

RESPONSE TO COMMENTS
MODEL REMEDIES FOR SITES WITH PETROLEUM CONTAMINATED SOIL

Comment No. 1 – Overall, I’m pleased with the direction and intent of the document (to streamline and accelerate the pace of cleanups), as it has long been noted that on a national scale, Washington State has substantial opportunities for improvement (most notably based on its inclusion in the 2011 EPA study of LUST cleanup sites, from “The National LUST Cleanup Backlog: A Study of Opportunities – State Summary Chapter: Washington State”; Office of Solid Waste and Emergency Response, Office of Underground Storage Tanks – September 2011).

That said, this document is only a very small step in the right direction and will likely only substantially streamline/accelerate a relatively small number of sites. I’m eager to see what subsequent Model Remedies will have to offer. The EPA study referenced above showed that while there are a number of soil-only releases (the study noted 630 of those sites at the time), the much larger proportion of sites that need streamlining include groundwater impacts (1,364 releases). Indeed, soil only sites seem to have a much greater success rate of accelerated closure already – 3,426 soil-only NFAs were referenced in the report with an average lifecycle of less than 2.8 years, while there were only 976 groundwater NFAs noted at the time with a lifecycle in excess of 5 years.

Response – The initial focus on model remedy development has been on sites with only petroleum contaminated soil since approximately 85% of all contaminated sites have some type of petroleum impacts. It was also felt that beginning with a narrower project scope would result in the process moving along more quickly. The next phase of model remedy activities will be on petroleum sites with groundwater impacts. Preliminary work has already begun and the overall level of effort will increase now that the petroleum contaminated soil model remedy document is largely complete.

Comment No. 2 – Section 4 B (i) notes that “soil removal is the remedial option of choice for cleanup of petroleum contaminated soil.” I take significant issue with this statement. In many cases, removal of soil has a very limited environmental benefit, particularly if it’s being moved hundreds of miles to a landfill, or even taken for thermal treatment, while creating a substantial carbon footprint for the remedial action – this is noted in the *Guidance for the Remediation of Petroleum Contaminated Sites* in section 12.0. If there is an opportunity demonstrate or induce, in-situ, conditions in which petroleum-contaminated soil is protective of human health and the environment using means that has less of a carbon footprint, that should be the remedial approach of choice. Indeed, I have growing concern that remedial actions undertaken under MTCA may have a net negative environmental impact due to a lack of evaluation of carbon output. I would certainly remove the statement that soil removal is always the preferred option.

Response – In order to develop model remedies for petroleum contaminated soil, Ecology reviewed NFA decisions for approximately 120 sites. Based on this evaluation, the statement on soil removal was included because virtually all of the petroleum contaminated soil sites used soil removal as the selected remedial option. Since in-situ remedies were not used at any of the 120 sites it was not possible to

develop an in-situ model remedy, although this option can always be considered on a site-specific basis. To improve the accuracy of the sentence, it has been revised to say “soil removal has been the remedial option of choice for cleanup of petroleum contaminated soil”.

Comment No. 3 – The approach noted in Section 5 to select a generic TPH Cleanup Level of 1,500 mg/kg appears flawed. MTCA and CLARC already acknowledge that gasoline releases and releases of other petroleum products have significantly different risks associated with them; indeed, as I’m sure many of my colleagues note, 1,500 mg/kg is significantly lower than the MTCA Method A levels for diesel or heavy oil releases and appears to be inappropriate for such releases. A different value for those types of release should be derived for this model remedy approach.

It also appears that the selection of 1,500 mg/kg appears to be somewhat arbitrary, as petroleum releases exclusively in the aromatic fraction range EC 10-12 are extremely unlikely to be encountered; the range of values observed by Ecology in their review of 100 TPH worksheets indicated that 1,923 mg/kg to be the lowest calculated value – 28% higher than the 1,500 mg/kg. Instead, it would make more sense to use the data available to Ecology to create a sufficiently large sample size and to evaluate a statistical approach to derive a sufficiently protective margin of error based on conditions that might actually be encountered at cleanup sites. Indeed, it should be noted that 1,500 mg/kg entered into the current MTCA Method B spreadsheets exclusively in the AR EC 10-12 section creates a Hazard Index of 1.015, which is not protective.

Response – Section 5 has been expanded to clarify that the 1,500 mg/kg generic direct contact cleanup level does not affect the existing Method A cleanup levels of 2,000 mg/kg for diesel/heavy oils or the 4,000 mg/kg for mineral oil. The generic level simply provides another option to address situations where TPHg exceeds the Method A value of 30 or 100 mg/kg but where the overall petroleum mixture is less than 1500 mg/kg.

The reason the aromatic EC 10-12 range was selected was because it is the most toxic and results in the lowest generic cleanup level. No other EC range or combination of ranges would result in a lower value. The 1500 mg/kg level represents a conservative approach but one which provides additional flexibility for situations where the Method A TPHg level is exceeded. If a concentration of 1,478 mg/kg is entered into the MTCA TPH spreadsheet exclusively under the AR EC 10-12 fraction, the Hazard Index = 1. Since the lowest observed value based on a review of over 100 TPH worksheets samples was 1,983 mg/kg this additional line of evidence supported the conclusion that rounding the number to two significant figures (i.e. 1,500 mg/kg) would always result in a Hazard Index of less than 1.

While the 1,500 mg/kg level is conservative from a direct contact standpoint, the data also show that sites with total TPH of 1,000 mg/kg or greater will almost always have exceedances of Method A cleanup levels for other compounds and often have groundwater impacts as well. Since the number of sites that would benefit from further refinement of the TPH direct contact upper limit would be extremely limited, Ecology believes that devoting additional resources to this effort is not warranted.

Comment No. 4 – The basis for the 10,000 mg/kg TPH value identified in Section 6 should be noted.

Response – Use of Method C can often result in a significant amount of contamination remaining in the soil following remediation. An upper limit was included to help encourage additional cleanup when a model remedy using Method C is selected.

Comment No. 5 – In Appendix A under Management of Contaminated Soil, it would be helpful to echo the note in *Guidelines for the Remediation of Petroleum Contaminated Sites* that re-use of petroleum contaminated soils should be evaluated due to carbon footprint/greenhouse gas emissions associated with other remedies; this indirectly referred to with the note to table 12.2 of that document, but it's an important point to make in this guidance document and should be emphasized here.

Response – Chapter 12 of the document entitled: “Guidelines for the Remediation of Petroleum Contaminated Sites” does not contain a reference to evaluating greenhouse gas emissions associated with other remedies and therefore was not referred to as part of this guidance document.

Comment No. 6 – Under Model Remedy 2, the cleanup levels for the petroleum hydrocarbon constituents in Table 745-1 (Model Remedy #2) are the same as in Table 740-1 (Model Remedy #1). This includes: gasoline, diesel, heavy oil and mineral oil range organics, benzene, toluene ethylbenzene, xylenes (BTEX), naphthalenes, ethylene dibromide (EDB), and MTBE. The only contaminants potentially associated with a hydrocarbon release that have industrial cleanup levels greater than for unrestricted land use are lead and polycyclic aromatic hydrocarbons (PAH). However, in any instance where a cleanup has achieved Method A cleanup levels for petroleum hydrocarbon compounds, but where lead and/or PAH unrestricted land use cleanup levels have not been achieved, it would be a near certainty that there is a secondary source unrelated to the petroleum release. The Model Remedies guidance is clear in that its applicability is only for sites contaminated with “gasoline, middle distillates/oils, or heavy fuels/oils and their constituents.” Therefore, there is no Model Remedy #2 as it is currently written.

Response – Ecology acknowledges that the differences in cleanup levels between Table 745-1 (Method A Soil Cleanup Levels for Industrial Properties) is not significantly different than Table 740-1 (Method A Soil Cleanup Levels for Unrestricted Use) and while this option may not be used frequently, certain diesels and heavy oils can contain one or more of the cPAH's. Given the relatively low unrestricted cleanup level of 0.1 mg/kg for Benzo(a)pyrene and considering that all 7 of the cPAH's need to be accounted for as a single hazardous substance (WAC 173-340-708(8)(e)) it is possible that a site meeting the other Method A cleanup levels could exceed the B(a)P level for unrestricted use. Therefore this model remedy option is being retained.

Comment No. 7 – The discussions for Model Remedies 4 and 5 need to tie back to Section 5 to ensure that the user knows how to establish Method B cleanup levels for total petroleum hydrocarbons (TPH). It should be noted that the links provided do not include Method B cleanup levels for TPH. Better yet, since it is a very limited list of compounds that are applicable under the model remedies, a table of compounds and their respective Method B cleanup levels would be more helpful. In the event that

Method B cleanup levels are later changed to reflect more current toxicity information, a note can be included to the effect that Ecology's CLARC web site should be checked for the most current Method B cleanup levels before initiating a cleanup.

Response – The discussion under Model Remedies 4 and 5 was expanded to indicate that the links to CLARC provide compound specific direct contact levels and the TPH direct contact levels can be determined using one of the options contained in Section 5. A table of compounds was not included as subsequent changes to CLARC could make the table values inaccurate. Due to this concern, tables of cleanup values are being removed from other Ecology guidance documents as well.

Comment No. 8 – The comments for Model Remedies 6 and 7 are essentially the same as for Model Remedies 4 and 5 in that more specific information and explanation needs to be provided. Also, please explain the basis for the 10,000 mg/kg maximum TPH concentration referenced in Model Remedy 7.

Response – Similar changes to those discussed in the response to Comment No. 7 were also made to Model Remedies 6 and 7. The response to Comment No. 3 provides an explanation as to the basis for the 10,000 mg/kg TPH cleanup level.

Comment No. 9 – For Model Remedies 3, 5 and 7, where residual contamination remains and for which an environmental covenant has been applied, will Ecology be conducting periodic reviews? If so, please note this in the document. If not, it would be interesting to know why this would not apply, but does apply to other sites that have obtained a no further action determination with an environmental covenant under the voluntary cleanup program.

Response – Ecology intends to conduct periodic reviews at sites where environmental covenants are used. This was noted in the second full paragraph on page 7 of the draft document.

Comment No. 10 – In Section 3 under *Contaminant Types*, it states that “If any contaminants other than those typically found in petroleum products . . . are discovered above the practical quantitation limits during the site characterization, the site is not eligible to use any of the model remedies included in this document.” We suggest that Ecology explicitly identify the constituents listed in MTCA Table 830-1, other than those identified as “Other Compounds”, be considered as contaminants “typically found in petroleum products.”

Response – The recommended change was made to the document.

Comment No. 11 – To make the lead in phrase under Section 4 (“.... so that:”) applicable, item (b) should read “(b) if structural impediments such as buildings, utility lines, or public roads prevent complete removal of the contaminated soil, ~~and~~ the remaining residual contamination will not impact other media including groundwater or indoor air quality.”

Response – The recommended change was made to the document.

Comment No. 12 – Under Model Remedy 3 it indicates that “This model remedy applies to situations where Method A levels are selected.” Does this apply to either Method A for Unrestricted Land Uses or Industrial Properties? This should be explicitly stated.

Response – This provision was expanded to clarify that the Model Remedy can apply to either unrestricted use or to situations where industrial land use is applicable.

Comment No. 13 – Under Model Remedy 6 and Model Remedy 7, no provisions are made for offsite contamination. We suggest that, similar to Model Remedy 2, these Model Remedies could also be applicable if off-site contamination is cleaned up to Method A Soil Cleanup Levels for Unrestricted Land Uses or applicable Method B standards.

Response – The reason that Model Remedies 1 and 2 included a provision for management of off-property impacts was because the cleanup would be conducted to meet Method A levels for unrestricted use. This approach would result in the off-property impacts being fully addressed. Ecology agrees it could be beneficial to expand this option and so the introductory language in Section 6 was modified to allow any model remedy to address off-site impacts using the Method A unrestricted levels.

Comment No. 14 – The section of Appendix A that refers to Selecting a Remediation Contractor/Consultant states that “Implementation [of Model Remedies] must address all of the applicable provisions contained in Appendix A.” However in the *Select a Remediation Contractor/Consultant* sections, it indicates “owners and operators **typically** [emphasis added] hire an environmental consultant”. The use of this language makes it ambiguous as to whether it is required of an owner or operator to hire an environmental consultant. We suggest that this should not be a requirement and that Ecology modify the first sentence of the *Select a Remediation Contractor/Consultant* section as follows: “**Although not required, Ecology encourages** owners and operators typically **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.

Response – The recommended change was made to the document.

Comment No. 15 – The section of Appendix A regarding Sampling and Analysis of Excavated Soil states that “Discrete grab samples should be collected as the soil is being placed into the storage area or into trucks for transportation off-site.” Collection of samples as the soil goes into stockpiles or into trucks is not standard practice and is contrary to Ecology’s guidance documents for stockpile sampling (*Guidance for Site Checks and Site Assessments for Underground Storage Tanks* and *Guidance for Remediation of Petroleum Contaminated Sites*). This section should be revised to be consistent with Ecology guidance.

Response – The referenced sentence was deleted as this provision is covered elsewhere in the section.

Comment No. 16 – On Page 4 under *Affected Media*, the requirement that petroleum contamination be below PQLs in groundwater may be problematic as written. I understand the goal of limiting the model remedies to sites with no groundwater impacts. However, many of the sites we deal with have low level detections of TPH-D ext (below 0.5 mg/L) that are derived from natural organics or other non-petroleum sources. Ideally the model remedy would allow the flexibility to demonstrate that reported groundwater hydrocarbon detections below Method A cleanup levels are not associated with the site soil contamination (either directly from the hydrocarbon source or from associated degradation products).

Response - This issue was briefly discussed briefly during an external workgroup meeting in December, 2014. Ecology understands that there could be a number of situations where sites previously impacted groundwater but due to implementation of one or more remedial actions, groundwater concentrations have been reduced to less than the applicable Method A cleanup level. The next model remedies document: “Sites with Petroleum Impacts to Groundwater” will address these types of situations.

Comment No. 17 – On Page 4 under *Contaminant Types*, should the model remedy document address metals? Obviously some metals are associated with hydrocarbon releases but will typically be present as the result of natural or regional background conditions. For metals not associated with the petroleum release, do soil concentrations have to be at background levels or below unrestricted direct contact levels? We have a number of sites with residual oil contamination in soils that also have background to low (below direct contact) levels of metals but no impacts to groundwater that we would like to cover under the model remedies.

Response – The purpose of the model remedies document was to focus specifically on petroleum contaminated soil. Existing rule language and guidance specify that lead is the only metal that may require analysis when evaluating petroleum releases. If other metals are tested for and found to be present, the option available through the model remedy process is to provide the necessary documentation that the measured concentrations meet the definition of background as provided for in WAC 173-340-709. The next model remedy document will address petroleum impacts to groundwater. After that, the focus will likely be on relatively immobile compounds such as metals and PCB’s.

Comment No. 18 - Based on previous text, I assume that the Method B cleanup levels referenced under Model Remedy 4 will only be based on direct contact since the other pathways (soil to groundwater, vapor, terrestrial) have already been shown to be incomplete and not of concern. The text stating that Method B soil cleanup levels must address these other pathways seems redundant and confusing.

Response – Ecology agrees this language should not be limited to Model Remedy 4 and has moved the reference to Section 3 as it applies to all of the model remedies identified.

Comment No. 19 – Under Section 3, sites that do not qualify for exclusions or simplified TEEs are excluded from the Model Remedy program. No reason is provided for this exception. These sites should be allowed in the model remedy program.

Response – Model remedies provide cleanup options for routine sites that have lower risk to human health and the environment. In order to limit model remedies to relatively simple, straightforward situations, sites needing to complete a site-specific terrestrial ecological evaluation (TEE) were excluded. It has been Ecology’s experience however, that the vast majority of sites eligible to use one of the proposed model remedies would either be excluded from preparing a TEE or would be limited to completing a simplified evaluation.

Comment No. 20 – In the 3rd paragraph of Section 5, it states that ECY has determined that their derived TPH method B cleanup level for direct contact is 1500 ppm. But Option 2 says it can only be used on Model Remedy sites. If it’s based on good science then others should also be allowed to use it.

Response – One of the primary factors in developing a generic direct contact TPH cleanup level was that groundwater impacts could not be present. In situations where groundwater exceedances are measured, the 1500 mg/kg level will very likely not be protective of the soil to groundwater pathway and therefore not appropriate to use as the Method B TPH soil cleanup level for the site. Ecology intends to continue evaluating this approach and may expand the use of this cleanup level to non Model Remedy sites in the future.

Comment No. 21 - Several Model Remedies note that institutional covenants can be applied when soil impacts extend beneath certain public right-of-ways. It’s my experience that these are extremely difficult to obtain. What does ECY propose if the ‘owner’ of the ROW doesn’t want to adopt a RC? Is there a plan?

Response – While there are a limited number of alternatives available to address soil contamination in the right-of-way, Ecology will be evaluating whether other options can be implemented based on existing rule language.

Comment No. 22 - When non-Method A cleanup levels (CULs) are selected, CULs must address the leaching pathway. Since only sites without contaminated groundwater can be in the Model Remedy program, can the empirical demonstration be used to demonstrate leaching pathway compliance?

Response – Yes, empirical demonstrations can be used to show that the measured soil concentrations will not cause groundwater exceedances at any time in the future.