels and remediation levels.

The changes to the Method A ground water and soil cleanup levels are not anticipated to have probable significant adverse impacts to human health since they were derived specifically to protect human health at the current acceptable level of risk under the current rule.

The changes providing for site-specific calculation of petroleum cleanup levels will likely result in higher residual petroleum contamination at sites and could delay cleanups at some sites. The analysis in Section 7.2.2 relating to site-specific risk assessment would apply here as well and based on that analysis, Ecology does not expect these changes to result in probable significant adverse impacts.

7.4 REMEDY SELECTION AND PERMANENCE

7.4.1 No Action Alternative (Current Rule)

The current rule, described in Chapter 2, establishes numerous criteria and requirements for selecting remedies. The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since that analysis, experience to date has shown that the selected remedies have been very effective in protecting human health by eliminating contaminant sources or using containment measures and institutional controls to cut off exposure pathways. The effectiveness of containment and institutional controls in controlling exposure over the long term is unknown, since it has only been approximately 5 years since these measures have begun being widely used.

7.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments, described in Chapter 2, are intended to 1) clarify the remedy selection process and criteria, 2) ensure long-term protectiveness of cleanup, and 3) simplify remedy selection for some sites through use of model remedies. Most of

the remedy selection-related amendments reflect practices that are already allowed under the current rule or are procedural changes and are not environmentally significant. Of the proposed changes, two have the potential for adverse environmental impacts – natural attenuation and dilution/dispersion.

Both of these provisions have the potential to result in delay of cleanups and higher residual contamination being left in all media, especially soil and ground water. However, as discussed in the other chapters in this Environmental Impact Statement, numerous safeguards have been built into the rule so that no significant adverse impacts to human health are expected as a result of these changes.

7.5 TERRESTRIAL ECOLOGICAL EVALUATION

Both the existing rule and the proposed amendments related to terrestrial ecological evaluation are not expected to result in adverse human health impacts. Even though exclusion of some sites under the proposed amendments may result in small hot spots of soil contamination, these hot spots would still be subject to an evaluation for the potential to adversely affect human health. Also, in comparison to the existing rule, the proposed amendments are expected to facilitate cleanup with respect to evaluation of terrestrial ecological impacts by providing a clear and consistent process for this evaluation.

8.0 IMPACTS ON PLANTS AND ANIMALS

Protection of the ecological health of the state is a primary goal of MTCA. Detailed descriptions of impacts on plants and animals associated with cleanup standards are provided in Chapter 4 of the 1991 final Environmental Impact Statement (Ecology 1991) and in Chapter 10 of the 1990 draft Environmental Impact Statement (Ecology 1990) documents. This chapter evaluates the proposed MTCA rule amendments in relation to the alternative of retaining the existing rule, and how they may impact plant and animal resources.

Under both the existing MTCA and the proposed amendments, Method B and Method C cleanups must be established at concentrations that are estimated to result in no adverse effects on the protection and propagation of aquatic and terrestrial life. Method A cleanup levels are derived from current scientific knowledge and conservative (protective) risk assessment methodologies to protect human health. Under the proposed amendments, they may only be used at sites that qualify for a Simple Exclusion from a Simplified or Site-specific Terrestrial Ecological Evaluation.

8.1 RISK ASSESSMENT

The existing rule and proposed amendment provisions pertaining to risk assessment are described in the previous chapters of this Environmental Impact Statement. Those provisions focus on the establishment of cleanup standards that are protective of human health. To the extent that the proposed rule amendments result in higher residual soil contamination, there is an increased potential for adverse impacts on plants and animals. This will result in the need for more systematic evaluation of these impacts, as provided by the proposal amendments. See Section 8.4 for additional analysis.

8.2 PETROLEUM CLEANUPS

Under the current rule, most cleanups use the Method A soil cleanup levels for petroleum-contaminated sites. These cleanup levels have been changed in the proposed amendments. For gasoline, the number is reduced from the current value of 100 mg/kg to 30 mg/kg, which is more stringent than the listed risk-based concentration for use in a Simplified Evaluation (Table 749-2) or a Site-specific Evaluation (Table 749-3). This change is, therefore, not expected to have adverse impacts on terrestrial plants and animals. For diesel, the numbers are increased from 200 mg/kg to 2,000 mg/kg,

which is also more stringent than the Table 749-2 and Table 749-3 values for industrial and commercial sites. However, the 2,000 mg/kg Method A value for diesel exceeds the Table 749-2 and Table 749-3 values for other land uses (200 mg/kg in both tables). This is not expected to result in significant adverse impacts on terrestrial plants and animals, since the proposed Method A diesel cleanup level will likely be used at sites where there is only limited potential for ecological exposure. Also, if necessary, a soil concentration that is protective of terrestrial ecological resources can be developed and substituted for the Method A value. The same considerations apply to Method B and C soil cleanup levels for petroleum.

8.3 REMEDY SELECTION AND PERMANENCE

Remedy selection is an administrative process to identify those remedial alternatives that will be protective of human health and the environment. The process for remedy selection under the current rule is described in Chapter 2. The proposed amendments, also described in Chapter 2, are primarily intended to simplify the remedy selection process and criteria in order to make it less confusing for evaluation of less complete or non-permanent cleanup alternatives.

Under both the existing rule and proposed amendments, there is a potential for impacts to plants and animals as a result of cleanup work such as excavation of soil. These impacts are expected to be minor since most contaminated sites are developed properties with limited use by plants and animals. For those sites where cleanup work could harm important plant or animal communities, this can be taken into account when selecting a remedy.

8.4 TERRESTRIAL ECOLOGICAL EVALUATION

The terrestrial ecological evaluation procedure included in the proposed amendments is described below. As noted earlier (Section 2.2.4), this procedure is not intended to evaluate all ecological pathways. The procedure is limited to the evaluation of potential threats from soil contamination to terrestrial plants and animals. Because the current rule provides few details on this subject, adverse impacts are defined for this analysis as the potential impacts of sites on plants and animals that will not be addressed under the no action or proposed amendment alternatives.

8.4.1 No Action Alternative (Current Rule)

Under the no action alternative, potential terrestrial ecological impacts would continue to be evaluated on a case-by-case basis. There would continue to be uncertainty on a number of issues, including: MTCA criteria for ecological protectiveness; when an ecological risk assessment should be conducted; and, how an ecological risk assessment should be conducted.

There would also continue to be uncertainty on the interpretation of current rule language relating to ecological protection. For example, the terms "no adverse effects on the protection and propagation of... terrestrial life" under Method B (WAC 173-340-705(2)(b)) and "no significant adverse effects on the protection and propagation of... terrestrial life" under Method C (WAC 173-340-706(2)(b)) are not defined in the current rule. Moreover, the distinction between "no adverse effects" and "no significant adverse effects" for Method B and C, respectively, does not appear in sections relating to soil cleanup standards (WAC 173-340-740 and –745).

Under the no action alternative, adverse terrestrial ecological impacts from soil contamination would be mitigated by cleanups based on protection of human health, ground water, or surface water. At those sites where an ecological risk assessment is required by Ecology, there may be further reductions in terrestrial ecological impacts. The extent of the reduction will vary from one site to another, depending in part on how each risk assessment is conducted and what level of ecological impact is considered acceptable in each risk assessment.

8.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments establish criteria for ecological protectiveness and define a tiered process for evaluating potential threats from soil contamination to terrestrial ecological receptors. In both areas, the proposed amendments provide considerably more specificity than the current MTCA. To clarify how potential adverse impacts were considered for significance, this analysis describes the Terrestrial Ecological Evaluation process. Following the description of each step in the process, a brief analysis is provided of the potential adverse impacts. Summary conclusions regarding the overall process are provided at the end of this chapter.

8.4.2.1 Ecological Protectiveness

Ecological protectiveness is defined by requirements in the amendment on what receptors are to be protected, the types of adverse effects from which they are protected (regulatory endpoints), and the level of protection required.

Receptors to be Protected

With the exception of species listed under the federal Endangered Species Act, which are to be protected at all sites, the receptors to be protected are based on land use. At industrial or commercial sites, protection is limited to wildlife (vertebrate animals other than fish), and for all other land uses, protection applies to wildlife, plants and ecologically important functions of soil biota that affect plants or wildlife.

At industrial and commercial sites, cleanups will be protective of plants or soil biota because use of the land for buildings, roads, parking areas and similar purposes precludes its use by vegetation and obviates the ecological services that soil biota would otherwise provide to plants and wildlife. The restricted focus on wildlife protection does not apply to areas of a commercial or industrial property that must be kept vegetated to comply with local government land use regulations. In addition, the restriction requires an institutional control that would reopen the ecological evaluation if the land use changed to other than commercial or industrial.

For land uses other than commercial or industrial, protection applies to wildlife, plants and soil biota. The proposed definition of "soil biota" does not include some organisms that may be important for maintaining the long-term fertility of soil, such as bacteria, fungi, and protozoans. Adverse impacts on these organisms are expected to be minor and will be mitigated by protecting plants and those animals included in the soil biota definition.

Regulatory Endpoints

Under the proposed amendments, terrestrial ecological receptors are protected from "significant" adverse effects. These are defined in the amendments (WAC 173-340-7490(3)):

Threatened or Endangered Species; Other Species Where Individuals Are Protected by Law. For protected species, a significant adverse effect is defined in the proposed amendments as "an impact that would significantly disrupt normal behavior patterns

which include but are not limited to breeding, feeding, or sheltering." This definition is based on the definition of "harm" in federal regulations implementing the Endangered Species Act (50 CFR).

Under this proposed definition, some adverse health effects are not considered "significant". For example, some genetic and physiological effects described as injuries in the federal Natural Resource Damage Assessment Type B Technical Information Document (USDI, 1987) may not necessarily disrupt normal behavior patterns, and would therefore not be considered significant under MTCA.

All other species. For all other species, an adverse effect is defined as significant if it impairs reproduction, growth or survival. These endpoints were chosen based on their generally accepted relevance to the persistence and stability of populations (e.g., EPA, 1995; 1997; DOE, 1996).

Under this proposed definition, some adverse effects on the health of individuals would not be considered to be sufficient to require remedial action unless a causal link to reproduction, growth or survival can be established. Examples may include organ pathologies and some forms of non-reproductive endocrine disruption (e.g., adrenocorticoid). Elevated contaminant concentrations in plants or animals are not considered significant unless they reach levels that are expected to affect the reproduction, growth or survival of the organism or animals that feed on it. Carcinogenic effects on laboratory animals that are used in establishing cleanup levels for the protection of human health are not used to establish ecologically-based standards. Since cancers are often associated with older, post-reproductive age classes, they are generally not considered ecologically significant. Because the endpoints excluded from consideration are not expected to affect populations, any adverse impacts are considered minor.

Level of Protection

As in the case of human health, numerical values for variables underlying the estimation of ecological risk are subject to uncertainty and variability. Variability has spatial (site to site) and temporal (seasonal, year to year) components. The selection of a particular value from the range of scientifically defensible possibilities is a matter of policy that implicitly defines the level of protection to be applied. The level of protection provided to terrestrial ecological receptors by the proposed amendments is determined by the criteria and policies established at different points in the Terrestrial Ecological Evaluation procedure (discussed in Section 8.4.2.2). Criteria and policies for

determining whether a site qualifies for a Simple Exclusion are particularly important, since none of the requirements in the subsequent stages of the evaluation procedure apply to those sites that qualify.

For non-qualifying sites, a Site-specific Evaluation procedure is provided that is intended to be "highly likely to be protective at any site" (WAC 173-340-7490(3)(a)). Alternatively, a Simplified Evaluation procedure is also provided that is intended to be "protective at most sites." Specific criteria and policies relating to each of these procedures should be viewed in the context of these goals. Although the goal for the Simplified Evaluation procedure implies a higher level of acceptable risk, this is not expected to result in significant adverse impacts. In addition, the consequences of an under-protective cleanup are constrained by requiring use of the Site-specific Evaluation Procedure at ecologically important sites.

8.4.2.2 Tiered Process

Simple Exclusions (WAC 173-340-7491) (1) Criteria for determining that no further evaluation is required.)

Under the proposed amendments, all sites with soil contamination proceed through at least the first stage (tier) of the terrestrial ecological evaluation procedure. No further evaluation is required if a site meets any one of three conditions indicating limited potential for exposure ("Simple Exclusions"):

Depth of contamination. No further evaluation is required if the soil contamination is at least six feet below the ground surface, with an institutional control to maintain this condition. The six-foot criterion was selected by Ecology in consultation with the MTCA Science Advisory Board as a default depth for the biologically active soil zone.

Some receptors (e.g., trees) may be exposed to soil contamination at depths greater than six feet. This is not a significant impact because where there is evidence that ecological exposure is occurring at greater depths, Ecology has the option of requiring a further evaluation under the proposed amendment (WAC 173-340-7490(5)).

Exposure barrier. No further evaluation is required if the soil contamination is covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed to the soil contamination. The use of this exclusion also requires an institutional control to maintain the exposure barrier.

There is some potential for future ecological exposure because complete physical containment of the hazardous substances is not required. Future exposure could occur as a result of animals burrowing under the barrier, plant roots extending laterally under the barrier, or migration of the hazardous substances beyond the area covered by the barrier. There may be minor adverse impacts under these scenarios. A surface barrier would not break the exposure pathway to organisms living in the soil (soil biota). However, impacts will not be significant because these organisms are protected only to the extent that they represent "ecologically important functions that affect plants or wildlife." In an area where a barrier eliminates access of wildlife or plants to the contaminated soil, their access to soil biota beneath the barrier is also eliminated.

Limited exposure potential. No further evaluation is required if there is less than 1.5 acres of contiguous undeveloped land within 500 feet of the site. For persistent, bioaccumulative chemicals listed in WAC 173-340-7491(1)(c)(iii), a more conservative criterion is used (less than 0.25 acres). See the discussion of the more complete (Table 749-1) analysis below, under Section 7492 (Limited Exposure Potential).

The impacts of these provisions on plants and animals are not expected to be significant. At small sites in developed areas that meet these conditions, cleanups based on protection of human health, ground water or other media will mitigate adverse impacts on terrestrial ecological receptors. Human health-based cleanup levels for persistent, bioaccumulative chemicals such as PCBs and dioxins are comparable to the ecologically-based soil concentrations in Tables 749-2 and 749-3, for example.

Sites Where a Site-Specific Evaluation Is Required (WAC 173-340-7491)(2) Procedure for a site that does not qualify for an exclusion)

For sites that do not qualify for a Simple Exclusion, the criteria below are used to identify sites where ecological values require a Site-specific Evaluation. For all other sites, the less conservative and easier to use Simplified Evaluation procedure may be conducted.

Areas where management or land use plans will maintain or restore native or semi-native vegetation. These may include, for example, areas set aside as open space, greenbelts, or environmentally sensitive areas. There is a high potential for future ecological exposure in these areas, which may increase over time where surrounding areas become developed.

Under some circumstances, a site that is frequently used by wildlife and that is planned to remain undeveloped may not require a Site-specific Evaluation. For example, a site covered with exotic weedy plant species that do not meet the "native or semi-native vegetation" criterion may not require a Site-specific Evaluation even if it is frequently used by wildlife. Assuming that the Simplified Evaluation procedure is used instead, wildlife at the site may not be protected from any adverse impact that is not addressed under the Simplified Evaluation procedure. This is not a significant effect because Ecology has the option of requiring a Site-specific Evaluation if the Department determines that the soil contamination may present a threat to significant wildlife populations (see below).

Sites used by listed species. Listed species includes Threatened or Endangered species; a wildlife species designated by Washington State Department of Fish and Wildlife as a "Priority Species" or "Species of Special Concern"; or a plant species listed in the Washington State Department of Natural Resources Natural Heritage Program's "Endangered, Threatened, and Sensitive Vascular Plants of Washington" publication.

There are no anticipated probable significant adverse effects impacts related to this criterion.

Areas of 10 or more acres of native vegetation within 500 feet of the site. Area and plant community characteristics are used as operational predictors of ecological exposure (frequency, duration, number of individuals and taxa potentially exposed). In general, a larger block of vegetation is expected to attract more use by more taxa than a smaller block, and native plant communities are similarly expected to support higher biotic diversity than plant communities composed of exotic, weedy plant species.

Under the proposed amendments, native vegetation outside the site property boundary may not be considered in applying this criterion. As a result, a large block of native vegetation that draws wildlife to an adjacent contaminated site would not trigger a requirement to conduct a Site-specific Evaluation if the vegetation is beyond the site property boundary. However, adverse impacts are not expected to be significant because Ecology has the option of requiring a Site-specific Evaluation nonetheless "when based upon a site-specific review, the Department determines that such measures are necessary to protect the environment." (WAC 173-340-7490(5)).

Sites that Ecology determines may present a threat to significant wildlife populations. This condition is intended to address exceptional and unanticipated situations involving potential threats to wildlife and therefore does not attempt to define "significant" wildlife

populations. However, the definition could be applied to wildlife of special concern to the public at a particular site, based on public comment received by Ecology.

There are no anticipated probable significant adverse impacts related to this criterion.

Simplified Terrestrial Ecological Evaluation (WAC 173-340-7492) Simplified terrestrial ecological evaluation procedure

This procedure may be used at all sites that do not meet any of the conditions requiring a Site-specific Evaluation. The Simplified Evaluation procedure was developed as an alternative to the site-specific approach that would be more straightforward and require less expertise. Because sites with endangered species or other ecological priorities are not eligible for a Simplified Evaluation, the procedure is based on a higher level of ecological risk than would otherwise be acceptable.

Elements of the Simplified Evaluation procedure are discussed below:

Minimal Exposure Potential

No further evaluation is required at small sites where the area of soil contamination does not exceed 350 square feet.

There is a potential for small areas of contamination to adversely affect wildlife if persistent bioaccumulative chemicals are present in high concentrations. However, these areas are likely to require remediation for the protection of human health.

Limited Exposure Potential

No further evaluation is required if a site is located in a developed area where soil is largely covered by buildings, roads, paved parking lots and other barriers limiting access to the soil. The evaluation (Table 749-1) adjusts exposure potential according to land use, habitat quality, and other factors that could affect the potential for wildlife exposure. Depending on the situation, the area of undeveloped land considered to represent limited potential for exposure ranges from 1.5 to 4 acres within 500 feet of the site. A potentially liable person who prefers not to conduct this analysis could use the more conservative 1.5-acre value. This option has also been included in Section 7491, where the emphasis is on simple conditions for obtaining an exclusion from further evaluation.

For listed bioaccumulative chemicals of concern, a more conservative range from 0.25 to 2.5 acres is used.

Impacts on plants and animals are not expected to be significant. Cleanups based on protection of human health, ground water or other media will mitigate adverse impacts on terrestrial ecological receptors. Moreover, the consequences of excluding a site from further evaluation when there is actually more than a limited potential for ecological exposure are constrained by requiring a Site-specific Evaluation at ecologically important sites.

No exposure pathways. This condition is similar to the exposure barrier exclusion in Section 7491, however a potentially liable person has the option of demonstrating to Ecology that a physical barrier other than those listed in Section 7491 will be equally protective.

There is some potential for future ecological exposure because complete physical containment of the hazardous substances is not required. Potential minor effects are the same as those described for the exposure barrier exclusion in Section 7491.

Contaminants analysis. No further evaluation is required unless one or more of the Priority Contaminants of Ecological Concern listed in Table 749-2 7 is present within six feet of the soil surface, and at higher concentrations than those listed in the table. If these concentrations are exceeded a potentially liable person has the options of remediating soil contamination that exceeds the tabled values, conducting testing to develop alternative standards, or conducting a Site-specific Evaluation.

The Table 749-2 Priority Contaminants of Ecological Concern list includes hazardous substances that are persistent, bioaccumulate, or are highly toxic. Chemicals that are unlikely to be encountered at MTCA sites have generally not been included in this list. Table 749-2 also includes soil concentrations that Ecology will accept as safe for plants and animals (or wildlife, for industrial and commercial land uses) at MTCA sites without any site-specific studies.

There is some potential for adverse impacts on plants and animals due to hazardous substances that are not included in Table 749-2 (e.g., volatile organic chemicals). However, adverse impacts that will continue indefinitely are not expected, because persistent chemicals that are likely to be encountered in site cleanups are included in Table 749-2. Adverse impacts from hazardous substances that are not listed in Table 749-2 should also be reduced by remediation based on protection of human health,

ground water, and aquatic life. Moreover, the potential magnitude of these adverse impacts is constrained by excluding use of the Simplified Evaluation procedure at more ecologically important sites.

Site-specific Ecological Evaluation (WAC 173-340-7493). Site-specific terrestrial ecological evaluation procedures)

The Site-specific Evaluation procedure includes requirements established to maintain a consistent level of ecological protection at all sites where the procedure is used. At the same time, the procedure also provides the opportunity for a potentially liable person to conduct measurements that can be used to develop site-specific standards that are ecologically protective within this policy framework. Because the procedure is flexible, professional judgement based on expertise in ecological risk is required. For example, an evaluation based on potential threats from PCB contamination to plants would not be acceptable because threats to wildlife are a greater concern with PCBs. Consequently, for sites where Ecology is involved, the planning and execution of a site-specific evaluation must be conducted in consultation with the Department. A person conducting an independent cleanup may conduct a Site-specific Evaluation without consulting Ecology, but the Department will eventually review the cleanup to determine whether it is acceptable and can require further cleanup.

Plants and animals may be adversely affected where policy decisions made in a site-specific evaluation result in a lower level of protection. These decisions include the choice of plants or animals to be included in the evaluation, exposure assumptions, and the selection of studies to be used in the evaluation from a range of possibilities in the scientific literature. Such decisions are constrained by the policy framework of the site-specific evaluation procedure, which primarily provides flexibility in using measurements of site-specific characteristics such as soil toxicity or contaminant bioavailability. Adverse impacts on plants and animals are therefore expected to be minor.

8.4.2.3 Summary

On a state-wide level, cumulative adverse impacts on terrestrial plants and animals are expected to be minor. A limit to any adverse impacts on terrestrial plants and animals is established by including an option for Ecology to depart from the prescribed procedures and require a further evaluation (WAC 173-340-7490(5)). Unusual site-specific circumstances that were not anticipated in developing these procedures can be evaluated under this option. As another safeguard, Ecology also has the option to

require a Site-specific Evaluation at any site that does not qualify for a Simple Exclusion where the Department determines that soil contamination may present a risk to significant wildlife populations (WAC 173-340-7491(2)(a)(iv)).

Residual adverse impacts on terrestrial plants and animals will also be reduced by MTCA requirements for the protection of human health, surface water, and other media.

9.0 IMPACTS ON LAND AND WATER USE

The presence of contamination in the environment can decrease the usability of the affected environmental media. This chapter provides an evaluation of the potential impacts of the alternatives on the loss of use of land and water resources. A variety of possible land and water uses were considered to complete this evaluation. They are drinking water, agriculture, ranching, hunting, fishing, logging, urban and suburban land uses, and recreation.

An example of a lost (or restricted) use is what happens when a ground water aquifer used to provide potable water to homes and/or businesses becomes contaminated. Such contamination can take several years to restore, assuming restoration is even possible. In the interim, wells may have to be abandoned and alternative water supplies found. If this is not feasible, treatment systems may need to be installed to enable continued use of the ground water. In either case, legal restrictions on the drilling of future wells in the area would be necessary to ensure future property owners and developers do not drill wells and become exposed to contaminated ground water.

9.1 ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

For the purposes of this analysis, an alternative that results in restrictions on land, surface water, or ground water use is considered to have adverse impacts on these resources. These restrictions may be a direct result of the contamination, as described in the above example. They may also be necessary to allow for safe remediation of the site (such as limiting access to the site during excavation). Whether these restrictions result in *probable significant adverse impacts* will depend on whether the restrictions would limit resources uses beyond what would normally occur (such as naturally non-potable water) or beyond what would be required by other laws (such as worker safety laws, land development ordinances and zoning). In this analysis, prolonged restrictions are assumed to have more of an adverse impact than short-term restrictions.

9.2 RISK ASSESSMENT

9.2.1 No Action Alternative (Current Rule)

As described in the preceding chapters of this Environmental Impact Statement, the current rule provides procedures for developing cleanup levels for ground water, soil,

surface water and ambient air. In general, these procedures use of applicable state and federal laws, Method A tables (for soil and ground water) and formulas and default assumptions for using risk assessment to calculate cleanup levels under Methods B and C. The current rule does not include any specific language about how risk assessments can be used in the remedy selection process.

For ground water, the current rule allows the establishment of cleanup levels for beneficial uses other than drinking water. If these cleanup levels are less stringent than drinking water cleanup levels, in most cases restrictions must be placed on the use of the ground water. For soils, cleanup levels can be established based on land uses other than residential (such as commercial and industrial). If this is done, restrictions limiting the use of the property are required. For any medium, if a Method C cleanup level or a conditional point of compliance is used, restrictions are also required.

The land and water use restrictions of these provisions were analyzed in the 1991 Environmental Impact Statement. Experience to date has shown that a majority of sites use Method A (residential) or Method B cleanup levels. At these sites, no restrictions are needed if the cleanup levels are actually achieved. As discussed earlier, most sites achieve these cleanup levels throughout the site and thus do not need restrictions. However, persons conducting cleanups at sites with extensive contamination where it is very expensive to meet cleanup levels throughout the site, often choose to use treatment or removal for the most contaminated areas, coupled with containment and/or a conditional point of compliance, and land and water use restrictions in order to achieve compliance. Experience to date has been that these restrictions generally do not limit use of the property or resources more than would already occur due zoning restrictions or through local development ordinances or other regulations.

9.2.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendment provides a similar framework as the current rule for developing cleanup levels. A general framework is provided for use of risk assessment in assessing remedies. Property and resource use restrictions are required in the same instances as described above in Section 9.2.1.

As described in the previous chapters of this Environmental Impact Statement, most changes in the proposed rule amendments are directed toward provided greater clarity in the use of site-specific risk assessment to establish cleanup levels and to assess the protectiveness of alternative cleanup plans. Based on Ecology's experience to date at sites using site-specific risk assessment, this approach can result in delayed site

cleanups while additional studies are conducted and more residual contamination being left at sites after cleanup. This could result in longer short-term limitations on use of the land or water until cleanup has been achieved, or in the case of greater residual contamination, more long-term restrictions. These impacts are most likely to be experienced at larger sites, since these are the sites most likely to take advantage of the increased flexibility. However, as with the current rule, it is not expected that these restrictions will limit the use of the property or resources more than would otherwise occur. For these reasons, it is not expected that this change will result in a probable significant adverse environmental impact.

Some minor impacts on land use during remediation can be expected. For example, if soil excavation is required, use of the site will be restricted during this excavation. However, since many cleanups are associated with property redevelopment, use of the property would be limited by normal construction activities anyway and the soil cleanup work, once underway, typically adds a few weeks or months to site development. Where higher soil cleanup standards are justified through a site-specific risk assessment, this time may be shortened somewhat. Similarly, lower soil cleanup standards may extend this time somewhat.

Ground water remediation may also have some minor impacts on land use. These remediation systems are usually mostly underground, with a small part of the surface of the site occupied by wells, connecting piping, and a treatment system. At most sites it is possible to install and operate these systems without precluding use of the remainder of the property.

While both the current rule and proposed amendments allow ground water cleanup levels to be based on beneficial uses other than drinking water, the amendments more specifically discuss these alternatives. These clarifications may lead to more cleanup sites seeking a non-potable ground water determination for their location, and thus more sites with long-term restrictions on the use of ground water after cleanup. This is not expected to result in probable significant adverse impacts since the ground water must be naturally non-potable to qualify for this classification.

The proposed changes to allow the application of an area-wide point of compliance for ground water cleanups will increase the area of ground water with residual contamination at sites using this provision. This would result in long-term restrictions on ground water use for a larger land area. It is expected that this provision will be used mostly in urban areas where the ground water is not currently being used since this is

where clusters of contaminated sites tend to occur and a public water supply is typically available.

Increased residual contamination levels may lead to an increase in restrictions on activities requiring earth moving or contact with contaminated ground water. This could lead to limitations on site development and construction and maintenance of underground utilities in areas of soil contamination and shallow ground water. However, even in these situations it is possible to return the land to some type of developed use, if that is the property owner's desired outcome.

Where the impacted resource is surface water, the cleanup plan may need to include restrictions on the consumption of fish or shellfish until the impacted area is restored. Many of these sites are in urban areas with restrictions on shellfish harvesting due to other urban impacts, such as storm water runoff or permitted effluent discharges.

9.3 PETROLEUM CLEANUPS

9.3.1 No Action Alternative (Current Rule)

The current rule provides Method A values for ground water and soil cleanup levels for TPH and individual contaminants contained in the various petroleum products. As noted earlier, this method is the only practical alternative available for determining ground water and soil cleanup levels for petroleum mixtures and discharge limits for oil/water separators are often used for surface water cleanup levels.

The impacts of these provisions on land and resource use were analyzed in the 1991 Environmental Impact Statement. Experience to date has been that a majority of petroleum-contaminated sites are able to clean up to the Method A or Method B cleanup levels and do not need restrictions on the land or water use after cleanup. Sites with extensive contamination, where it is not practical to meet cleanup levels, often choose to use excavation and treatment or disposal of the most contaminated areas coupled with containment and land and water use restrictions to achieve compliance.

9.3.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed changes to the current petroleum-related rule provisions were described in the preceding chapters of this Environmental Impact Statement. In general terms, these amendments include changes to several of the Method A soil and ground water

values, as well as changes to allow the calculation of site-specific petroleum cleanup levels and remediation levels.

If a site cleanup achieves the Method A ground water and soil cleanup levels for the petroleum constituents, no use restrictions are required by the proposed rule amendment. However, as discussed in Section 4.3.2, some sites that achieve the ground water cleanup levels may still have taste and odor impacts on the ground water, limiting its usability for drinking water purposes. For soil, the diesel and heavy oil cleanup levels may result in the soil retaining a petroleum odor. This may result in some minor impacts by limiting some future uses of these properties but should not preclude most types of development.

The changes providing for site-specific calculation of petroleum cleanup levels and remediation levels will likely result in higher residual petroleum contamination at sites. Depending on the outcome of these calculations, there may be some taste and odor impacts on the soil or taste and odor impacts on ground water that may limit some site or ground water uses. Similarly, sites using Method C cleanup levels are required to restrict future uses of the property or resource. However, as noted above, this may result in some minor impacts by limiting some future uses of these properties but should not preclude most types of development.

9.4 REMEDY SELECTION AND PERMANENCE

9.4.1 No Action Alternative (Current Rule)

The current rule, described in Chapter 2, establishes numerous criteria and requirements for selecting remedies. The environmental impacts of these provisions were analyzed in the 1991 Environmental Impact Statement. Since that analysis, experience to date has shown that many sites, especially smaller sites, have been able to restore the affected media to levels where restrictions on land or resource use are not necessary. For example, data from voluntary cleanup sites indicate that approximately 90 percent of these sites achieve cleanup levels and do not need restrictive covenants. Sites with more extensive contamination typically use excavation and treatment, coupled with containment and institutional controls to control exposure and minimize off-property migration. Even with such restrictions, these sites have been restored to productive use, and real estate transactions of property with these restrictions occur regularly.

One outcome of the Policy Advisory Committee Review was a finding that Ecology had not been very effective in following up with sites to make sure that the institutional controls had actually been implemented. Ecology has since followed up on sites where deed restrictions were not recorded, and improved its tracking of these restrictions.

9.4.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed amendments, described in Chapter 2, are intended to 1) clarify the remedy selection process and criteria, 2) ensure long-term protectiveness of cleanup, and, 3) simplify remedy selection for some sites through use of model remedies. Most of the remedy selection related amendments reflect practices that are already allowed under the current rule or are procedural changes and are not environmentally significant. Of the proposed changes, two have the potential for adverse environmental impacts – natural attenuation and dilution/dispersion.

Both of these proposed amendments may result in the increased use of institutional controls consisting of land and water use restrictions. However, as has been the experience under the current rule, these restrictions are not expected to significantly limit the use of these resources beyond what would normally occur, or beyond what other laws would require. Thus, these changes are not anticipated to have significant adverse impacts.

9.5 TERRESTRIAL ECOLOGICAL EVALUATION

9.5.1 No Action Alternative (Current Rule)

Under the no action alternative, potential terrestrial ecological impacts of contamination would continue to be evaluated on a site-by-site basis. See Chapter 8 of this Environmental Impact Statement for an evaluation of this alternative.

9.5.2 Proposed Action Alternative (Proposed Rule Amendments)

The proposed rule amendments provide procedures for ensuring that soil cleanups are protective of terrestrial plants and animals (Chapter 8). To the extent that containment is accepted in the procedure as a method for eliminating an exposure pathway, the procedures do provide an incentive for leaving contamination on some sites, rather than removing or treating the soil contamination. Containment, with institutional controls, will limit future uses of the affected land. However, the effect on land use is not expected to

be significant. Soil contamination that exceeds standards for protection of human health, ground water, and other media will be subject to the remedy selection process. Under that process, containment cannot be used unless it is justified under the remedy selection criteria. This should limit the number of sites where containment is selected to eliminate terrestrial ecological exposure pathways.

The proposed terrestrial ecological evaluation procedures also apply less stringent standards of protection to industrial and commercial sites than for other land uses. These include requirements on receptors to be protected (wildlife) that are less encompassing than for other land uses (wildlife, plants, and ecologically important functions of soil biota that affect plants and animals). In addition, the Simplified Evaluation exclusion relating to the area of undeveloped land at and near the site is less conservative for industrial or commercial sites than for other land uses. These requirements may influence land use decisions, such as decision not to convert an industrial site to other land uses. However, since land use decisions largely depend on zoning and market conditions, the Simplified Evaluation Exclusion is not expected to significantly change land use decisions.

10.0 REFERENCES

Cal EPA, 1984. Benzo[a]pyrene as a Toxic Air Contaminant. California Environmental Protection Agency Air Resources Board. July, 1984.

Cruzan, G., L.K. Low, G.E. Cox, J.R. Meeks, C.R. Mackerer, P.H. Craig, E.J. Singer and M.A. Mehlman. 1986. Systemic Toxicity from Subchronic Dermal Exposure, Chemical Characterization, and Dermal Penetration of Catalytically Cracked Clarified Slurry Oil. Toxicology and Industrial Health 2(4): 429-444.

DOE. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Prepared for the U.S. Department of Energy Office of Environmental Management. ES/ER/T-M-86/R3.

Duwamish Coalition. 1999. The Duwamish Brownfields/TPH Project Final Report. April 1999.

Feuston, M.H., S.L. Kerstetter, E.J. Singer and M.A. Mehlman. 1989. Developmental Toxicity of Clarified Slurry Oil Applied Dermally to Rats. Toxicology and Industrial Health 5(3): 587-599.

Washington State Department of Health. Health Consultation: Sternoff Metals Corporation (Sternco Site) Renton, King County. September 30, 1997. CERCLIS No. WAD047482757.

Model Toxics Control Act Policy (MTCA) Advisory Committee. 1996. Final Report. December 15, 1996.

State Environmental Policy Act (SEPA).

U.S. Department of Interior. 1987. Type B Technical Information Document: Injury to Fish and Wildlife Species, PB88-100169.

U.S. EPA. 1989. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A). Interim Final. EPA/540/1-89/002.

U.S. EPA. 1995. Technical Support Document for the Hazardous Waste Identification Rule: Risk Assessment for Human and Ecological Receptors. Volume I. Prepared for U.S. Environmental Protection Agency Office of Solid Waste. Contract No. 68-D2-0065, 68-W3-0028. (Section 4.0, p. 4-27).

U.S. EPA. 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. EPA 540-R-97-006. (Section 1.3.1).

Washington Administrative Code (WAC). Chapter 173-340.

Washington State Department of Ecology. 1990. Draft Environmental Impact Statement Cleanup Standards, Amendments to the Model Toxics and Control Act Cleanup Rule. Chapter 173-340 WAC.

Washington State Department of Ecology. 1991. Final Environmental Impact Statement Cleanup Standards, Amendments to the Model Toxics and Control Act Cleanup Rule. Chapter 173-340 WAC. January 1991.

Washington State Department of Ecology. 1991. Responsiveness Summary on the Amendments to the Model Toxics Control Act Cleanup Rule – Chapter 173-340 WAC. February, 1991.

Zangar, R.C., D.L. Springer, R.L. Buschbom, and D.D. Mahlum. 1989. Comparison of Fetotoxic Effects of a Dermally Applied Complex Organic Mixture in Rats and Mice. Fundamental and Applied Toxicology 13: 662-669.

Zartarian, V.G., and J.O. Leckie. 1998. Dermal exposure: The Missing Link. Environmental Science & Technology: 134A-137A.

11.0 GLOSSARY

cleanup standards	means the standards promulgated under RCW 70.105D.030 (2)(d).
exposure pathway	means activities that can result in a person becoming exposed to contamination. Examples are drinking contaminated water, eating contaminated fish or contacting contaminated soil.
default methods, values, and assumptions	The standard methods (typically equations) and pre-assigned values and assumptions specified in the rule when using risk assessment for deriving cleanup levels.
independent cleanup sites	Sites where the cleanup is not being overseen or approved by Ecology.
potentially liable person	The entity or person responsible for cleanup of a contaminated site.
residual contamination	The level and amount of contamination left at a site after cleanup.
sole-source aquifer	An aquifer formally designated by the federal EPA as the only source of ground water supply in a geographic area.
surrogates	means substances used to represent the noncancer toxicity of a portion of a mixture of petroleum hydrocarbons. For example, pyrene is used to represent the toxicity of the highest aromatic fractions.

APPENDIX A

Proposed Rule Amendments

If you need a copy of the proposed amendments, please call Carol Esget at (360) 407-7224 or email: cesg461@ecy.wa.gov. You may also obtain a copy by visiting our website at http://www.wa.gov/ecology/tcp/regs/reg_main.html

APPENDIX B

Distribution List

Cities, Counties, Ports

Washington Ports Association
Association of Washington Cities
County Planning Departments

Business Organizations

Washington Oil Marketers Association
National Federation of Independent Businesses
Association of Washington Businesses

Federal Agencies

U.S. Environmental Protection Agency Region 10
Department of the Navy

Universities

Washington State University
University of Washington

Environmental Organizations

Washington Environmental Council
Heart of America
Washington Toxics Coalition
Sierra Club
Waste Action Project
Friends of the Duwamish
People for Puget Sound
National Audubon Society
League of Women Voters

State Agencies

Washington State Department of Health
Washington State Department of Ecology Headquarters and Regional Offices
Washington State Department of Natural Resources
Washington State Department of Fish and Wildlife
Washington State Department of Transportation
Office of Financial Management

Office of the Attorneys General, Ecology Division
Pollution Liability Insurance Association
Washington State Department of Agriculture

Tribes of Washington

Yakima Nation
Squaxin Island Tribal Council
Muckelshoot Tribal Council
Port Gamble S'Klallam Tribe
Puyallup Tribe

Legislature

House Environmental Affairs
Senate Ways and Means Committee

Press

Associated Press
United Press

General Public/Stakeholders

All interested individuals and groups on the Department's EIS mailing lists.

APPENDIX C

Response to Comments on Draft Environmental Impact Statement

This responsiveness summary contains those comments directly pertaining to the Environmental Impact Statement. The text was excerpted from the comment letters received during the comment period for the proposed rule and draft EIS that closed on January 17, 2000. For a full record of all comments received on the rule revision including the draft EIS, please see the Concise Explanatory Statement for the proposed Model Toxics Control Act rule revision. The comment numbers noted in this summary correspond directly to those included in the appendices of the MTCA Concise Explanatory Statement.

Comment letters with comments specific to the draft EIS received from the following individuals:

U.S Environmental Protection Agency
Risk Evaluation Unit
1200 Sixth Avenue
OEA-095
Seattle, WA 98101

Duwamish Coalition
TPH Project Oversight Group (POG)
Numerous members

Michael B. Gillett, PS
9032 Burke Avenue North
Seattle, WA 98103

Greg Wingard
Waste Action Project
Via email attachment

Roger Herbst
Washington Environmental Council
Via email attachment

Association of Washington Businesses
Grant Nelson
PO Box 658
Olympia, WA 98507-7600

Aluminum Company of America
A. B. Piecka
6200 Malaga/Alcoa Hwy
Malaga, WA 98828-9728

DEIS Comment 55
EPA

Page 34, Dermal Exposure Pathway:

1. The first statement in this section of the draft EIS read as follows:

The proposed rule amendment requires evaluation of the dermal pathway whenever a site-specific risk assessment results in dermal becoming a potentially significant exposure pathway.
The exact language of the proposed amendments reads as follows (WAC 173-340-740(3)(c)(iii) and 745(5)(c)(iv)):

For hazardous substances other than petroleum mixtures, dermal contact with the soil shall be evaluated whenever the proposed changes to the standard [Method B or Method C] equations or default values would result in soil cleanup levels that are high enough that dermal contact could become a significant potential exposure pathway.

The EIS language should be amended to straightforwardly acknowledge that the proposed amendment language does not explain what constitutes a "significant potential exposure pathway," and that, therefore, it is not clear what circumstances might trigger the requirement to evaluate dermal exposure to soil in addition to ingestion.

Response:

Suggestion noted. EIS amended to acknowledge that it is a site-specific decision on whether the dermal pathway is evaluated at a specific site.

DEIS Comment 56
EPA

2. The second and third sentences in this section of the draft EIS read as follows:

This is because dermal absorption (absorption of contaminants through the skin) can be an important exposure pathway (Zartarian, 1998 and DOH, 1997.) As can be seen in Table 3.2.c, inclusion of the dermal pathway in the direct contact soil calculation, using the default assumptions in the proposed rule amendments, has only a minor effect on soil concentrations for unrestricted land use.

There is no reference of "DOH, 1997" in the references. It appears this reference may be the one listed as "Health Consultation: Sternoff Metals Corporation" on page 96 of the draft EIS. This reference should be corrected and placed in a correct alphabetic manner in the list of references. Table 3.2.c cannot be presented or otherwise alluded to as a comprehensive presentation of how inclusion of dermal contact with contaminated soil would affect cleanup levels, since only a selection of chemicals are included in the table. It would be acceptable to state that the inclusion of dermal contact has more impact on cleanup levels derived for direct contact under section 745, since the default assumption of incidental soil ingestion is 25% of that under section 740, rendering dermal contact of more relative importance.

Response:

DOH, 1997 reference corrected.

Ecology concurs that dermal contact has more affect on cleanup levels for industrial soil ingestion primarily because there is less soil ingestion (thus dermal exposure becomes relatively more important). Ecology concurs that Table 3.2.c is not a comprehensive look at all hazardous substances; however, we believe that the values in Table 3.2.c are representative of the classes of contaminants likely to be found at contaminated sites (metals, volatile organic compounds and other organic hazardous substances), and thus the conclusion reaches beyond just the substances in this table.

DEIS Comment 57
EPA

3. The second-to last sentence in this section of the draft EIS reads as follows:

It should be noted that for most of these chemicals, the soil cleanup level would be controlled by the leaching pathway, not direct contact, so most sites would not be affected by this change.

First, it is not clear what is meant by the term "these chemicals." Is the statement limited to the chemicals listed in Table 3.2.c of the draft EIS? This should be clarified. Even so, it is not possible to state with any assurance that the leaching pathway would be the risk driver for any group of chemicals. This discussion pertains only to site-specific risk assessments (i.e., Modified Methods B and C), and therefore, the leaching pathway may be considerably less important, or even discounted, depending on the site. For example, cleanup levels for soil at a site in the desert where ground water is hundreds of feet below ground surface may be more important for direct contact with soil than as a source to ground water, if the use of partitioning models or other allowed demonstrations so indicates. Likewise, cleanup levels for soil at a site where ground water is not potable and does not immediately discharge to surface water may be controlled by direct contact, not leaching to ground water. This statement should be amended to state correctly that dermal contact, like incidental soil ingestion, will not affect soil cleanup levels when the leaching pathway requires a lower cleanup level than does direct contact with the soil.

Response:

Suggested change made to text. See also response to comment #56.

DEIS Comment 148
TPH POG

Attachment IV
Comments on the Draft Environmental Impact Statement
For the MTCA Proposed Rule Amendments

Overall Comment

The document repeatedly refers to petroleum cleanups as pertaining to Method A or to site-specific risk assessments under Methods B and C (i.e., modified Methods B and C). Standard Methods B and C are also appropriate for petroleum cleanups. If the use of the term "site-specific" in these contexts simply refers to the site specificity of TPH fractions, the term is used incorrectly in the context of MTCA.

Response:

As used in the EIS, "site-specific" is intended to include site-specific petroleum analyses. A statement to this effect has been added to Section 1.6.2.

DEIS Comment 149
TPH POG

Page 14, Section 1.6.2, Petroleum Cleanups

In the first paragraph, it should be made clear that both standard and modified Methods B and C are appropriate for petroleum cleanups.

In the second paragraph, it would be informative to the reader to make the observation that some proposed Method A TPH values are higher than existing values, not just lower. (It is understood that the main purpose of this document is to evaluate potential adverse effects of the proposed amendments, but for perspective, additional information would be appropriate in this case.)

Third paragraph: Delete the term "site-specific" in the first sentence, as it implies it is only for modified Methods B and C. The second sentence reads as follows:

These methods are based on the ASTM Risk-Based Corrective Action (RBCA) model, modified to make it compatible with the existing MTCA framework.

It is suggested that the sentence be changed to the following, for accuracy:

These methods are loosely based on the tiered approach of the ASTM Risk-Based Corrective Action (RBCA) model and incorporates the concept of using petroleum fractions first put forth by the TPH Criteria Working Group to evaluate the toxicity of TPH components as well as to evaluate their fate and transport characteristics in the environment.

The third sentence states that the TPH methods proposed will likely result in "some delays in cleanups." The POG does not agree that the TPH cleanup program is likely to cause such delays, unless this is meant to be a strict comparison of Method A with Methods B and C; in that case, it is not different from any non-TPH site cleanup where Method A is an option. There is nothing inherent about the proposed TPH requirements for establishing cleanup levels or conducting site cleanups that would result in delays in cleanups.

Response:

a. Ecology acknowledges that both standard and modified Methods B and C can be used, as appropriate, to establish site-specific petroleum cleanup levels. These terms are introduced later in the EIS.
b. Ecology acknowledges that some proposed Method A values are higher than current values. This is discussed later in the EIS.

c. Site-specific is intended to include site-specific petroleum analyses and is not intended to imply only use of modified Methods B and C. See response to comment 56.
d. Comment noted. A change has been made to the text. It should be noted that the MTCA rule has always incorporated a tiered approach (although that term is not used in the rule), similar to the RBCA process. What is meant by saying MTCA is based on the RBCA process is that MTCA uses petroleum fractions and provides for a tiered process to develop TPH cleanup levels.
e. Ecology disagrees with the POG's contention that use of site-specific risk assessment (SSRA) will not delay cleanups. Experience to date with sites that have used site-specific risk assessment is that some delay will likely occur due to the additional testing and research required to develop appropriate alternative assumptions. By expanding use of SSRA, it is only logical that additional delay in site cleanup will occur. However, as noted in the analysis, it is not expected that these delays will result in significant adverse environmental impacts because of the safeguards built into the rule.

DEIS Comment 150
TPH POG

Page 14, Section 1.6.3, Remedy Selection and Permanence

The first sentence states that the proposed amendments are, for the most part, "intended to clarify the existing rule and Ecology policies, without introducing policy changes." There are a number of changes in the proposed amendments, which are policy-related, e.g., the acceptable uses of natural attenuation and dilution/dispersion. It is recommended that this document delineate those changes in Remedy Selection and Permanence, which are the results of policy changes.

Response:

EIS revised to note that with the exception of natural attenuation and dilution/dispersion, the amendments related to remedy selection reflect current policy practice.

DEIS Comment 151
TPH POG

Page 22, fourth bullet item:

This item explains that the proposed amendments will require that free product be removed at all sites, instead of just at underground storage tank sites, as is the case in the current rule. It then states that this change "reflects current practice." It is the POG's impression that free product is not always required to be removed from MTCA sites that are not underground storage tanks under the current rule, and that this change is a significant one (and one that the POG agrees with). The POG suggests that Ecology check the accuracy of this statement, and change it to reflect the significance of the change.

Response:

Ecology has queried site managers with regard to free-product removal. They have confirmed that free-product removal to the extent practicable is always required at contaminated sites. This is typically a low cost, high benefit step in the cleanup process.

DEIS Comment 152
TPH POG

Page 32, Land Use:

The third sentence states that the soil leaching pathway controls the soil cleanup levels at most sites (as opposed to direct contact with soil), and that "land use is irrelevant in setting the soil cleanup level." Direct contact is important for soil overlying an aquifer, which is nonpotable and does not immediately discharge to surface water; and may be important in a remediation circumstance where groundwater cleanup levels are not achieved. In addition, the importance of direct contact v. leaching is site- and chemical-specific. These issues should be discussed in this section.

Response:

EIS text changed to note the sites at which direct contact MAY BE an important pathway of concern.

DEIS Comment 153
TPH POG

Page 39, first paragraph:

The first sentence should be revised by deleting the term "site-specific risk assessment under" [Methods B and C]. As noted previously, the proposed amendments for petroleum apply to both standard and modified Methods B and C.

The third sentence refers to the surrogate method for calculating cleanup levels as a "nationally accepted approach." This is somewhat of an overstatement, in that only a few states have adopted the approach, and there is no national body which uses it.

Response:

See response to Comment 148 regarding use of site-specific risk assessment in the EIS as it pertains to petroleum contamination. As for "nationally accepted", the text has been changed to avoid the impression of universal acceptance nation-wide.

DEIS Comment 154
TPH POG

Page 39, second paragraph:

This states that Ecology can require more stringent cleanup levels if "residual contamination causes odors that threaten human health or the environment." The POG is unaware of a situation wherein an odor could threaten human health. References to commercial property should be changed to industrial property.

Response:

Ecology believes it has statutory authority to require additional cleanup beyond health-based standards when site specific conditions indicate an adverse impact to human health or the environment may still exist at the health based standard. For example, it has been Ecology's experience at sites that petroleum odors can cause people to become nauseous and render a structure uninhabitable even though available health standards may not have been exceeded.

Since petroleum releases are most often connected to commercial land uses (such as gas stations), the statement is correct. Industrial land uses have been added in response to this comment.

DEIS Comment 155
TPH POG

Page 42, Section 3.5.2, Proposed Action Alternative (Proposed Rule Amendments), Terrestrial Ecological Evaluation:

This states that the proposed amendments are "not expected to result in higher levels of residual soil contamination." This is not true for TPH at commercial/industrial sites.

Response:

Ecology believes this is a true statement because petroleum contamination typically occurs at commercial and industrial facilities where the primary concerns are with ground water or surface water protection or human health impacts. Additional explanation has been added to the final EIS.

DEIS Comment 156
TPH POG

Page 47, Table 4.2
For the description of how free product is regulated under the proposed amendments, add "at the point of compliance" after "Must remove free product at all sites" for clarification purposes.

Response:

The requirement that free product be removed is not intended to be limited to free product at the point of compliance, it is meant to apply throughout the site.

DEIS Comment 157
TPH POG

Page 52, second and third paragraphs:

The discussion should be changed to reflect the fact that both standard and modified Methods B and C are available for cleanups of petroleum-contaminated sites. Statements concerning "odors that threaten human health" are repeated in the third paragraph.

Response:

EIS text modified to reflect both standard and modified Methods B and C. With regard to odors, it is Ecology's experience that petroleum odors can render a water unusable for domestic purposes, even though a health-based standard may not have been exceeded. To the extent this occurs, Ecology believes it has statutory authority to require additional cleanup beyond health based standards when site-specific conditions indicate an adverse impact to human health or the environment may still exist at the health-based standard.

DEIS Comment 171
Gillett

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The State Environmental Policy Act (SEPA) requires that all "major actions significantly affecting the quality of the environment" be accompanied by an environmental impact statement that, among other things, identifies "alternatives to the proposed action". The Draft Environ-mental Impact Statement (DEIS) for the proposed amendments identifies only three alternatives: "No Action alternative (existing MTCA rule unchanged)", Proposed action alternative (adoption of the proposed rule amendments)", and "Policy and Guidance alternative (publishing of policies and guidance in lieu of the proposed rule amendments). Having identified these three amendments, the DEIS discards the third one from further analysis because "changes to requirements in the rule cannot be enforced through policy and guidance documents." Therefore, the DEIS' evaluation and comparison of environmental impacts is limited to the current rule and the proposed rule. This inadequate approach skews the analysis in favor of Ecology's preferred alternative.

This completely ignores at least two obvious reasonable alternatives. First, it does not consider an alternative that is limited to implementing the PAC recommendations. Ecology is, of course, aware of this alternative. For some 3? years, it has been the alternative advocated by several former PAC members, as well as representatives of the state's business community. The AWB discussion draft was based on this approach.

A second alternative not considered in the DEIS is implementation of the POG's unaltered recommendations for petroleum cleanups. Again, Ecology is aware of this alternative. It participated as a member of the POG, and adopted portions of the POG's recommendations but rejected others. As with the PAC recommendations, several POG members and others have specifically urged Ecology to accept all of the POG recommendations without modification.

To simplify the consideration of alternatives, it could be argued that the PAC alternative and the POG alternative be combined into one. After all, the PAC did endorse the process by which the POG was developing provisions for petroleum cleanups. However, it is unreasonable for Ecology to have failed to even consider these alternatives, whether separately or combined.

Response:

As is discussed in Section 1.1, while the PAC recommendations were the basis for many of the proposed changes, they are not the sole source of the proposed revisions. It is not possible to craft an alternative that incorporates only PAC recommended changes because the PAC recommendations were typically broad policy statements, not specific rule language. Similarly, while the technical approaches discussed by the

POG are the basis for many of the proposed changes, they are not the sole source of the proposed revisions. It is not possible to craft an alternative that incorporates only POG recommended changes because the POG recommendations did not take the form of an alternative rule but rather consist of a series of evolving technical recommendations and comments made on earlier drafts of the rule. Ecology believes it has made a good-faith effort to craft a rule consistent with the recommendations of both of these groups while addressing concerns raised by the MTCA Science Advisory Board, and the public during the rulemaking process. As part of the final EIS, a review was conducted of the Association of Washington Business (AWB) October, 2000 draft rule, provided during the public comment period. That review is addressed in Section 2.4 of the Final EIS.

DEIS Comment 1082
Wingard

If Ecology action (or lack of action) at this site is indicative of how the revised MTCA will be implemented, please indicate how the environmental impacts related to such action(s), or lack of same, were scoped, analyzed, and mitigated for in the MTCA Rule Amendments Draft Environmental Impact Statement.

Response:

This non-project SEPA analysis doesn't evaluate specific projects or sites. To the extent that the amendments to the MTCA cleanup regulation may affect specific projects or sites, those amendments were evaluated as part of this programmatic SEPA analysis. All site-specific MTCA actions, including independent remedial actions, are required to comply with SEPA, to the extent required under Chapter 197-11 WAC. Questions pertaining to specific site actions should be addressed directly to the appropriate regional office, Toxics Cleanup Program—in this case, the Northwest Regional Office.

DEIS Comment 1083
Wingard

I am interested in how Ecology plans to implement the MTCA Rule revision at sites (including independent remedial actions) in such a way as to not constitute a take of a listed species, such as the Chinook Salmon, and Bull Trout.

Response:

The Federal Endangered Species Act (ESA) is an applicable law under MTCA and was considered during preparation of the EIS. Because technical requirements resulting from the listing of salmon and bull trout are still evolving, no specific amendments were proposed to MTCA to address this emerging concern. However, any site-specific cleanups that could result in a "take" of a listed species must be evaluated in light of the ESA. Under MTCA, Ecology has the authority to require more stringent cleanups, if required under the ESA.

DEIS Comment 1084
Wingard

Also, what specific action is, or will Ecology take to address this specific site, SeaCon, in South Park?

Response:

This non-project SEPA analysis doesn't evaluate specific projects or sites. To the extent that the amendments to the MTCA cleanup regulation may affect specific projects or sites, those amendments were evaluated as part of this programmatic SEPA analysis. All site-specific MTCA actions, including independent remedial actions, are required to comply with SEPA, to the extent required under Chapter 197-11 WAC. Questions pertaining to specific site actions should be addressed directly to the appropriate regional office, Toxics Cleanup Program—in this case, the Northwest Regional Office.

DEIS Comment 1085
Wingard

The second site is the SeaTac International Airport, run by the Port of Seattle. It has come to my attention, that the Northwest Regional Office of Ecology, has reached agreement with the Port of Seattle on a criteria for contaminated fill for import into SeaTac Airport, and used as part of the proposed Third Runway Project, and other construction related projects at this site. This agreement is embodied in the "Clean Fill Criteria", sent from the NRO to Ecology Headquarters . The document defines clean fill as that fill which in most cases does not exceed the MTCA method A standards, with allowance for exceeding the standard, on a case by case basis. Besides the use of the term clean fill being an obscene perversion of the English language, in this instance, a number of concerns are raised. It was never intended, and is an incredible abuse of the MTCA standards, to use them to define clean fill so as to allow a polluter to place contaminated fill in a previously uncontaminated area, and contaminate that area up to or in exceedance of the MTCA method A standards. The MTCA standards are to be used to provide standards for the cleanup of contaminated sites, not as permissible levels of contamination that polluters can get away with. It is hard to comprehend why anybody in Ecology would advocate for allowing polluters to create new contaminated sites by importing contaminated waste into clean sites, or uncontaminated portions of a site. At SeaTac Airport, the primary area the fill is proposed to be placed in is the west side of the airport, a location that Ecology has stated as a matter of record , is currently uncontaminated. The area is also currently a major source of immediate recharge for Walker Creek, and Miller Creek. It is also overlying, a provides some level of recharge to a sole source aquifer, the Highline Aquifer, the source of drinking water for hundreds of thousands of people. To allow polluters to contaminate property that is currently not contaminated, which recharges critical salmon bearing streams, and overlays a sole source aquifer up to, or in exceedence of the MTCA standards, is in my opinion criminal, and must not be allowed under the revised MTCA regulations. Please explain how gross abuses of the MTCA regulations, such as the above example, will be prevented under the revised rule. Please explain how the impacts of the use of the MTCA regulations in the manner explained above, and documented in the Ecology policy document entitled, "Clean Fill Criteria" (cited above), was considered, and addressed, or mitigated in the Model Toxics Control Act Proposed Rule Amendments, Draft Environmental Impact Statement, November 17, 1999.

Response:

The MTCA cleanup standards are not intended to define what is "clean fill" under other laws. While it is possible that the standards defining what is "clean fill" could end up the same as the MTCA cleanup standards, any such standards must be established under the processes provided for under these other laws. Use of the MTCA cleanup standards in this manner under other laws, whether appropriate or not, was not specifically addressed in the MTCA rule amendments or analyzed in the EIS. This is because use

of the MTCA cleanup standards in this manner would require speculation beyond what is statutorily authorized. Such concerns must be addressed under these other laws or through the permitting process for a specific site under these other laws.

DEIS Comment 1086
Wingard

At the same site, SeaTac Airport, there is another agreement with the Port of Seattle which would allow contractors to disturb MTCA wastes, in MTCA site(s), without addressing the wastes they uncover, with the exception of the wastes they actually excavate while working. The following letter(s) addresses this issue.

[Editor's Note: The letters are incorporated by reference. Please refer to the original comments.]

Please explain how the revised rules will prevent this kind of piece-mealing, and bad practices from being implemented. If the MTCA rule revisions will not prevent such piece-mealing, and bad practices, please explain how the Draft EIS considered, analyzed, and mitigated for impacts such as those outlined above.

Response:

The current MTCA rule addresses partial site cleanups to some extent in WAC 173-340-430 and WAC 173-340-700(7)(l). These provisions are not substantially altered by the proposed amendments (the later provision is moved to WAC 173-340-702(9)) and as such, were not evaluated in detail in the EIS. In general, Ecology implements MTCA in such a way that sites are addressed in their entirety, rather than piecemeal, although this can vary on a site-specific basis. Concerns such as this need to be expressed during the site-specific MTCA or SEPA public review process.

DEIS Comment 1156
Herbst

A. Potential for arbitrary weakening of default equations for site specific cleanup

(WSR pg. 130). WAC 173-340-420 periodic review: when required, periodic reviews shall be conducted by the department at least every 5 years after the initiation of a cleanup action.

periodic reviews required at the following sites:
...
(d) Where , in the departments judgment, modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at a site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional follow up review is necessary to assure long-term protection of human health and the environment.

[WEC comment: If in the departments judgment, such modifications using site specific information might threaten human health or the environment, why would it be approved in the first place?]

[WEC comment: In Section 1.6.1 of MTCA Proposed Rule Amendments DEIS, Site-Specific Risk Assessment, pg. 13 states "If inappropriate changes are made to risk assumptions, there is a potential for underestimating the risk to human health..... Based on Ecology's experience with use of site-specific risk assessment under the current rule, increased use of Site Specific Risk Assessment
can result in more delays and increased concentrations of contamination remaining at sites after cleanup".]

Response:

While there is a potential for arbitrary weakening of the default cleanup levels, Ecology does not believe that this will be a likely outcome of the proposed amendments. The potential for site-specific risk assessments (SSRA) to underestimate human health risk and delay cleanups was recognized during the PAC process and is acknowledged in this EIS. As noted in this EIS, the rule amendments contain several provisions intended to constrain the use of SSRA (consistent with PAC recommendations) so that these impacts are minimized. Included in these amendments is the cited provision in periodic reviews, which Ecology believes is an appropriate further safeguard to assure the long-term protection of human health and the environment.

DEIS Comment 1166
Herbst

I. Degraded aesthetics for petroleum cleanups.

Section 1.6.2 of MTCA Proposed Rule Amendments DEIS, Petroleum Cleanups, notes: several method A values for petroleum-related substances are higher, so three will be higher contamination. Although values are "expected" to be protective of human health and the environment, some taste and odor impacts to water and odor impacts to soil could result.

use of ASTM risk based corrective action model, will likely result in higher levels of petroleum contamination, so taste and odor may be impacted

[WEC comment: Such aesthetic degradation of resources is contrary to the spirit of the original MTCA Rule.]

Response:

Ecology concurs that aesthetic degradation of resources as they may adversely impact human health or the environment, is contrary to the statutory intent. Ecology has the responsibility to ensure that cleanups conducted under MTCA are protective of human health and the environment. Under the existing rule, Ecology may establish cleanup levels that are more stringent than those required by the rule when, based on a site-specific evaluation, the department determines it necessary to protect human health and the environment.

DEIS Comment 1182
Nelson

IV. Environmental Impact Statement Comments

The State Environmental Policy (SEPA), RCW 43.21C requires that an Environmental Impact Statement (EIS) be submitted for all "major actions significantly affecting the quality of the environment." The statute further requires that the EIS list "alternatives to the proposed action." The Draft EIS submitted by Ecology is deficient is several key areas:

- The EIS inadequately identifies only two plausible alternatives: (1) No Action Alternative (existing MTCA rule unchanged); and (2) Proposed Action Alternative, (adoption of the proposed rule amendments).

- The EIS completely ignores two alternatives: (1) Implementing the PAC recommendations which AWB supported; and (2) implementation of the Project Oversight Group's recommendations for petroleum cleanups.

Response:

As is discussed in Section 1.1, while the PAC recommendations were the basis for many of the proposed changes, they are not the sole source of the proposed revisions. It is not possible to craft an alternative that incorporates only PAC recommended changes because the PAC recommendations were typically broad policy statements, not specific rule language. Similarly, while the technical approaches discussed by the POG are the basis for many of the proposed changes, they are not the sole source of the proposed revisions. It is not possible to craft an alternative that incorporates only POG recommended changes because the POG recommendations did not take the form of an alternative rule but rather consist of a series of evolving technical recommendations and comments made on earlier drafts of the rule. Ecology believes it has made a good-faith effort to craft a rule consistent with the recommendations of both of these groups while addressing concerns raised by the MTCA Science Advisory Board, and the public during the rulemaking process. As part of the final EIS, a review was conducted of the Association of Washington Business (AWB) October, 2000 draft rule, provided during the public comment period. That review is addressed in Section 2.4 of the Final EIS.

DEIS Comment 1291
Piecka

The Relative Significance of the PAC Process is Understated

The DEIS reports that MTCA amendments were developed to implement recommendations provided by the PAC and the MTCA Science Advisory Board, to meet required rule update requirements, to reflect Department policies, and to clarify the readability of the current rules. ALCOA believes that the MTCA PAC, mandated by Engrossed Substitute House Bill 1810, should have been the most important source of ideas and suggestions for MTCA revisions. All of the other contributing factors were supplemental to the PAC, and not in our opinion, of equal significance.

The DEIS fails to clearly state under Section 1.1 Purpose and Need, that the fundamental reason that the MTCA amendments were necessary was because of a common concern that MTCA cleanups were too inflexible, procedural and costly. The PAC committed to a common goal, namely to find ways to make MTCA cleanups faster, easier to understand and implement, more innovative, and less expensive. The recommendations of the SAB on several key issues were the result of PAC requests and ideas; similarly the department policies were provided to add clarity and direction. Unfortunately additional non-PAC programs including dermal and vapor exposure pathways were added resulting in the elaborate rule revision that exists today.

Response:

Ecology concurs that the PAC recommendations were an important basis for many of the rule revisions and that several recommendations from other groups such as the POG and SAB stemmed in part from the PAC recommendations. However, it is also important to note that the POG and SAB reviews were initiated prior to the PAC process, and that the SAB has independent statutory authority under MTCA. Also, the PAC process did not supplant other statutory obligations. As such, Ecology believes it is necessary to integrate all recommendations together in the most coherent fashion possible. It should be noted that the added complexity of the rule including the manner in which the dermal and vapor pathways are considered is, in part, a direct result of the PAC recommendations.