



DEPARTMENT OF
ECOLOGY
State of Washington

Model Remedies for Sites with Petroleum Impacts to Groundwater

Toxics Cleanup Program

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Acronyms & Abbreviations

Acronym or Abbreviation	Definition
CAP	Cleanup Action Plan
CLARC	Cleanup Level and Risk Calculations
CSM	Conceptual Site Model
CUL	cleanup level
CPOC	conditional point of compliance
CSWGP	Construction Stormwater General Permit (CSWGP)
EC	equivalent carbon
EPA	Environmental Protection Agency
EPH/VPH	extractable petroleum hydrocarbons / volatile petroleum hydrocarbons
HQ	hazard quotient
ISIS	Integrated Site Information System
L&I	Washington State Department of Labor & Industries
MTCA	Model Toxics Control Act
NFA	no further action
NWTPH	Northwest Total Petroleum Hydrocarbon Method
PCBs	polychlorinated biphenyls
PLP	potentially liable person
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
TCLP	Toxicity Characteristic Leaching Procedure
TCP	Toxics Cleanup Program
TPH	total petroleum hydrocarbons
TPH-Dx	total petroleum hydrocarbons – Diesel Range Organics
TPH-Gx	total petroleum hydrocarbons – Gasoline Range Organics
UST	underground storage tank
VCP	Voluntary Cleanup Program
VI	vapor intrusion
VOCs	halogenated volatile organic compounds
WAC	Washington Administrative Code

Summary: Model Remedies for Sites with Petroleum Impacts to Groundwater

To help streamline and accelerate the pace of cleanups, the Washington State Department of Ecology (Ecology) is developing standardized cleanup methods called “model remedies.” If a site meets the eligibility criteria and individual provisions for a particular model remedy, that cleanup method can be selected and implemented. Once the requirements for using a model remedy are met, it will not be necessary to conduct a Feasibility Study or Disproportionate Cost Analysis or to submit Ecology review fees with a no further action request. Any requests for Ecology oversight or feedback prior to submitting an application for a no further action determination must include the appropriate review fees.

Twelve model remedies have been developed for sites that have petroleum impacts to groundwater. They are discussed in Chapter 6 of this document.

This guidance is a companion to Ecology’s [Model Remedies for Sites with Petroleum Contaminated Soils](#) (Ecology 2017). In 2018, Ecology will evaluate whether developing model remedies for sites with other types of contamination would be beneficial.

Introduction: Determine If Using a Model Remedy Is Appropriate

Information must be gathered and analyzed prior to selecting and implementing a model remedy for a site. The following chapters provide detailed information to assist in this effort. Chapters 3 and 6 are critical for assessing if it is appropriate to use a model remedy:

- Chapter 1:** What changes to the Model Toxics Control Act (MTCA) cleanup regulations affect model remedy development.
- Chapter 2:** What is the purpose of Model Remedies.
- Chapter 3:** What eligibility criteria must each project meet.
- Chapter 4:** How the model remedies meet the remedy selection and the compliance monitoring requirements of MTCA.
- Chapter 5:** Additional provisions for addressing the direct contact and vapor intrusion pathways.
- Chapter 6:** What are the twelve model remedies, and which provisions apply to each one.

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Chapter 1: Changes to MTCA Affect Model Remedy Development

In 2013, the Washington Legislature made significant changes to the Model Toxics Control Act (MTCA). One of the provisions gave additional direction to Ecology regarding the establishment of model remedies. In response to the 2013 legislative amendments, Ecology has assembled information in this document to establish model remedies for sites with petroleum impacts to groundwater. This guidance is a companion to Ecology's [Model Remedies for Sites with Petroleum Contaminated Soils](#) (Ecology 2017). During 2018, Ecology will evaluate whether developing model remedies for other types of contamination would be beneficial.

MTCA regulations ([WAC 173-340-390](#)) specify that Ecology must identify the circumstances under which application of a model remedy meets the requirements for selection of cleanup actions established under [WAC 173-340-360](#). If a site meets the requirements for use of a model remedy, it is not necessary to conduct a Feasibility Study ([WAC 173-340-350\(8\)](#)) or a Disproportionate Cost Analysis ([WAC 173-340-360\(3\)](#)).

A Feasibility Study evaluates and screens potential remedial technologies that may be appropriate for addressing contamination at a particular site. A Disproportionate Cost Analysis compares more costly remedial actions against the most practicable permanent remedy to determine whether the increased costs are warranted. If the cost to implement the more aggressive remedy is significantly higher than the incremental increase in benefits achieved, then selection of the more costly remedy is not required.

The 2013 legislative changes also provided Ecology the option to waive fees for the time spent reviewing no further action (NFA) requests at cleanups that qualify for and appropriately use a model remedy. As a matter of policy, Ecology will not require a fee to review no further action requests for sites in the Voluntary Cleanup Program (VCP) if the selected remedy meets the specified criteria and implementation follows the provisions set forth in this document.

The 2013 legislative changes require that development of model remedies include the following elements:

- Requirements for characterizing a site;
- A description of how the model remedy meets the cleanup standards and remedy selection provisions in MTCA;
- Monitoring requirements; and
- Public notice and the opportunity to comment on the proposed model remedy and the conditions under which it may be used.

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Chapter 2: Purpose of Model Remedies

The purpose of model remedies is to streamline and accelerate the selection of cleanup actions that protect human health and the environment, with a preference for permanent solutions to the maximum extent practicable. This document provides information to establish model remedies for cleanup at sites with petroleum impacts to groundwater, including: a) the eligibility criteria each project must meet, and b) a discussion of how the model remedies comply with the requirements of MTCA. Specific data from sites that received an NFA determination between January 2012 and June 2015 were used to identify remedies that have successfully met the requirements in MTCA. The data formed the basis for establishing twelve model remedies, as well as the criteria that apply to each individual remedy. Appendix A identifies the provisions that must be evaluated and implemented for all selected model remedies.

Before considering a model remedy, the following steps in the remedial process must have already been completed:

1. A release to the environment has been confirmed;
2. Ecology has been notified of the release;
3. Emergency/Interim Actions have been implemented (if appropriate); and
4. An adequate site characterization has been completed.

Ecology previously developed guidance to address these steps in the cleanup process, so details for completing them are not included here. The model remedies in this document do not apply to sites with petroleum impacts to surface water, sediments, or water supply wells. Therefore, it is strongly recommended that the applicable provisions found in Chapters 4 through 7 of Ecology's [*Guidance for Remediation of Petroleum Contaminated Sites*](#) (Ecology 2016) be followed when conducting the site characterization so that sufficient data are collected to confirm that none of these pathways have been impacted.

Model remedies are most appropriate for routine cleanup projects at lower risk sites, and are generally more applicable to independent cleanups. This includes those seeking a No Further Action (NFA) letter under the Voluntary Cleanup Program (VCP) or situations where the potentially liable person (PLP) is implementing the cleanup with no Ecology oversight. However, these model remedies can also apply to Ecology-supervised cleanups.

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Chapter 3: Eligibility Criteria for Model Remedies

The following criteria apply to all model remedies identified in this document unless otherwise noted:

Geographic Area. The model remedies in this document are applicable throughout Washington State.

Release Confirmation and Ecology Notification. A release of petroleum has been confirmed and Ecology notification of the release has been completed.

Affected Media. An adequate characterization of the site is necessary to confirm that neither the surface water or sediment pathway have been impacted by petroleum. This means that contamination has not previously and is not currently impacting surface water or sediment quality. Soil cleanup levels must address direct contact, the soil to groundwater pathway, terrestrial ecological receptors, and vapor intrusion.

After the selected remedy is implemented and adequate compliance monitoring is completed, the Method A soil and groundwater cleanup levels cannot be exceeded beyond the source property. This will help ensure that the potential for future impacts to other pathways is minimized. Given the importance of conducting an adequate site characterization, Ecology strongly recommends selecting a consultant who has significant experience performing this type of work, and is very familiar with the information in Chapter 6, “Conducting an Effective Site Characterization,” in Ecology’s [Guidance for Remediation of Petroleum Contaminated Sites](#) (Ecology 2016).

Note about meeting the Method A cleanup levels beyond the source property:

Washington state’s statutes specify that model remedies are: “...for use in routine types of clean-up projects at facilities that have common features and lower risk to human health and the environment” ([RCW 70.105D.020\(20\)](#)). It has been Ecology’s experience that addressing off-property impacts often does not consist of routine, lower risk situations. As a result, Ecology included this provision so the model remedy process is not focused on those sites with issues requiring a significant amount of time and effort to resolve. While it is certainly possible to consider soil cleanup levels other than Method A – Unrestricted Use for off-source properties, this would need to be done outside of the model remedy process.

Note about Vapor Intrusion: While the focus of this guidance is on sites that have petroleum impacts to soil and groundwater, these model remedies can also be used to address situations where vapors may be impacting air quality. This is because vapor intrusion is typically directly linked to soil and/or groundwater impacts from volatile contaminants and in most cases, sufficiently remediating these sources will also address

the vapor intrusion pathway. The vapor intrusion pathway is discussed in more detail in Chapter 5.

Contaminant Types. The site investigation must document that petroleum hydrocarbons consisting of gasoline, middle distillates/oils, or heavy fuels/oils and their constituents are the only contaminants present in soil, groundwater, soil vapor, or indoor air (see Table 7.1 in *Guidance for Remediation of Petroleum Contaminated Sites*). The testing requirements for petroleum releases are found in Table 830-1 of [WAC 173-340-900](#). Additional testing information is found in Table 7.2 in *Guidance for Remediation of Petroleum Contaminated Sites*.

If any contaminants other than those typically found in petroleum products are discovered above the Method A cleanup levels for unrestricted use during the site characterization, the site is not eligible to use any of the model remedies included in this document. The compounds identified in Table 830-1—with the exception of Polychlorinated Biphenyls (PCBs), Halogenated Volatile Organic Compounds (HVOCs) and other site-specific compounds—are considered “those typically found in petroleum products.” The only exceptions are for situations where:

- a) The hazardous constituent(s) present meet the definition of natural background,
- b) Metals are present but at the time cleanup is completed, the remaining concentrations do not exceed the applicable cleanup standards, and
- c) Non-petroleum contaminants are present but have not co-mingled with the petroleum impacts. Upon successful completion of the remedial action, the petroleum release would be eligible for an NFA determination. This determination would not apply to the non-petroleum exceedances and the property would continue to be identified as contaminated.

Emergency/Interim Actions. Emergency or interim actions are not required due to the lower risk nature of the site, or if the necessary emergency/interim actions required by WAC 173-340-450 have already been implemented. Additionally, at sites where free product is present, the UST owner/operator must follow the provisions in [WAC 173-340-450\(4\)](#), which includes conducting free product removal to the maximum extent practicable and in a manner that minimizes the spread of hazardous substances.

Terrestrial Ecological Evaluation. The site must: a) meet the criteria in [WAC 173-340-7491](#) and therefore be excluded from a terrestrial ecological evaluation, or b) the simplified terrestrial ecological evaluation can be ended under [WAC 173-340-7492](#). There may be situations where a simplified terrestrial ecological evaluation results in adjusting the cleanup standards for certain compounds to meet the provisions in Table 749-2 of [WAC 173-340-900](#).

Remedy Selection. The primary remedy consists of source removal, including free product and contaminated soil to the greatest degree practicable. This can be combined with any of the following remedial actions and will be considered a model remedy provided the eligibility criteria are satisfied and the specific requirements contained in Chapter 6 are met:

- a) Soil vapor extraction;
- b) Groundwater removal and treatment;
- c) Air sparging;
- d) Chemical/biological treatment; or
- e) Natural attenuation¹.

Impacts to Water Supply Wells. The site cannot have caused impacts above the practical quantitation limit (PQL) to any water supply well used for drinking water purposes.

Proximity to Private Wells. When a model remedy relies on a conditional point of compliance (i.e. options 3, 4, 9 or 10 as set forth in Chapter 6, Table 1) the site cannot have a well present on the property unless the well is located at least 250 feet from the lateral extent of the contamination. The 250-foot separation distance also applies to wells used solely for non-potable purposes, such as for livestock, but does not include dewatering wells used for remediation.

¹ At least one older Ecology document indicates that natural attenuation, either alone or in combination with other cleanup action components as the groundwater cleanup action, is not a model remedy as defined in WAC 173-340-390, and therefore a feasibility study would need to be prepared to demonstrate that the option met the minimum requirements specified in WAC 173-340-360(2). However, this more current 2016 Model Remedies guidance does allow natural attenuation to be used in conjunction with one or more of the remedies identified in this chapter without completing a Feasibility Study, provided that all of the criteria identified for the specific model remedy selected are met. Any Ecology publication that indicates natural attenuation is not a model remedy will eventually be modified to be consistent with the language outlined in the previous sentence.

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Chapter 4: How Model Remedies Meet the Remedy Selection and the Compliance Monitoring Requirements of MTCA

After implementing the selected model remedy, the site must meet the criteria listed below:

1. **Free Product Removal.** Compliance with WAC 173-340-450(4) including removal to the greatest degree practicable.
2. **Soil.** Sufficient compliance monitoring has been completed to document that contaminants either:
 - a) Meet the cleanup levels established in accordance with MTCA and specified in Chapter 6 for the specific model remedy selected; or
 - b) If structural impediments such as buildings, utility lines, or public roads prevent complete removal, the contaminated soil must be removed to the maximum extent practicable. This generally means that the contamination is not accessible due to the presence of structures (e.g. buildings or roadways) or due to safety concerns related to working in close proximity to utility lines/product piping systems or the geotechnical conditions at the site.
3. **Groundwater.** Sufficient monitoring must be performed to document that the Method A cleanup levels are met throughout the property or that the following criteria are met:
 - a) There are no off-property impacts above the Method A cleanup levels;
 - b) The on-property plume is stable or receding; and
 - c) All conditional points of compliance are as close as practicable to the source of the hazardous substances.
4. **Vapor Intrusion.** The soil and groundwater concentrations must be such that the air cleanup standards, as determined in accordance with WAC 173-340-750, have been met. This includes ambient air, existing buildings and structures, as well as buildings that could be constructed in the future.

All of the model remedies are intended to minimize the impact of the site by requiring that a) the contamination cannot exceed the property boundary at the time a no further action determination is requested, and b) if contamination remains on the source property after the remedy is implemented, or if industrial cleanup standards are used, institutional controls (typically

environmental covenants) that meet the provisions in WAC 173-340-450 must be implemented to ensure the remedy remains protective.

It is recommended that cleanup standards, including points of compliance, be developed as early as possible in the cleanup process, but no later than immediately following completion of the site characterization. When developing the standards, use the provisions in:

- [WAC 173-340-720](#) (groundwater cleanup standards);
- [WAC 173-340-740](#) (unrestricted land use soil cleanup standards) or
- [WAC 173-340-745](#) (soil cleanup standards for industrial properties);
- [WAC 173-340-750](#) (cleanup standards to protect air quality); and
- The applicable provisions in Chapters 8 and 9 of [Guidance for Remediation of Petroleum Contaminated Sites](#).

The following discussion documents how the model remedies meet the minimum requirements found in [WAC 173-340-360](#) and [WAC 173-340-390](#).

A. Threshold Requirements

- (i) *Protect human health and the environment.* Model remedies must comply with the appropriate cleanups standards as well as all applicable state and federal laws. Cleanups complying with these two threshold requirements are presumed to be protective of human health and the environment (WAC 173-340-702).
- (ii) *Comply with cleanup standards contained in WAC 173-340-700 to 760.* All of the model remedies identified in this document require compliance with the soil, groundwater and air quality standards set forth in MTCA. Adequate characterization must be completed to document that the site has not impacted surface water or sediments.

When considering which soil, groundwater and air quality cleanup standards to use, most of the options found in [WAC 173-340-704](#), [705](#) or [706](#) are available. Table 1 in Chapter 6 of this guidance provides more information on which options are specifically allowed. Ecology guidance, in conjunction with rule requirements, forms the basis for evaluating and selecting the appropriate standards. Finally, the site must meet the criteria in WAC 173-340-7491 and therefore be excluded from a terrestrial ecological evaluation, or the simplified terrestrial ecological evaluation can be ended under WAC 173-340-7492.

- (iii) *Comply with applicable state and federal laws.* Due to the lower risk nature of sites eligible to use these model remedies, some state or federal laws will not be applicable. For example, releases from the site cannot have impacted sediments, and therefore requirements found in the Sediment Management Standards ([Chapter 173-204 WAC](#)) will not be applicable. Although implementing any of these model remedies is unlikely to trigger compliance with an excessive number of state or federal laws, there will be several laws that will apply (e.g., transporting and managing contaminated soil in accordance with the state’s solid waste management rules). Conduct an evaluation to determine compliance with applicable state and federal laws.

- (iv) *Provisions for compliance monitoring.* There are three types of compliance monitoring: 1) protection, 2) performance, and 3) confirmational monitoring. Protection monitoring includes the preparation of a health and safety plan, which should be completed before implementing any of the model remedies. Performance and confirmational monitoring can likely be combined and are necessary to: a) document that applicable cleanup standards have been met, or b) to estimate the amount of contaminant mass that remains. Specific information about the number of samples and type of confirmation testing needed is found in Appendix A.

B. Other Requirements

- (i) *Use a preference for permanent solutions to the maximum extent practicable.* A Disproportionate Cost Analysis determines whether the selected remedy used permanent solutions to the maximum extent practicable. If the incremental increase in costs for an alternative remedy is disproportionate to the benefits achieved, then selection of the more costly remedy is not warranted. Model remedies are, by definition, exempt from the requirement to evaluate cleanup action alternatives by preparing a Feasibility Study and a Disproportionate Cost Analysis.

In order to establish model remedies that meet the criteria of having “a preference for permanent solutions to the maximum extent practicable,” a review of information in Ecology’s Integrated Site Information System (ISIS) database was conducted. This evaluation revealed that between January 2012 and June 2015, more than 300 sites with petroleum-contaminated soil and groundwater received an NFA determination. The Toxics Cleanup Program evaluated more than half of these letters. It was found that source removal (including free product and

contaminated soil) or source removal in combination with one or more of the remedial actions listed in Chapter 3 were routinely used to achieve an NFA determination.

This review of over 150 sites also confirms that focusing on the source of contamination has been critical in addressing the direct contact threat, improving groundwater quality, and significantly reducing the potential for vapor migration. Source control also enhances the natural degradation process, can often be implemented quickly, and ultimately has been very successful in ensuring that these sites are protective of human health and the environment.

A number of the model remedies identified in Chapter 6 require that an environmental covenant be filed to minimize the overall risk and help ensure that the site remains protective over the long-term. As provided under WAC 173-340-420, Ecology intends to perform periodic reviews of sites where environmental covenants are required.

- (ii) *Provide for a reasonable restoration time frame.* The reasonable restoration timeframe criteria is used to help evaluate cleanup action alternatives that meet the threshold requirements. Since sites that use a model remedy are not required to conduct a Feasibility Study, it is not possible to use restoration timeframe to compare remedies. However, selection and implementation of any of the model remedies identified should limit the timeframe needed to achieve compliance to the greatest degree practicable.
- (iii) *Consideration of public concerns.* This guidance document was modified in response to feedback received during the public comment period.

Chapter 5: Additional Provisions for Addressing the Direct Contact and Vapor Intrusion Pathways

Establishing Method B or C Direct Contact TPH Cleanup Levels

Several of the model remedies identified later in this document rely on the use of Method B or Method C soil cleanup levels. Until recently, the only way to establish a Method B or Method C direct contact TPH (total petroleum hydrocarbons) cleanup level was to perform fractionation testing using the EPH/VPH methods (extractable petroleum hydrocarbons / volatile petroleum hydrocarbons methods). For many sites, especially older ones, available TPH data are from sample analysis using the NWTPH method (Northwest total petroleum hydrocarbon method) and often these results exceed the Method A TPH-Gx values of 30 or 100 mg/kg. (The higher value can only be used if the soil is tested and found to not contain benzene.)

When selecting and implementing a model remedy set forth in this guidance, there are two options for establishing a Method B or Method C direct contact TPH level:

Option 1: Analyze samples using the EPH/VPH methods, then follow the procedures specified in Figure 8.1 (p. 119) of Ecology’s [Guidance for Remediation of Petroleum Contaminated Sites](#) (Ecology 2016) to determine a direct contact TPH cleanup level using the fractionated data.

Option 2: Apply a generic TPH cleanup level of 1500 mg/kg as discussed on pages 13-14 of Ecology’s [Model Remedies for Sites with Petroleum Contaminated Soils](#) (Ecology 2017). The 1500 mg/kg level applies to situations where only TPH-Gx is present or for mixtures that include TPH-Gx. This level does not affect the Method A cleanup level of 2000 mg/kg for diesel range organics/heavy oils, or the 4000 mg/kg level for mineral oil if TPH-Gx is not present or is a limited portion of the mixture.

For example, if the measured TPH-Gx concentration is less than 30 mg/kg (when benzene is present) and TPH-Dx is 1750, then both the Method A cleanup levels are met. If the measured TPH-Gx concentration is 250 mg/kg and TPH-Dx is 300 mg/kg, then the combined total is less than the generic value of 1500 and the direct contact pathway has been addressed.

Use of the 1500 mg/kg direct contact TPH cleanup level is limited to sites that do not use Method A for establishing soil cleanup standards (i.e. options 5, 6, 11 or 12 as specified in Table 1 on page 21. The other limitation that applies when using the 1500 mg/kg cleanup level relates to determining compliance with the measured concentrations. Several options are provided in Chapter 10, “Determining Compliance with Cleanup

Standards” in [Guidance for Remediation of Petroleum Contaminated Sites](#). However, given the methodology used to develop the 1500 mg/kg cleanup level, only the direct comparison method can be used at this time. Additional explanation on the development of the 1500 mg/kg level is contained on pages 13-14 of Ecology’s 2017 guidance, [Model Remedies for Sites with Petroleum Contaminated Soils](#). Regardless of which option is used, the direct contact levels for compound-specific substances (e.g. benzene) also need to be met.

Vapor Intrusion (VI) Pathway

[WAC 173-340-740\(3\)\(b\)\(iii\)\(C\)](#) and [WAC 173-340-745\(5\)\(b\)\(iii\)\(C\)](#) specify that whenever the TPH concentrations or other petroleum VOC concentrations are significantly higher than a concentration derived for protection of groundwater, the soil to vapor pathway must be evaluated. This means an initial assessment of the vapor intrusion pathway will almost always be necessary before implementing any of the model remedies identified in Chapter 6.

Ecology recommends following the provisions in Sections 3 through 5 of EPA’s [Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites](#) (EPA June 2015) for initially assessing the vapor intrusion pathway. Ecology’s Implementation Memo No. 14, [Updated Process for Initially Assessing the Potential for Petroleum Vapor Intrusion](#) (Ecology 2016) provides additional guidance on how to complete this evaluation.

If circumstances are such that the site cannot be screened out during the initial assessment, then further investigation and mitigation (if necessary) would need to follow the provisions outlined in Ecology’s [Draft: Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action](#) (Ecology rev. 2016).

Ecology has updated the Method B and Method C cleanup and screening levels for the vapor intrusion pathway. This information can be found at <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Vapor-intrusion-overview/Vapor-intrusion-2015-changes-to-the-2009-toxicit>. In general, sites that meet the Method A levels following remediation will have adequately addressed the vapor intrusion pathway.

Chapter 6: Twelve Model Remedies for Sites with Petroleum Impacts to Groundwater

General Information

As discussed in Chapter 3, the primary remedy for each of the 12 options identified consists of source removal, including free product and contaminated soil to the maximum extent practicable². This can be combined with any of the following remedial actions and will be considered a model remedy provided the eligibility criteria are satisfied and the specific requirements identified later in this Chapter are met:

- a) Soil vapor extraction;
- b) Groundwater removal and treatment;
- c) Air sparging;
- d) Chemical/biological treatment; or
- e) Natural attenuation.

This chapter discusses the scope of each model remedy. Before any of these model remedies can be used, a cleanup action plan must be completed that identifies the specific work to be done. Appendix A contains information that should be considered when developing the cleanup action plan. The level of detail in the cleanup action plan can be based on the site's complexity and the specific model remedy selected. Upon completion of the remedial action, confirmation sampling must be implemented to document compliance with the applicable cleanup standards.

There are a number of model remedies that if selected, will require an environmental covenant be filed. These include:

1. A structural impediment precludes complete removal of contaminated soil;
2. When industrial cleanup levels are used; or
3. A conditional point of compliance for groundwater is established.

In these situations, the source property owner must record an environmental covenant with the Register of Deeds in the County in which the site is located. The environmental covenant must meet all applicable requirements in WAC 173-340-440 but can be tailored to address site-specific situations. A copy of the draft restriction must be included as part of the final remedial action report. Within 90 days from completion of the remedial action, a final remedial action report documenting the results of all work must be submitted to Ecology.

² There could be situations with no soil contamination (e.g. the release was directly into groundwater through fractured rock). These sites would still be eligible to use a model remedy, provided an adequate groundwater remedy was implemented.

Table 1 identifies a number of important criteria and whether they are applicable to the model remedies identified. A more detailed discussion of the multiple model remedy options for addressing petroleum contamination on the source property follows. If off-property contamination also exists, the selected model remedy can be expanded to address these impacts, provided that the eligibility criteria in Chapter 3 have been satisfied and the cleanup levels in Tables 720-1 and 740-1 are met for all adjacent properties³.

Four of the model remedies allow the use of a groundwater Conditional Point of Compliance (CPOC) on the property where the release occurred but not exceeding the property boundary. For sites where multiple remedies are being evaluated through the preparation of a Feasibility Study, MTCA requires a demonstration that it is not practicable to meet the cleanup level throughout the site within a reasonable restoration timeframe. However, sites using model remedies are not required to conduct a Feasibility Study, and therefore don't need to specifically address the issue of reasonable restoration timeframe. To help ensure that model remedies appropriately utilize a conditional point of compliance, Appendix B provides information on the factors that need to be considered when evaluating this option.

³ None of the model remedies set forth in Chapter 6 allow for off-property soil or groundwater contamination above the Method A cleanup levels, once the selected remedy has been implemented and adequate compliance monitoring has been completed. This requirement includes any road right-of-way where the land is not owned by the source property owner.

Table 1. Summary of model remedies for sites with petroleum impacts to groundwater.

Option	Soil Cleanup Method Selected	Meets Soil Cleanup Levels?	Is the 1,500 mg/kg generic TPH CUL appropriate?	Meets Method A Groundwater CUL's throughout property?	Conditional Point of Compliance?	Empirical Demonstration Used?	IC Required on the property?
1	Method A – Unrestricted	Yes	No	Yes	No	No	No
2	Method A - Unrestricted	No	No	Yes	No	No	Yes
3	Method A – Unrestricted	Yes	No	No	Yes	No	Yes
4	Method A - Unrestricted	No	No	No	Yes	No	Yes
5	Method B	Yes	Yes	Yes	No	Yes	Maybe ⁴
6	Method B	No	Yes	Yes	No	Yes	Yes
7	Method A - Industrial	Yes	No	Yes	No	No	Yes
8	Method A – Industrial	No	No	Yes	No	No	Yes
9	Method A - Industrial	Yes	No	No	Yes	No	Yes
10	Method A - Industrial	No	No	No	Yes	No	Yes
11	Method C	Yes	Yes	Yes	No	Yes	Yes
12	Method C	No	Yes	Yes	No	Yes	Yes

⁴ Depending on the amount of contamination remaining and the site-specific conditions, an institutional control may be necessary to address the vapor intrusion pathway.

Model Remedy 1. This model remedy is for situations where the selected remedial action results in the Method A groundwater cleanup levels and the Method A soil cleanup levels for unrestricted land use being met throughout the site. Following remediation, sufficient confirmation sampling and post-remedial monitoring would be necessary to document compliance with these cleanup levels. An environmental covenant would not be necessary.

Model Remedy 2. This model remedy is similar to Model Remedy 1. The major difference is that the remedial action is not sufficient to fully comply with the Method A direct contact cleanup levels for unrestricted use at all locations on the source property due to the presence of one or more structural impediments (e.g., buildings, roadways, or safety concerns). Sufficient monitoring data are collected to confirm that the Method A groundwater cleanup levels are met throughout the site. An environmental covenant would be necessary to address direct contact exceedances and (potentially) the soil to groundwater pathway.

In order to obtain an NFA, information must be provided to document that:

- a) Soil removal was implemented to the greatest degree practicable; and
- b) An environmental covenant has been filed to document that contaminated soil remains on the property. Contaminated soil that is located beneath a parking lot, building or roadway, is not necessarily representative of future site conditions because if the structure is removed, leaching of contaminants could be increased and ultimately result in exceedances of the applicable groundwater cleanup levels. The environmental covenant would need to require that the existing structures remain in-place and be adequately maintained so they continue to serve as a barrier to water migration through the contaminated soil, unless written approval from Ecology is granted to implement modifications. Visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures.

Model Remedy 3. This Model Remedy applies to situations where, following remediation, the soil meets the Method A cleanup levels for unrestricted land use throughout the site. Groundwater monitoring confirms that there are no off-property exceedances; however, sampling data from the source property indicates that the Method A groundwater cleanup levels are not met at all sampling locations.

A demonstration justifying the use of a Conditional Point of Compliance (CPOC) must be provided. The demonstration needs to address all of the applicable factors identified in Appendix B, and in particular meet the criteria listed below in order to be eligible for an NFA letter.

- a) Enough monitoring data have been collected and sufficiently analyzed to document that the plume is stable or receding;
- b) The conditional point(s) of compliance are as close as practicable to the source of the hazardous substances; and
- c) An environmental covenant has been filed to impose groundwater use restrictions on the property. Ecology has model language to use when preparing an environmental covenant. For more information, visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures.

Model Remedy 4. This model remedy applies to situations where Method A levels for unrestricted use are selected but the remedial action is not sufficient to fully comply with the Method A soil cleanup levels at all locations on the source property due to the presence of one or more structural impediments (e.g., buildings, roadways, or safety concerns). Groundwater monitoring confirms that there are no off-property exceedances, however sampling data from the source property indicates that the Method A groundwater cleanup levels are not met at all locations.

As with Model Remedy 3, a demonstration justifying the use of a Conditional Point of Compliance (CPOC) must be provided. The demonstration needs to address all of the applicable factors identified in Appendix B, and in particular meet the criteria listed below in order to be eligible for an NFA letter.

- a) Soil removal was implemented to the greatest degree practicable;
- b) Enough monitoring data have been collected and sufficiently analyzed to document that the plume is stable or receding;
- c) The conditional point(s) of compliance are as close as practicable to the source of the hazardous substances; and
- d) An environmental covenant has been filed to impose groundwater use restrictions and to document that contaminated soil remains on the property. Contaminated soil that is located beneath a parking lot, building or roadway, is not necessarily representative of future site conditions because if the structure is removed, leaching of contaminants could be increased and ultimately result in exceedances of the applicable groundwater cleanup levels. The environmental covenant would need to require that the existing structures remain in-place and be adequately maintained so they continue to serve as a barrier to water migration through the contaminated soil, unless written approval from Ecology is granted to implement modifications. For more information, visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures.

Model Remedy 5. This model remedy is for situations where, following remediation, sufficient monitoring data are collected to confirm that the Method A groundwater cleanup levels are met throughout the site. Once groundwater quality has been adequately addressed, an empirical demonstration can be pursued using the provisions in [WAC 173-340-747](#) to establish Method B soil cleanup levels that are protective of groundwater. This requires that the characteristics of the site are representative of future site conditions. Method B soil cleanup levels that are protective of the direct contact pathway (with the exception of the generic TPH level) must be determined using the provisions contained in [WAC 173-340-740\(3\)](#). Ecology’s Cleanup Level and Risk Calculations (CLARC) website houses the CLARC spreadsheet that provides compound-specific Method B direct contact levels for unrestricted use:

- CLARC website: <https://fortress.wa.gov/ecy/clarc/>
- CLARC spreadsheet: <https://fortress.wa.gov/ecy/clarc/FocusSheets/Soil%20Methods%20B%20and%20A%20unrestricted.pdf>.

The options for determining Method B direct contact TPH cleanup levels are set forth in Chapter 5 of this document.

After implementation of the remedy, confirmation testing must be performed to document that the Method B direct contact cleanup levels have been met at the point of compliance and the vapor intrusion pathway has been adequately addressed. At that point an NFA letter could be issued and no environmental covenant would be necessary.

Model Remedy 6. This model remedy is similar to Model Remedy 5. The major difference is that the remedial action is not sufficient to fully comply with the Method B direct contact cleanup levels at all locations on the source property due to the presence of one or more structural impediments (e.g., buildings, roadways, or safety concerns). Sufficient monitoring data are collected to confirm that the Method A groundwater cleanup levels are met throughout the site. An empirical demonstration can be used for the soil to groundwater pathway. However, an environmental covenant would be necessary to address direct contact exceedances and potentially the soil to groundwater pathway.

In order to obtain an NFA, information must be provided to document that:

- a) Soil removal was implemented to the greatest degree practicable; and
- b) An environmental covenant has been filed to ensure the remedy remains protective. In this case, the environmental covenant would need to indicate that contaminated soil remains that exceeds direct contact levels. If the contaminated soil is located beneath a parking lot, building or roadway, the characteristics of the site are not necessarily representative of future site conditions because if the structure is removed, leaching of contaminants could be increased and ultimately result in exceedances of the applicable groundwater cleanup levels. The environmental covenant would also need to require that the existing structures remain in-place and be adequately maintained so they continue to serve as a barrier to water migration through the contaminated soil, unless written approval from Ecology is granted to implement modifications. For more information, visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures.

The options for determining Method B direct contact TPH cleanup levels are set forth in Chapter 5 of this document.

Model Remedy 7. This model remedy is for those situations where the site meets the definition of an industrial property per [WAC 173-340-745](#). Following remediation, the site meets the Method A soil cleanup levels for industrial properties and the Method A cleanup levels for groundwater. Sufficient confirmation sampling and post-remedial monitoring would be necessary to document compliance with these cleanup levels. The site would be eligible for an NFA letter provided an environmental covenant is filed to require the property be maintained as industrial land use.

Model Remedy 8. This model remedy is similar to Model Remedy 7. The major difference is that the remedial action is not sufficient to fully comply with the Method A direct contact cleanup levels for industrial land use at all locations on the source property due to the presence of one or more structural impediments (e.g., buildings, roadways, or safety concerns). Sufficient monitoring data must be collected to confirm that the Method A groundwater cleanup levels are met throughout the site. An environmental covenant would be necessary to ensure the property is maintained as industrial land use, to address direct contact exceedances and potentially address the soil to groundwater pathway.

In order to obtain an NFA, information must be provided to document that:

- a) Soil removal was implemented to the greatest degree practicable; and
- b) An environmental covenant has been filed to ensure the remedy remains protective. In this case, the environmental covenant would need to indicate that contaminated soil remains on the property. Contaminated soil that is located beneath a parking lot, building or roadway, is not necessarily representative of future site conditions because if the structure is removed, leaching of contaminants could be increased and ultimately result in exceedances of the applicable groundwater cleanup levels. The environmental covenant would need to require that the existing structures remain in-place and be adequately maintained so they continue to serve as a barrier to water migration through the contaminated soil, unless written approval from Ecology is granted to implement modifications. The environmental covenant would also need to require the property be maintained as industrial land use. For more information, visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures.

Model Remedy 9. This Model Remedy applies to situations where, following remediation, the soil meets the Method A cleanup levels for industrial land use throughout the property. Groundwater monitoring confirms that there are no off-property exceedances; however, sampling data from the source property indicates that the Method A groundwater cleanup levels are not met at all locations.

A demonstration justifying the use of a Conditional Point of Compliance (CPOC) must be provided. The demonstration needs to address all of the applicable factors identified in Appendix B, and in particular meet the criteria listed below in order to be eligible for an NFA letter.

- a) Enough monitoring data have been collected and sufficiently analyzed to document that the plume is stable or receding;
- b) The conditional point(s) of compliance are as close as practicable to the source of the hazardous substances; and
- c) An environmental covenant has been filed to impose groundwater use restrictions on the property and that the property be used only for industrial purposes. For more information Visit TCP’s Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search “environmental covenant” under TCP Procedures.

Model Remedy 10. This model remedy applies to situations where Method A levels for industrial use are selected but the remedial action is not sufficient to fully comply with the Method A cleanup levels at all locations on the source property due to the presence of one or more structural impediments (e.g., buildings, roadways, or safety concerns). Groundwater monitoring confirms that there are no off-property exceedances; however, sampling data from the source property indicates that the Method A groundwater cleanup levels are not met at all locations.

As with Model Remedy 9, a demonstration justifying the use of a Conditional Point of Compliance (CPOC) must be provided. The demonstration needs to address all of the applicable factors identified in Appendix B, and in particular meet the criteria listed below in order to be eligible for an NFA letter.

- a) Soil removal was implemented to the greatest degree practicable;
- b) Enough monitoring data have been collected and sufficiently analyzed to document that the plume is stable or receding;
- c) The conditional point(s) of compliance are as close as practicable to the source of the hazardous substances; and
- d) An environmental covenant has been filed to impose groundwater use restrictions on the property and to ensure the remaining soil impacts, which exceed industrial standards, do not pose a threat to human health and the environment. Contaminated soil that is located beneath a parking lot, building or roadway, is not necessarily representative of future site conditions because if the structure is removed, leaching of contaminants could be increased and ultimately result in exceedances of the applicable groundwater cleanup levels. The environmental covenant would need to require that the existing structures remain in-place and be adequately maintained so they continue to serve as a barrier to water migration through the contaminated soil, unless written approval from Ecology is granted to implement modifications. The covenant would also need to require that the property be used only for industrial purposes. For more information, visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures.

Model Remedy 11. This model remedy is for situations where the site meets the definition of an industrial property per WAC 173-340-745. Following remediation, sufficient monitoring data are collected to confirm that the Method A groundwater cleanup levels are met throughout the site. Once groundwater quality has been adequately addressed, an empirical demonstration can be pursued using the provisions in WAC 173-340-747 to establish Method C soil cleanup levels that are protective of groundwater. This requires that the characteristics of the site are representative of future site conditions. The Method C soil direct contact cleanup levels must be determined using the provisions contained in [WAC 173-340-745\(5\)](#). Ecology’s Cleanup Level and Risk Calculations (CLARC) website houses the CLARC spreadsheet that provides compound-specific Method C direct contact cleanup levels:

- CLARC spreadsheet:
<https://fortress.wa.gov/ecy/clarc/FocusSheets/Soil%20Methods%20C%20and%20A%20Industrial.pdf>.

The options for determining Method C direct contact TPH cleanup levels are set forth in Chapter 5 of this document.

After implementation of the remedy, confirmation testing must be performed to document that the Method C soil cleanup levels have been met at the point of compliance and that the vapor pathway has been adequately addressed, such that the only environmental covenant would be that the site be maintained for industrial use.

Model Remedy 12. This model remedy is for situations where the site meets the definition of an industrial property per [WAC 173-340-745](#). Implementation of the remedial action is not sufficient to fully comply with the Method C cleanup levels at all locations on the source property due to the presence of one or more structural impediments (e.g., buildings, roadways, or safety concerns). Sufficient monitoring data are collected to confirm that the Method A groundwater cleanup levels are met throughout the site. An empirical demonstration can be used for the soil to groundwater pathway. However, an environmental covenant would be necessary to address direct contact exceedances.

In order to obtain an NFA, information must be provided to document that:

- a) Soil removal was implemented to the greatest degree practicable; and
- b) An environmental covenant has been filed to ensure the remedy remains protective. In this case, the environmental covenant would need to indicate that contaminated soil is present which exceeds direct contact levels. If the contaminated soil is located beneath a structure such as a parking lot, building or roadway, the environmental covenant would need to require that the existing structures remain in-place and be adequately maintained so leaching of contaminants continues to be minimized, unless written approval from Ecology is granted to implement modifications. Finally, the environmental covenant would need to specify that the site be maintained for industrial use. (For more information, visit TCP’s Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search “environmental covenant” under TCP Procedures.)

The options for determining Method C direct contact TPH cleanup levels are set forth in Chapter 5 of this document.

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Appendix A:
**Model Remedy Provisions for Developing a
Cleanup Action Plan (CAP)**

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Appendix A: Model Remedy Provisions for Developing a Cleanup Action Plan (CAP)

Appendix A contains information that needs to be considered when developing the cleanup action plan. Applicants whose sites meet the criteria in Chapter 6 may select and implement that particular model remedy. Implementation needs to address all of the applicable provisions contained in Appendix A, including preparation and submittal of the final remedial action report to Ecology.

Select a Remediation Contractor/Consultant

Although not required, Ecology encourages owners and operators to hire an environmental consultant to act as their representative during the entire cleanup process to help ensure that all applicable regulatory requirements are met. Based on the results of a site characterization, an environmental consultant can determine whether any of the model remedies identified would apply, then prepare the necessary plans and specifications to implement the selected remedy. The consultant is also available to help solicit and evaluate bids from interested parties so that a qualified and experienced contractor can be selected to conduct the work.

Obtain Necessary Permits and Approvals

Model remedies are not exempt from local, state or federal laws and therefore implementation must comply with all applicable procedural and substantive requirements, including the need to obtain any necessary permits. The model remedies identified in this document will often result in the need to obtain one or more permits. See Chapter 11 of Ecology's [Guidance for Remediation of Petroleum Contaminated Sites](#) (Ecology 2016) for a general discussion of permits. The information in this section is intended to supplement that guidance.

The information below is provided for example purposes only. Some provisions may not apply to the specific cleanup action being implemented, while additional requirements to those below may apply. Therefore, anyone considering using one of the model remedies outlined in this document should consult Ecology and other government entities (e.g., city or county authorities) to ensure compliance with all required permits, notifications, and other requirements.

- **State Environmental Policy Act (SEPA)**

SEPA (RCW 43.21C, Chapter 197-11 WAC, and the SEPA procedures found in Chapter 173-802 WAC) are intended to ensure that state and local government officials consider environmental values when making decisions. The SEPA process is triggered whenever a local or state permit is required to conduct the cleanup. It begins by

completing a SEPA Environmental Checklist and submitting it to the “lead agency” (usually the county or city where the site is located). The lead agency will use the checklist to decide whether the cleanup action is likely to cause a significant adverse impact to the environment. The SEPA Environmental Checklist form can be found in WAC 197-11-960. Information on how to use the checklist can be found in WAC 197-11-315 and 330.

□ **Grade and Fill Permit**

Most local governments require a grade and fill permit for larger excavations. Prior to conducting a cleanup, contact the city or county development permitting department with jurisdiction for the area to determine if a permit is required.

□ **Demolition Permit**

If the cleanup requires the demolition of a building or other structure, a permit will likely be needed from the local government. Contact the city or county development permitting department for additional information.

□ **Electrical Permit**

If the cleanup involves changes to electrical systems, an electrical permit will often be necessary. Many smaller jurisdictions rely on the Washington State Department of Labor & Industries (L&I) for electrical permitting and inspections. Contact the city or county development permitting department for additional information.

□ **Construction Stormwater General Permit (CSWGP)**

Construction site operators are required to obtain a Construction Stormwater General Permit (also known as a General Permit) if:

- a) They are engaged in clearing, grading, and excavating activities that disturb one or more acres; and
- b) Stormwater will or may be discharged to surface waters of the state.

Construction activity that Ecology has determined to be a significant contributor of pollutants to waters of the state, and construction activity that has a reasonable expectation to cause a violation of any water quality standard, also require a CSWGP. General Permits typically apply only to situations where runoff does not come in contact with contaminated soil or groundwater. Further information on the CSWGP can be found on Ecology’s website at:

<http://www.ecology.wa.gov/programs/wq/stormwater/construction/>.

Contaminated sites may not be eligible for a General Permit if the stormwater and/or dewatering discharge from the construction site have the potential to violate water quality standards. In these situations, Ecology's Water Quality Program should be contacted for direction on the applicable permit submittal requirements and permitting options. Permitting options include Individual Permits and/or site-specific companion orders to a General Permit.

Air Emissions

Excavation of petroleum contaminated soils may trigger regulatory requirements related to volatile emissions, diesel equipment emissions, and dust. Although using local construction equipment and dust controls (such as wetting or covering exposed soils during construction) should limit diesel emissions and airborne particulates, the local authority should be contacted to determine if any additional requirements apply.

In addition, several of the remedial options identified, including air sparging and soil vapor extraction, have the potential to result in air emissions. These remedies may therefore trigger the need to submit a permit application.

Noise Ordinance Requirements

Construction activities must be carried out in a manner consistent with the local and state environmental noise standards (Chapter 173-60 WAC). Contact the city or county development permitting department for additional information.

Minimum Standards for Construction and Maintenance of Wells

Groundwater monitoring wells that will be installed or removed as part of excavation activities must be constructed or decommissioned in accordance with the requirements of Chapter 173-160 WAC.

Access Agreements

If soil, groundwater or vapor contamination extends to neighboring properties, an access agreement is required before initiating any remedial action work on property owned by others. These access agreements should be negotiated and obtained as early in the cleanup process as possible. When a model remedy is being used to address off-property contamination, the site characterization must address the full extent of contamination from the release without regard to property boundaries.

Local Health Jurisdiction Permits

Some local health departments/districts require that a permit be obtained prior to UST decommissioning. In addition, implementation of remedial actions such as treatment or

disposal of petroleum contaminated soil may also require a local health department/district permit.

Groundwater Extraction and Treatment

If groundwater extraction and treatment will be used to address contaminated groundwater at the site, a permit may be necessary before operations begin. You are encouraged to contact Ecology's Water Resources Program in order to help determine the applicable requirements for installing and operating extraction wells. Ecology's Water Quality Program should also be contacted to help determine the options available for properly managing the contaminated groundwater.

Complete Pre-Construction Activities

Before initiating any remedial activities, the following important actions must be completed:

Utility Locating

Excavation or drilling locations should be marked with white paint and notification must be provided to underground utility service providers by calling 811 or 800-424-5555. Notification to the utility locate service must be made not less than two business days and not more than ten business days before the scheduled date of work. Failure to provide notification can result in significant penalties. Owners and operators may also want to contract a private utility locating service to mark areas within their facilities that will not be addressed by the one-call service.

UST Removal

If the model remedy is being applied at a site where the source of the contamination is determined to be a leak from or in the vicinity of an underground storage tank (UST), the UST must be removed and the margins of the excavation tested for compliance as part of remedy implementation. Notify applicable local authorities and Ecology UST officials prior to UST removal and conduct UST decommissioning according to the requirements of Chapter 173-360 WAC. UST decommissioning requires the person conducting the work to be certified under Chapter 173-360 WAC.

Conduct Remediation Activities

□ **Source Excavation Approach and Methods**

All of the model remedies set forth in this document require source removal (including free product and contaminated soil) or source removal combined with one or more of the remedial actions listed in Chapter 3 of this document. When source removal is used as the primary mechanism for addressing soil contamination, excavation activities must extend laterally and vertically until soil concentrations are below the established cleanup levels or the presence of structural impediments precludes complete removal of the contaminated soil. The soil conditions, depth of excavation, and the proximity to buildings are all situations that may require shoring systems or other safety precautions. Shoring systems must be designed by a professional engineer and excavation slopes must comply with Washington State construction safety standards for excavation, trenching, and shoring (Chapter 296-155 WAC, Part N).

□ **Field Screening and Confirmation Soil Sampling**

Field-screening (headspace organic vapor screening, water sheen screening, and visual observation) should be used as excavation proceeds to help determine the extent of contaminant removal. Field-screening techniques are discussed in Chapter 5 of Ecology's [Guidance for Remediation of Petroleum Contaminated Sites](#) (Ecology 2016). Once it appears that the appropriate limits are reached or further excavation is not practicable, collect confirmation soil samples from the excavation sidewalls and base, and submit the samples for laboratory analysis. If an UST has been removed from the site, specific samples must be collected to comply with Chapter 173-360 WAC, which may be required in addition to those specified below.

Confirmation samples should be collected from locations where field screening/visual observations indicate contamination may be present, or at locations where a professional geologist or engineer has determined is the most appropriate based on site-specific factors. Follow the sampling criteria contained in Ecology's [Guidance on Sampling and Data Analysis Methods](#) (Ecology 1995). Confirmation soil samples must be submitted to an Ecology-certified laboratory and analyzed for those constituents that are most likely to be present based on site characterization data (see Table 7.2 in [Guidance for Remediation of Petroleum Contaminated Sites](#) for the appropriate chemicals of concern to submit for analysis).

□ **Sampling and Analysis of Excavated Soil**

Excavated soil must be sampled and analyzed in order to properly classify the material. Sampling should be performed as specified in Table 5-3 of Ecology's [Guidance for Site Checks and Site Assessments for Underground Storage Tanks](#) (Ecology 2003).

Soil contaminated by releases from federally regulated USTs is exempt from many of the dangerous waste regulations under WAC 173-303-071(3)(t). However, the Toxicity Characteristic Leaching Procedure (TCLP) values set forth in WAC 173-303-090(8) for waste codes D004 to D017 (which includes lead) must be met. In addition, petroleum contaminated soil from other releases (e.g., non-federally regulated USTs and spills) are not exempt. It is the responsibility of the waste generator to determine if the dangerous waste rules apply and if so, to manage the material properly. The remainder of this discussion focuses on those situations where the soil is not defined as a dangerous waste.

Collect soil samples from locations that are representative of the soil and where field-screening indicates contamination may be present. Samples that will be analyzed for VOCs must be collected using EPA Method 5035. Submit soil samples for chemical analysis and test for gasoline, diesel, and oil-range petroleum hydrocarbon-related compounds listed in the WAC 173-340-900, Table 830-1. Additional testing information is also available in Table 7.2 of Ecology's [Guidance for Remediation of Petroleum Contaminated Sites](#) (Ecology 2016)

□ **Soil Segregation and Storage**

Contaminated material that will be temporarily stored on-site must be managed such that releases to the environment (e.g. groundwater, surface water, and air) are minimized. The contaminated soil must also be secured and covered as appropriate when not actively in use. Chapter 11.3.2 of the *Guidance for Remediation of Petroleum Contaminated Sites* provides specific information on options for appropriately storing petroleum contaminated soil. In some cases it may be advantageous to separate excavated soil based on visual observations or preliminary testing, since additional management options will often be available for soils with more limited impacts.

□ **Management of Contaminated Soil**

Excavated contaminated soil must be managed in accordance with state and local requirements. Table 12.2 of *Guidance for Remediation of Petroleum Contaminated Sites* provides a number of options, depending on the level of petroleum impacts. Anyone transporting contaminated material must be properly trained, licensed, and in compliance with applicable DOT regulations. Owners and operators must obtain the necessary approvals prior to transportation and maintain records of how the material was ultimately

managed. This can include weight tickets provided by the disposal facility, manifests, or completed dangerous waste manifests as applicable to document disposal. The appropriate documentation must be submitted to Ecology as part of the remedial action report.

□ **Compliance with MTCA Soil Cleanup Levels and Site Restoration**

If laboratory analytical results indicate all confirmation samples are less than the soil cleanup levels established for the site, or if removal of additional contaminated soil is no longer practical due to the presence of structural impediments, the excavation can be backfilled and site restoration activities completed. Backfill must be placed and compacted in a manner consistent with the planned use of the site and in accordance with all applicable local building, zoning, and grading requirements to prevent settling.

□ **Compliance with MTCA Groundwater Cleanup Standards**

Sampling of groundwater quality will be necessary to complete the site characterization and during the time remedy is being implemented. In most cases, monitoring will also be needed to evaluate the overall effectiveness of the cleanup. Section 10.3 of *Guidance for Remediation of Petroleum Contaminated Sites* identifies the approach recommended by Ecology for determining whether the cleanup standards have been met.

Prepare and Submit a Remedial Action Report to Ecology

The results of all site characterization activities, as well as a description of the cleanup work completed, must be compiled and submitted to Ecology in a remedial action report. This report must provide adequate information to document that the selected model remedy meets the applicable cleanup standards unless the presence of structural impediments precluded complete removal of the contaminated soil and/or a conditional point of compliance is established for groundwater.

For those sites that are in the Voluntary Cleanup Program (VCP) process, the remedial action report submittal needs to follow the format and requirements set out in Chapter 5 of Ecology's [*Guidelines for Property Cleanups under the Voluntary Cleanup Program*](#) (Ecology 2015). The cover letter should indicate that an Ecology-approved model remedy is being used so it is clear that a Feasibility Study, Disproportionate Cost Analysis and a review fee are not required.

Based on the selected model remedy, it may be necessary to use environmental covenants or (for certain public rights-of-way) other institutional controls to help ensure that the remedy remains protective of human health and the environment over the long-term. If an environmental covenant is used, it must be filed with the Register of Deeds in the county where the site is located. The environmental covenant must meet all applicable requirements in WAC 173-340-440 and a copy of the draft restriction must be included as part of the final remedial action report. For more information, visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures. Documentation on the impediments encountered and an estimate of the mass of contamination remaining needs to be provided in the final remedial action report.

Pursue a No Further Action (NFA) Determination

Sites in the independent cleanup process that are interested in pursuing a no further action determination must apply to enter the VCP Program, including completing the Application Form and the Agreement. Part 1 of the Application Form should indicate that a no further action determination is being requested. While it is not required to submit a no further action request for sites under independent cleanup, the fees for such reviews are waived when a model remedy is selected as the remedial option. Therefore, Ecology encourages persons to pursue an NFA determination after work is completed, so that a final determination of the adequacy of the cleanup can be provided. The procedures for submitting a no further action request are found in Chapter 5 of Ecology's *Guidelines for Property Cleanups under the Voluntary Cleanup Program*. Ecology recently developed checklists to help identify the information that needs to be provided when requesting an opinion from Ecology. These documents are available at: <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-process/Cleanup-options/Voluntary-cleanup-program/Reporting-requirements>. For sites where Ecology oversight is being provided under either an Agreed Order or Consent Decree, the method for documenting the cleanup actions must follow the specific requirements contained in those documents.

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Appendix B:
**Factors to Consider When Establishing a
Conditional Point of Compliance**

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Appendix B: Factors to Consider When Establishing a Conditional Point of Compliance

Background

In order to establish a Conditional Point of Compliance (CPOC), MTCA requires a demonstration that it is not practicable to meet the cleanup level throughout the site within a reasonable restoration timeframe. The rule defines restoration timeframe as “the period of time needed to achieve the required cleanup levels at the points of compliance established for the site.” The rule goes on to require that when a groundwater CPOC is proposed, the person responsible for undertaking the cleanup must demonstrate that all practicable methods of treatment are to be used in site cleanup. MTCA defines all practicable methods of treatment to mean “all technologies and/or methods currently available and demonstrated to work under similar site circumstances or through pilot studies, and applicable to the site at a reasonable cost.”

As discussed on pages 14 and 20 of this guidance, the reasonable restoration timeframe criteria is used to help evaluate cleanup action alternatives that meet the threshold requirements. Since sites that use a model remedy are not required to conduct a Feasibility Study, it is not possible to complete this type of evaluation. The establishment of a CPOC must be protective of human health and the environment and the process specified in the following section provides further direction for addressing this requirement.

In general, unless groundwater cleanup levels for the site are based on protection of surface water (i.e. properties abutting or in close proximity to surface water) or where groundwater has been impacted by multiple sources that have resulted in co-mingled plumes of contamination that are not practicable to address separately, the CPOC cannot exceed the property boundary.

Note: None of the model remedies set forth in Chapter 6 of this document allow for off-property soil or groundwater contamination above Method A cleanup levels following completion of the cleanup. Therefore, none of the three off-property options for establishing a conditional point as specified in WAC 173-340720(8)(d) are allowed.

Factors to Consider

Establishing a CPOC needs to include documentation that all practicable methods of treatment have been used in site cleanup and that sufficient compliance monitoring has been performed to confirm:

- Contamination does not extend beyond the property boundary;
- The groundwater plume is stable or receding;

- The conditional compliance points are as close as practicable to the source of the contamination; and
- An environmental covenant is filed to document groundwater cleanup level exceedances are present on the property.

In order to help ensure that sufficient information is provided to justify the establishment of a CPOC, Ecology evaluated approximately 25 sites where a CPOC has been approved. This evaluation revealed that the following factors were routinely considered and addressed to provide the necessary justification:

- 1) Size of the site;
- 2) Age of the release;
- 3) Type of contaminants;
- 4) Proximity to potential receptors;
- 5) The geology and hydrogeology of the site;
- 6) Extent of the remedial action(s) implemented;
- 7) Proximity of the impacted wells to the source area;
- 8) Willingness to file an environmental covenant;
- 9) Amount of groundwater monitoring data; and
- 10) Plume stability.

The first seven factors will likely already have been addressed as part of previous reports, although some limited updating of the information may be necessary. The last three factors are typically considered the most critical for establishing a CPOC, particularly, whether the plume is stable or receding. Options for evaluating plume stability are contained in the Ecology publication [*Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation*](#) (Ecology 2005).

When a CPOC is approved an environmental covenant must be filed to document groundwater exceedances are present on the property. Specifically, the covenant will need to: 1) prohibit the construction of any water supply well; 2) require that any extracted groundwater be considered potentially contaminated and be properly managed; and 3) prohibit the construction of any new buildings without prior Ecology approval in order to minimize the potential for vapor intrusion. Ecology has model language to use when preparing environmental covenants. Visit TCP's Policies and Procedures website at <https://www.ecology.wa.gov/Regulations-Permits/Plans-policies/Toxics-cleanup-policies> and search "environmental covenant" under TCP Procedures. The document should be tailored to the site-specific situation.

Ongoing groundwater monitoring is often required when a site receives approval to use a CPOC and files an environmental covenant. In some cases the PLP will propose a long-term monitoring program, but more frequently, Ecology will determine whether continued monitoring is necessary based on site-specific circumstances.

**Appendix C:
Response to Comments for
*Model Remedies for Sites with Petroleum Impacts to
Groundwater (August 2017 Review Draft)***

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Appendix C: Response to Comments for *Model Remedies for Sites with Petroleum Impacts to Groundwater* (August 2017 Review Draft)

A public comment period was held from mid-August through September 22, 2017, for the August 2017 draft of this document. The following comments were received during that time and helped inform updates to this December 2017 revision.

Comment No. 1 – Chapter 6, paragraph 4 and Appendix A, page 8 contain references to an “executed” environmental covenant. This language should be revised to specify a “draft” covenant be provided as part of the remedial action report since Ecology’s review comments need to be incorporated prior to finalizing the document.

Response – The requested change was made to the guidance.

Comment No. 2 – The last 2 sentences in the first paragraph of page 2 in Appendix A uses the phrase “may be” which makes it sound like Ecology is not certain about the location of these documents. Use of “can be” or “is” would sound better.

Response – The guidance was changed revised to replace “may be” with “can be”.

Comment No. 3 – The fourth paragraph on page 15 of Chapter 5 is actually a surprisingly dense and important block of information. The “For example...” half of that paragraph feels like it gets a little lost in the total amount of information conveyed in the paragraph. I think it would make this “Option 2” section clearer if everything starting from “For example...” was made into its own paragraph, or done in a “call-out” box below the paragraph, or given an additional off-set (indent it another level).

Response – An additional paragraph was created as requested.

Comment No. 4 – The first sentence in paragraph 2 of Chapter 3 under “Affected Media” indicates that the Method A soil cleanup levels cannot be exceeded beyond the source property in order to use a model remedy. However, there are a number of model remedies that allow for higher levels of contamination to be left in-place due to the presence of limitations such as buildings, roadways or safety concerns, with the use of environmental covenants to address that contamination on the source property. Please clarify how concentrations higher than Method A levels for unrestricted use could be left in-place extending up to the roadway adjacent to the property boundary, with an expectation to meet the Method A levels immediately beyond the source property boundary.

Response – Ecology added a note to this section explaining why the Method A soil cleanup levels beyond the source property must be met when a model remedy is being used to address the contamination.

Comment No. 5 – The last sentence in the first paragraph on page 8 of Chapter 3 has an “is” that doesn’t belong.

Response – The guidance was revised to remove the unnecessary word.

Comment No. 6 – Option 12 in Table 1 under the heading “Meets Soil Cleanup Levels” is missing an “N”.

Response – The guidance was revised to add the missing letter.

Comment No. 7 – The last 2 sentences on page 16 indicate that the direct contact TPH cleanup level may need to be adjusted downward to account for the residual saturation screening levels set out in Table 747-5 in Washington Administrative Code (WAC) 173-340-900. Explain when this adjustment would be warranted.

Response – Ecology is removing these two sentences from the guidance as a reduction is not necessary when an empirical demonstration is used to show the contaminant levels do not exceed the Method A groundwater cleanup levels.

Comment No. 8 – Please consider allowing one or two model remedies to use EPH/VPH analysis of groundwater for determining a Method B groundwater cleanup level. Use of Method B groundwater cleanup levels seem appropriate for Model Remedies Nos. 5 and 6, especially since they allow the use of Method B for soil. Our recent experience shows that this approach has already been accepted by Ecology to demonstrate compliance with MTCA.

If allowing the open-ended use of Method B for groundwater is a concern, consider providing some limitations such as diesel/oil TPH concentrations up to 1500 ppb or an alternative level.

Response – Ecology is currently evaluating when the use of EPH/VPH analysis of groundwater would be appropriate for determining compliance with Method B groundwater cleanup levels. Since this approach has broader applicability than to just sites using model remedies, Ecology intends to wait until a program policy on this issue has been developed before attempting to integrate anything into the Model Remedy guidance.

Comment No. 9 – The Section on page 9 dealing with “Proximity to Private Wells” specifies that when a model remedy relies on a conditional point of compliance, the site cannot have a well present on the property unless the well is located at least 250 feet from the source of contamination. The edge of the source area may be difficult to determine, whereas applying the separation distance from the lateral extent of contamination would be relatively straightforward.

Response – The guidance was revised to specify that the 250 foot separation distance should be applied from the lateral extent of the contamination.

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