

WAC 173-340-900 Tables.

Table 708-1: Toxicity Equivalency Factors for Chlorinated dibenzo-p-dioxins and Chlorinated Dibenzofurans Congeners

| CAS Number | Hazardous Substance | Toxicity Equivalency Factor (unitless) ⁽¹⁾ |
|-------------------------|---|---|
| Dioxin Congeners | | |
| 1746-01-6 | 2,3,7,8-Tetrachloro dibenzo-p-dioxin | 1 |
| 40321-76-4 | 1,2,3,7,8-Pentachloro dibenzo-p-dioxin | 1 |
| 39227-28-6 | 1,2,3,4,7,8-Hexachloro dibenzo-p-dioxin | 0.1 |
| 57653-85-7 | 1,2,3,6,7,8-Hexachloro dibenzo-p-dioxin | 0.1 |
| 19408-74-3 | 1,2,3,7,8,9-Hexachloro dibenzo-p-dioxin | 0.1 |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachloro dibenzo-p-dioxin | 0.01 |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachloro dibenzo-p-dioxin | 0.0003 |
| Furan Congeners | | |
| 51207-31-9 | 2,3,7,8-Tetrachloro dibenzofuran | 0.1 |
| 57117-41-6 | 1,2,3,7,8-Pentachloro dibenzofuran | 0.03 |
| 57117-31-4 | 2,3,4,7,8-Pentachloro dibenzofuran | 0.3 |
| 70648-26-9 | 1,2,3,4,7,8-Hexachloro dibenzofuran | 0.1 |
| 57117-44-9 | 1,2,3,6,7,8-Hexachloro dibenzofuran | 0.1 |
| 72918-21-9 | 1,2,3,7,8,9-Hexachloro dibenzofuran | 0.1 |
| 60851-34-5 | 2,3,4,6,7,8-Hexachloro dibenzofuran | 0.1 |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachloro dibenzofuran | 0.01 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachloro dibenzofuran | 0.01 |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachloro dibenzofuran | 0.0003 |

⁽¹⁾ Source: Van den Berg et al. 2006. The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences 2006 93(2):223-241; doi:10.1093/toxsci/kfl055.

Table 708-2: Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708 (e)

| CAS Number | Hazardous Substance | TEF (unitless) ⁽¹⁾ |
|------------|------------------------|-------------------------------|
| 50-32-08 | benzo[a]pyrene | 1 |
| 56-55-3 | benzo[a]anthracene | 0.1 |
| 205-99-2 | benzo[b]fluoranthene | 0.1 |
| 207-08-9 | benzo[k]fluoranthene | 0.1 |
| 218-01-9 | chrysene | 0.01 |
| 53-70-3 | dibenz[a, h]anthracene | 0.1 |
| 193-39-5 | indeno[1,2,3-cd]pyrene | 0.1 |

⁽¹⁾ Source: Cal-EPA, 2005. Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II Technical Support Document for Describing Available Cancer Potency Factors. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. May 2005.

Table 708-3: Toxicity Equivalency Factors for Carcinogenic Polyaromatic Hydrocarbons (cPAHs) that May be Required under WAC 173-340-708 (8) (e) (v)

| CAS Number | Hazardous Substance | TEF (unitless) ⁽¹⁾ |
|------------|----------------------|-------------------------------|
| 205-82-3 | benzo(j)fluoranthene | 0.1 |

| CAS Number | Hazardous Substance | TEF (unitless) ⁽¹⁾ |
|------------|-----------------------------|-------------------------------|
| 224-42-0 | dibenz[a, j]acridine | 0.1 |
| 226-36-8 | dibenz[a, h]acridine | 0.1 |
| 194-59-2 | 7H-dibenzo[c, g]carbazole | 1 |
| 192-65-4 | dibenzo[a, e]pyrene | 1 |
| 189-64-0 | dibenzo[a, h]pyrene | 10 |
| 189-55-9 | dibenzo[a, i]pyrene | 10 |
| 191-30-0 | dibenzo[a, l]pyrene | 10 |
| 3351-31-3 | 5-methylchrysene | 1 |
| 5522-43-0 | 1-nitropyrene | 0.1 |
| 57835-92-4 | 4-nitropyrene | 0.1 |
| 42397-64-8 | 1,6-dinitropyrene | 10 |
| 42397-65-9 | 1,8-dinitropyrene | 1 |
| 7496-02-8 | 6-nitrochrysene | 10 |
| 607-57-8 | 2-nitrofluorene | 0.01 |
| 57-97-6 | 7,12-dimethylbenzanthracene | 10 |
| 56-49-5 | 3-methylcholanthrene | 1 |
| 602-87-9 | 5-nitroacenaphthene | 0.01 |

(1) Source: Cal-EPA, 2005. Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II Technical Support Document for Describing Available Cancer Potency Factors. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. May 2005.

Table 708-4: Toxicity Equivalency Factors for Dioxin-Like Polychlorinated Biphenyls (PCBs)

| CAS Number | Hazardous Substance | TEF (unitless) ⁽¹⁾ |
|-------------------------|--|-------------------------------|
| Dioxin-Like PCBs | | |
| 32598-13-3 | 3,3',4,4'-Tetrachlorobiphenyl (PCB 77) | 0.0001 |
| 70362-50-4 | 3,4,4',5- Tetrachlorobiphenyl (PCB 81) | 0.0003 |
| 32598-14-4 | 2,3,3',4,4'-Pentachlorobiphenyl (PCB 105) | 0.00003 |
| 74472-37-0 | 2,3,4,4',5-Pentachlorobiphenyl (PCB 114) | 0.00003 |
| 31508-00-6 | 2,3',4,4',5-Pentachlorobiphenyl (PCB 118) | 0.00003 |
| 65510-44-3 | 2',3,4,4',5-Pentachlorobiphenyl (PCB 123) | 0.00003 |
| 57465-28-8 | 3,3',4,4',5-Pentachlorobiphenyl (PCB 126) | 0.1 |
| 38380-08-4 | 2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156) | 0.00003 |
| 69782-90-7 | 2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157) | 0.00003 |
| 52663-72-6 | 2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167) | 0.00003 |
| 32774-16-6 | 3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169) | 0.03 |
| 39635-31-9 | 2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189) | 0.00003 |

(1) Source: Van den Berg et al. 2006. The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences 2006 93(2):223-241; doi:10.1093/toxsci/kfl055.

**Table 720-1
Method A Cleanup Levels for Groundwater.^a**

| Hazardous Substance | CAS Number | Cleanup Level |
|--|--------------------------------------|---------------------------------|
| Arsenic | 7440-38-2 | 5 ug/liter ^b |
| Benzene | 71-43-2 | 5 ug/liter ^c |
| Benzo(a)pyrene | 50-32-8 | 0.1 ug/liter ^d |
| Cadmium | 7440-43-9 | 5 ug/liter ^e |
| Chromium (Total) | 7440-47-3 | 50 ug/liter ^f |
| DDT | 50-29-3 | 0.3 ug/liter ^g |
| 1,2 Dichloroethane (EDC) | 107-06-2 | 5 ug/liter ^h |
| Ethylbenzene | 100-41-4 | 700 ug/liter ⁱ |
| Ethylene dibromide (EDB) | 106-93-4 | 0.01 ug/liter ^j |
| Gross Alpha Particle Activity | | 15 pCi/liter ^k |
| Gross Beta Particle Activity | | 4 mrem/yr ^l |
| Lead | 7439-92-1 | 15 ug/liter ^m |
| Lindane | 58-89-9 | 0.2 ug/liter ⁿ |
| Methylene chloride | 75-09-2 | 5 ug/liter ^o |
| Mercury | 7439-97-6 | 2 ug/liter ^p |
| MTBE | 1634-04-4 | 20 ug/liter ^q |
| Naphthalenes | 91-20-3 | 160 ug/liter ^r |
| PAHs (carcinogenic) | | See benzo(a)pyrene ^d |
| PCB mixtures | | 0.1 ug/liter ^s |
| Radium 226 and 228 | | 5 pCi/liter ^t |
| Radium 226 | | 3 pCi/liter ^u |
| Tetrachloroethylene | 127-18-4 | 5 ug/liter ^v |
| Toluene | 108-88-3 | 1,000 ug/liter ^w |
| Total Petroleum Hydrocarbons ^x | | |
| [Note: Must also test for and meet cleanup levels for other petroleum components—see footnotes!] | | |
| Gasoline Range Organics | | |
| | Benzene present in groundwater | 800 ug/liter |
| | No detectable benzene in groundwater | 1,000 ug/liter |
| Diesel Range Organics | | |
| | Heavy Oils | 500 ug/liter |
| | Mineral Oil | 500 ug/liter |
| 1,1,1 Trichloroethane | 71-55-6 | 200 ug/liter ^y |
| Trichloroethylene | 79-01-6 | 5 ug/liter ^z |
| Vinyl chloride | 75-01-4 | 0.2 ug/liter ^{aa} |
| Xylenes | 1330-20-7 | 1,000 ug/liter ^{bb} |

Footnotes:

- a Caution on misusing this table.** This table has been developed for specific purposes. It is intended to provide conservative cleanup levels for drinking water beneficial uses at sites undergoing routine cleanup actions or those sites with relatively few hazardous substances. This table may not be appropriate for defining cleanup levels at other sites. For these reasons, the values in this table should not automatically be used to define cleanup levels that must be met for financial, real estate, insurance coverage or placement, or similar transactions or purposes. Exceedances of the values in this table do not necessarily mean the groundwater must be restored to those levels at all sites. The level of restoration depends on the remedy selected under WAC 173-340-350 through 173-340-390.
- b Arsenic.** Cleanup level based on background concentrations for state of Washington.
- c Benzene.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- d Benzo(a)pyrene.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61), adjusted to a 1×10^{-5} risk. If other carcinogenic PAHs are suspected of being present at the site, test for them and use this value as the total concentration that all carcinogenic PAHs must meet using the toxicity equivalency methodology in WAC 173-340-708(8).
- e Cadmium.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.62).
- f Chromium (Total).** Cleanup level based on concentration derived using Equation 720-1 for hexavalent chromium. This is a total value for chromium III and chromium VI. If just chromium III is present at the site, a cleanup level of 100 ug/l may be used (based on WAC 246-290-310 and 40 C.F.R. 141.62).
- g DDT (dichlorodiphenyltrichloroethane).** Cleanup levels based on concentration derived using Equation 720-2.
- h 1,2 Dichloroethane (ethylene dichloride or EDC).** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- i Ethylbenzene.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).

- j Ethylene dibromide (1,2 dibromoethane or EDB).** Cleanup level based on concentration derived using Equation 720-2, adjusted for the practical quantitation limit.
- k Gross Alpha Particle Activity, excluding uranium.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.15).
- l Gross Beta Particle Activity, including gamma activity.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.15).
- m Lead.** Cleanup level based on applicable state and federal law (40 C.F.R. 141.80).
- n Lindane.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- o Methylene chloride (dichloromethane).** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- p Mercury.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.62).
- q Methyl tertiary-butyl ether (MTBE).** Cleanup level based on federal drinking water advisory level (EPA-822-F-97-009, December 1997).
- r Naphthalenes.** Cleanup level based on concentration derived using Equation 720-1. This is a total value for naphthalene, 1-methyl naphthalene and 2-methyl naphthalene.
- s PCB mixtures.** Cleanup level based on concentration derived using Equation 720-2, adjusted for the practical quantitation limit. This cleanup level is a total value for all PCBs.
- t Radium 226 and 228.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.15).
- u Radium 226.** Cleanup level based on applicable state law (WAC 246-290-310).
- v Tetrachloroethylene.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- w Toluene.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- x Total Petroleum Hydrocarbons (TPH).** TPH cleanup values have been provided for the most common petroleum products encountered at contaminated sites. Where there is a mixture of products or the product composition is unknown, samples must be tested using both the NWTPH-Gx and NWTPH-Dx methods and the lowest applicable TPH cleanup level must be met.
 - **Gasoline range organics** means organic compounds measured using method NWTPH-Gx. Examples are aviation and automotive gasoline. The cleanup level is based on protection of groundwater for noncarcinogenic effects during drinking water use. Two cleanup levels are provided. The higher value is based on the assumption that no benzene is present in the groundwater sample. If any detectable amount of benzene is present in the groundwater sample, then the lower TPH cleanup level must be used. No interpolation between these cleanup levels is allowed. The groundwater cleanup level for any carcinogenic components of the petroleum [such as benzene, EDB and EDC] and any noncarcinogenic components [such as ethylbenzene, toluene, xylenes and MTBE], if present at the site, must also be met. See Table 830-1 for the minimum testing requirements for gasoline releases.
 - **Diesel range organics** means organic compounds measured using NWTPH-Dx. Examples are diesel, kerosene, and #1 and #2 heating oil. The cleanup level is based on protection from noncarcinogenic effects during drinking water use. The groundwater cleanup level for any carcinogenic components of the petroleum [such as benzene and PAHs] and any noncarcinogenic components [such as ethylbenzene, toluene, xylenes and naphthalenes], if present at the site, must also be met. See Table 830-1 for the minimum testing requirements for diesel releases.
 - **Heavy oils** means organic compounds measured using NWTPH-Dx. Examples are #6 fuel oil, bunker C oil, hydraulic oil and waste oil. The cleanup level is based on protection from noncarcinogenic effects during drinking water use, assuming a product composition similar to diesel fuel. The groundwater cleanup level for any carcinogenic components of the petroleum [such as benzene, PAHs and PCBs] and any noncarcinogenic components [such as ethylbenzene, toluene, xylenes and naphthalenes], if present at the site, must also be met. See Table 830-1 for the minimum testing requirements for heavy oil releases.
 - **Mineral oil** means non-PCB mineral oil, typically used as an insulator and coolant in electrical devices such as transformers and capacitors measured using NWTPH-Dx. The cleanup level is based on protection from noncarcinogenic effects during drinking water use. Sites using this cleanup level must analyze groundwater samples for PCBs and meet the PCB cleanup level in this table unless it can be demonstrated that: (1) The release originated from an electrical device manufactured after July 1, 1979; or (2) oil containing PCBs was never used in the equipment suspected as the source of the release; or (3) it can be documented that the oil released was recently tested and did not contain PCBs. Method B (or Method C, if applicable) must be used for releases of oils containing greater than 50 ppm PCBs. See Table 830-1 for the minimum testing requirements for mineral oil releases.
- y 1,1,1 Trichloroethane.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- z Trichloroethylene.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61).
- aa Vinyl chloride.** Cleanup level based on applicable state and federal law (WAC 246-290-310 and 40 C.F.R. 141.61), adjusted to a 1×10^{-5} risk.
- bb Xylenes.** Cleanup level based on xylene not exceeding the maximum allowed cleanup level in this table for total petroleum hydrocarbons and on prevention of adverse aesthetic characteristics. This is a total value for all xylenes.

**Table 740-1
Method A Soil Cleanup Levels for
Unrestricted Land Uses.^a**

| Hazardous Substance | CAS Number | Cleanup Level |
|--------------------------|------------|---------------------------|
| Arsenic | 7440-38-2 | 20 mg/kg ^b |
| Benzene | 71-43-2 | 0.03 mg/kg ^c |
| Benzo(a)pyrene | 50-32-8 | 0.1 mg/kg ^d |
| Cadmium | 7440-43-9 | 2 mg/kg ^e |
| Chromium | | |
| Chromium VI | 18540-29-9 | 19 mg/kg ^{f1} |
| Chromium III | 16065-83-1 | 2,000 mg/kg ^{f2} |
| DDT | 50-29-3 | 3 mg/kg ^g |
| Ethylbenzene | 100-41-4 | 6 mg/kg ^h |
| Ethylene dibromide (EDB) | 106-93-4 | 0.005 mg/kg ⁱ |
| Lead | 7439-92-1 | 250 mg/kg ^j |
| Lindane | 58-89-9 | 0.01 mg/kg ^k |
| Methylene chloride | 75-09-2 | 0.02 mg/kg ^l |
| Mercury (inorganic) | 7439-97-6 | 2 mg/kg ^m |
| MTBE | 1634-04-4 | 0.1 mg/kg ⁿ |

| Hazardous Substance | CAS Number | Cleanup Level |
|--|------------|---------------------------------|
| Naphthalenes | 91-20-3 | 5 mg/kg ^o |
| PAHs (carcinogenic) | | See benzo(a)pyrene ^d |
| PCB Mixtures | | 1 mg/kg ^p |
| Tetrachloroethylene | 127-18-4 | 0.05 mg/kg ^q |
| Toluene | 108-88-3 | 7 mg/kg ^f |
| Total Petroleum Hydrocarbons ^s | | |
| [Note: Must also test for and meet cleanup levels for other petroleum components—see footnotes!] | | |
| Gasoline Range Organics | | |
| Gasoline mixtures without benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture | | 100 mg/kg |
| All other gasoline mixtures | | 30 mg/kg |
| Diesel Range Organics | | 2,000 mg/kg |
| Heavy Oils | | 2,000 mg/kg |
| Mineral Oil | | 4,000 mg/kg |
| 1,1,1 Trichloroethane | 71-55-6 | 2 mg/kg ^t |
| Trichloroethylene | 79-01-6 | 0.03 mg/kg ^u |
| Xylenes | 1330-20-7 | 9 mg/kg ^v |

Footnotes:

- a Caution on misusing this table.** This table has been developed for specific purposes. It is intended to provide conservative cleanup levels for sites undergoing routine cleanup actions or for sites with relatively few hazardous substances, and the site qualifies under WAC 173-340-7491 for an exclusion from conducting a simplified or site-specific terrestrial ecological evaluation, or it can be demonstrated using a terrestrial ecological evaluation under WAC 173-340-7492 or 173-340-7493 that the values in this table are ecologically protective for the site. This table may not be appropriate for defining cleanup levels at other sites. For these reasons, the values in this table should not automatically be used to define cleanup levels that must be met for financial, real estate, insurance coverage or placement, or similar transactions or purposes. Exceedances of the values in this table do not necessarily mean the soil must be restored to these levels at a site. The level of restoration depends on the remedy selected under WAC 173-340-350 through 173-340-390.
- b Arsenic.** Cleanup level based on direct contact using Equation 740-2 and protection of groundwater for drinking water use using the procedures in WAC 173-340-747(4), adjusted for natural background for soil.
- c Benzene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures in WAC 173-340-747 (4) and (6).
- d Benzo(a)pyrene.** Cleanup level based on direct contact using Equation 740-2. If other carcinogenic PAHs are suspected of being present at the site, test for them and use this value as the total concentration that all carcinogenic PAHs must meet using the toxicity equivalency methodology in WAC 173-340-708(8).
- e Cadmium.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4), adjusted for the practical quantitation limit for soil.
- f1 Chromium VI.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- f2 Chromium III.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4). Chromium VI must also be tested for and the cleanup level met when present at a site.
- g DDT (dichlorodiphenyltrichloroethane).** Cleanup level based on direct contact using Equation 740-2.
- h Ethylbenzene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- i Ethylene dibromide (1,2 dibromoethane or EDB).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4), adjusted for the practical quantitation limit for soil.
- j Lead.** Cleanup level based on preventing unacceptable blood lead levels.
- k Lindane.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4), adjusted for the practical quantitation limit.
- l Methylene chloride (dichloromethane).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- m Mercury.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- n Methyl tertiary-butyl ether (MTBE).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- o Naphthalenes.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4). This is a total value for naphthalene, 1-methyl naphthalene and 2-methyl naphthalene.
- p PCB Mixtures.** Cleanup level based on applicable federal law (40 C.F.R. 761.61). This is a total value for all PCBs.
- q Tetrachloroethylene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- r Toluene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- s Total Petroleum Hydrocarbons (TPH).** TPH cleanup values have been provided for the most common petroleum products encountered at contaminated sites. Where there is a mixture of products or the product composition is unknown, samples must be tested using both the NWTPH-Gx and NWTPH-Dx methods and the lowest applicable TPH cleanup level must be met.

- **Gasoline range organics** means organic compounds measured using method NWTPH-Gx. Examples are aviation and automotive gasoline. The cleanup level is based on protection of groundwater for noncarcinogenic effects during drinking water use using the procedures described in WAC 173-340-747(6). Two cleanup levels are provided. The lower value of 30 mg/kg can be used at any site. When using this lower value, the soil must also be tested for and meet the benzene soil cleanup level. The higher value of 100 mg/kg can only be used if the soil is tested and found to contain no benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture. No interpolation between these cleanup levels is allowed. In both cases, the soil cleanup level for any other carcinogenic components of the petroleum [such as EDB and EDC], if present at the site, must also be met. Also, in both cases, soil cleanup levels for any noncarcinogenic components [such as toluene, ethylbenzene, xylenes, naphthalene, and MTBE], also must be met if these substances are found to exceed groundwater cleanup levels at the site. See Table 830-1 for the minimum testing requirements for gasoline releases.
- **Diesel range organics** means organic compounds measured using method NWTPH-Dx. Examples are diesel, kerosene, and #1 and #2 heating oil. The cleanup level is based on preventing the accumulation of free product on the groundwater, as described in WAC 173-340-747(10). The soil cleanup level for any carcinogenic components of the petroleum [such as benzene and PAHs], if present at the site, must also be met. Soil cleanup levels for any noncarcinogenic components [such as toluene, ethylbenzene, xylenes and naphthalenes], also must be met if these substances are found to exceed the groundwater cleanup levels at the site. See Table 830-1 for the minimum testing requirements for diesel releases.
- **Heavy oils** means organic compounds measured using NWTPH-Dx. Examples are #6 fuel oil, bunker C oil, hydraulic oil and waste oil. The cleanup level is based on preventing the accumulation of free product on the groundwater, as described in WAC 173-340-747(10) and assuming a product composition similar to diesel fuel. The soil cleanup level for any carcinogenic components of the petroleum [such as benzene, PAHs and PCBs], if present at the site, must also be met. Soil cleanup levels for any noncarcinogenic components [such as toluene, ethylbenzene, xylenes and naphthalenes], also must be met if found to exceed the groundwater cleanup levels at the site. See Table 830-1 for the minimum testing requirements for heavy oil releases.
- **Mineral oil** means non-PCB mineral oil, typically used as an insulator and coolant in electrical devices such as transformers and capacitors, measured using NWTPH-Dx. The cleanup level is based on preventing the accumulation of free product on the groundwater, as described in WAC 173-340-747(10). Sites using this cleanup level must also analyze soil samples and meet the soil cleanup level for PCBs, unless it can be demonstrated that: (1) The release originated from an electrical device that was manufactured after July 1, 1979; or (2) oil containing PCBs was never used in the equipment suspected as the source of the release; or (3) it can be documented that the oil released was recently tested and did not contain PCBs. Method B must be used for releases of oils containing greater than 50 ppm PCBs. See Table 830-1 for the minimum testing requirements for mineral oil releases.
- t **1,1,1 Trichloroethane.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- u **Trichloroethylene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- v **Xylenes.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4). This is a total value for all xylenes.

Table 745-1
Method A Soil Cleanup Levels for Industrial
Properties. ^a

| Hazardous Substance | CAS Number | Cleanup Level |
|--------------------------|------------|---------------------------------|
| Arsenic | 7440-38-2 | 20 mg/kg ^b |
| Benzene | 71-43-2 | 0.03 mg/kg ^c |
| Benzo(a)pyrene | 50-32-8 | 2 mg/kg ^d |
| Cadmium | 7440-43-9 | 2 mg/kg ^e |
| Chromium | | |
| Chromium VI | 18540-29-9 | 19 mg/kg ^{f1} |
| Chromium III | 16065-83-1 | 2,000 mg/kg ^{f2} |
| DDT | 50-29-3 | 4 mg/kg ^g |
| Ethylbenzene | 100-41-4 | 6 mg/kg ^h |
| Ethylene dibromide (EDB) | 106-93-4 | 0.005 mg/kg ⁱ |
| Lead | 7439-92-1 | 1,000 mg/kg ^j |
| Lindane | 58-89-9 | 0.01 mg/kg ^k |
| Methylene chloride | 75-09-2 | 0.02 mg/kg ^l |
| Mercury (inorganic) | 7439-97-6 | 2 mg/kg ^m |
| MTBE | 1634-04-4 | 0.1 mg/kg ⁿ |
| Naphthalene | 91-20-3 | 5 mg/kg ^o |
| PAHs (carcinogenic) | | See benzo(a)pyrene ^d |
| PCB Mixtures | | 10 mg/kg ^p |
| Tetrachloroethylene | 127-18-4 | 0.05 mg/kg ^q |
| Toluene | 108-88-3 | 7 mg/kg ^r |

Total Petroleum Hydrocarbons^s

[Note: Must also test for and meet cleanup levels for other petroleum components—see footnotes!]

Gasoline Range Organics

| Hazardous Substance | CAS Number | Cleanup Level |
|--|------------|-------------------------|
| Gasoline mixtures without benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture | | 100 mg/kg |
| All other gasoline mixtures | | 30 mg/kg |
| Diesel Range Organics | | 2,000 mg/kg |
| Heavy Oils | | 2,000 mg/kg |
| Mineral Oil | | 4,000 mg/kg |
| 1,1,1 Trichloroethane | 71-55-6 | 2 mg/kg ^t |
| Trichloroethylene | 79-01-6 | 0.03 mg/kg ^u |
| Xylenes | 1330-20-7 | 9 mg/kg ^v |

Footnotes:

- a Caution on misusing this table.** This table has been developed for specific purposes. It is intended to provide conservative cleanup levels for sites undergoing routine cleanup actions or for industrial properties with relatively few hazardous substances, and the site qualifies under WAC 173-340-7491 for an exclusion from conducting a simplified or site-specific terrestrial ecological evaluation, or it can be demonstrated using a terrestrial ecological evaluation under WAC 173-340-7492 or 173-340-7493 that the values in this table are ecologically protective for the site. This table may not be appropriate for defining cleanup levels at other sites. For these reasons, the values in this table should not automatically be used to define cleanup levels that must be met for financial, real estate, insurance coverage or placement, or similar transactions or purposes. Exceedances of the values in this table do not necessarily mean the soil must be restored to these levels at a site. The level of restoration depends on the remedy selected under WAC 173-340-350 through 173-340-390.
- b Arsenic.** Cleanup level based on protection of groundwater for drinking water use, using the procedures in WAC 173-340-747(4), adjusted for natural background for soil.
- c Benzene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747 (4) and (6).
- d Benzo(a)pyrene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4). If other carcinogenic PAHs are suspected of being present at the site, test for them and use this value as the total concentration that all carcinogenic PAHs must meet using the toxicity equivalency methodology in WAC 173-340-708(8).
- e Cadmium.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4), adjusted for the practical quantitation limit for soil.
- f1 Chromium VI.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- f2 Chromium III.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4). Chromium VI must also be tested for and the cleanup level met when present at a site.
- g DDT (dichlorodiphenyltrichloroethane).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- h Ethylbenzene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- i Ethylene dibromide (1,2 dibromoethane or EDB).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4), adjusted for the practical quantitation limit for soil.
- j Lead.** Cleanup level based on direct contact.
- k Lindane.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4), adjusted for the practical quantitation limit.
- l Methylene chloride (dichloromethane).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- m Mercury.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- n Methyl tertiary-butyl ether (MTBE).** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- o Naphthalenes.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4). This is a total value for naphthalene, 1-methyl naphthalene and 2-methyl naphthalene.
- p PCB Mixtures.** Cleanup level based on applicable federal law (40 C.F.R. 761.61). This is a total value for all PCBs. This value may be used only if the PCB contaminated soils are capped and the cap maintained as required by 40 C.F.R. 761.61. If this condition cannot be met, the value in Table 740-1 must be used.
- q Tetrachloroethylene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- r Toluene.** Cleanup level based on protection of groundwater for drinking water use, using the procedure described in WAC 173-340-747(4).
- s Total Petroleum Hydrocarbons (TPH).** TPH cleanup values have been provided for the most common petroleum products encountered at contaminated sites. Where there is a mixture of products or the product composition is unknown, samples must be tested using both the NWTPH-Gx and NWTPH-Dx methods and the lowest applicable TPH cleanup level must be met.
- Gasoline range organics** means organic compounds measured using method NWTPH-Gx. Examples are aviation and automotive gasoline. The cleanup level is based on protection of groundwater for noncarcinogenic effects during drinking water use using the procedures described in WAC 173-340-747(6). Two cleanup levels are provided. The lower value of 30 mg/kg can be used at any site. When using this lower value, the soil must also be tested for and meet the benzene soil cleanup level. The higher value of 100 mg/kg can only be used if the soil is tested and found to contain no benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture. No interpolation between these cleanup levels is allowed. In both cases, the soil cleanup level for any other carcinogenic components of the petroleum [such as EDB and EDC], if present at the site, must also be met. Also, in both cases, soil cleanup levels for any noncarcinogenic components [such as toluene, ethylbenzene, xylenes, naphthalene, and MTBE], also must be met if these substances are found to exceed groundwater cleanup levels at the site. See Table 830-1 for the minimum testing requirements for gasoline releases.
- Diesel range organics** means organic compounds measured using method NWTPH-Dx. Examples are diesel, kerosene, and #1 and #2 heating oil. The cleanup level is based on preventing the accumulation of free product on the groundwater, as described in WAC 173-340-747(10). The soil cleanup level for any carcinogenic components of the petroleum [such as benzene, and PAHs], if present at the site, must also be met. Soil cleanup levels for any noncarcinogenic components [such as toluene, ethylbenzene, xylenes and naphthalenes], also must be met if these substances are found to exceed the groundwater cleanup levels at the site. See Table 830-1 for the minimum testing requirements for diesel releases.

- **Heavy oils** means organic compounds measured using NWTPH-Dx. Examples are #6 fuel oil, bunker C oil, hydraulic oil and waste oil. The cleanup level is based on preventing the accumulation of free product on the groundwater, as described in WAC 173-340-747(10) and assuming a product composition similar to diesel fuel. The soil cleanup level for any carcinogenic components of the petroleum [such as benzene, PAHs and PCBs], if present at the site, must also be met. Soil cleanup levels for any noncarcinogenic components [such as toluene, ethylbenzene, xylenes and naphthalenes], also must be met if found to exceed the groundwater cleanup levels at the site. See Table 830-1 for the minimum testing requirements for heavy oil releases.
- **Mineral oil** means non-PCB mineral oil, typically used as an insulator and coolant in electrical devices such as transformers and capacitors, measured using NWTPH-Dx. The cleanup level is based on preventing the accumulation of free product on the groundwater, as described in WAC 173-340-747(10). Sites using this cleanup level must also analyze soil samples and meet the soil cleanup level for PCBs, unless it can be demonstrated that: (1) The release originated from an electrical device that was manufactured after July 1, 1979; or (2) oil containing PCBs was never used in the equipment suspected as the source of the release; or (3) it can be documented that the oil released was recently tested and did not contain PCBs. Method B or C must be used for releases of oils containing greater than 50 ppm PCBs. See Table 830-1 for the minimum testing requirements for mineral oil releases.
- t **1,1,1 Trichloroethane.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- u **Trichloroethylene.** Cleanup level based on protection of groundwater for drinking water use, using the procedures described in WAC 173-340-747(4).
- v **Xylenes.** Cleanup level based on protection of groundwater for drinking water use, using the procedure in WAC 173-340-747(4). This is a total value for all xylenes.

Table 747-1
Soil Organic Carbon-Water Partitioning
Coefficient (K_{oc}) Values:
Nonionizing Organics.

| Hazardous Substance | K_{oc} (ml/g) |
|----------------------------|-----------------------------------|
| ACENAPHTHENE | 4,898 |
| ALDRIN | 48,685 |
| ANTHRACENE | 23,493 |
| BENZ(a)ANTHRACENE | 357,537 |
| BENZENE | 62 |
| BENZO(a)PYRENE | 968,774 |
| BIS(2-CHLOROETHYL)ETHER | 76 |
| BIS(2-ETHYLHEXYL)PHTHALATE | 111,123 |
| BROMOFORM | 126 |
| BUTYL BENZYL PHTHALATE | 13,746 |
| CARBON TETRACHLORIDE | 152 |
| CHLORDANE | 51,310 |
| CHLOROBENZENE | 224 |
| CHLOROFORM | 53 |
| DDD | 45,800 |
| DDE | 86,405 |
| DDT | 677,934 |
| DIBENZO(a,h)ANTHRACENE | 1,789,101 |
| 1,2-DICHLOROBENZENE (o) | 379 |
| 1,4-DICHLOROBENZENE (p) | 616 |
| DICHLOROETHANE-1,1 | 53 |
| DICHLOROETHANE-1,2 | 38 |
| DICHLOROETHYLENE-1,1 | 65 |
| trans-1,2 DICHLOROETHYLENE | 38 |
| DICHLOROPROPANE-1,2 | 47 |
| DICHLOROPROPENE-1,3 | 27 |
| DIELDRIN | 25,546 |
| DIETHYL PHTHALATE | 82 |
| DI-N-BUTYLPHTHALATE | 1,567 |
| EDB | 66 |
| ENDRIN | 10,811 |

| Hazardous Substance | K _{oc} (ml/g) |
|----------------------------|------------------------|
| ENDOSULFAN | 2,040 |
| ETHYL BENZENE | 204 |
| FLUORANTHENE | 49,096 |
| FLUORENE | 7,707 |
| HEPTACHLOR | 9,528 |
| HEXACHLOROBENZENE | 80,000 |
| α-HCH (α-BHC) | 1,762 |
| β-HCH (β-BHC) | 2,139 |
| γ-HCH (LINDANE) | 1,352 |
| MTBE | 11 |
| METHOXYCHLOR | 80,000 |
| METHYL BROMIDE | 9 |
| METHYL CHLORIDE | 6 |
| METHYLENE CHLORIDE | 10 |
| NAPHTHALENE | 1,191 |
| NITROBENZENE | 119 |
| PCB-Arochlor 1016 | 107,285 |
| PCB-Arochlor 1260 | 822,422 |
| PENTACHLOROBENZENE | 32,148 |
| PYRENE | 67,992 |
| STYRENE | 912 |
| 1,1,2,2,-TETRACHLOROETHANE | 79 |
| TETRACHLOROETHYLENE | 265 |
| TOLUENE | 140 |
| TOXAPHENE | 95,816 |
| 1,2,4-TRICHLOROBENZENE | 1,659 |
| TRICHLOROETHANE -1,1,1 | 135 |
| TRICHLOROETHANE-1,1,2 | 75 |
| TRICHLOROETHYLENE | 94 |
| o-XYLENE | 241 |
| m-XYLENE | 196 |
| p-XYLENE | 311 |

Sources: Except as noted below, the source of the K_{oc} values is the 1996 EPA Soil Screening Guidance: Technical Background Document. The values obtained from this document represent the geometric mean of a survey of values published in the scientific literature. Sample populations ranged from 1-65. EDB value from ATSDR Toxicological Profile (TP 91/13). MTBE value from USGS Final Draft Report on Fuel Oxygenates (March 1996). PCB-Arochlor values from 1994 EPA Draft Soil Screening Guidance.

**Table 747-2
Predicted Soil Organic Carbon-Water
Partitioning Coefficient (K_{oc}) as a
Function of pH: Ionizing Organics.**

| Hazardous Substance | K _{oc} Value (ml/g) | | |
|---------------------------|------------------------------|----------|----------|
| | pH = 4.9 | pH = 6.8 | pH = 8.0 |
| Benzoic acid | 5.5 | 0.6 | 0.5 |
| 2-Chlorophenol | 398 | 388 | 286 |
| 2,4-Dichlorophenol | 159 | 147 | 72 |
| 2,4-Dinitrophenol | 0.03 | 0.01 | 0.01 |
| Pentachlorophenol | 9,055 | 592 | 410 |
| 2,3,4,5-Tetrachlorophenol | 17,304 | 4,742 | 458 |

| Hazardous Substance | K _{oc} Value (ml/g) | | |
|-----------------------|------------------------------|-------|-----|
| | 2,3,4,6-Tetrachlorophenol | 4,454 | 280 |
| 2,4,5-Trichlorophenol | 2,385 | 1,597 | 298 |
| 2,4,6-Trichlorophenol | 1,040 | 381 | 131 |

Source: 1996 EPA Soil Screening Guidance: Technical Background Document. The predicted K_{oc} values in this table were derived using a relationship from thermodynamic equilibrium considerations to predict the total sorption of an ionizable organic compound from the partitioning of its ionized and neutral forms.

**Table 747-3
Metals Distribution Coefficients (K_d).**

| Hazardous Substance | K _d (L/kg) |
|---------------------|-----------------------|
| Arsenic | 29 |
| Cadmium | 6.7 |
| Total Chromium | 1,000 |
| Chromium VI | 19 |
| Copper | 22 |
| Mercury | 52 |
| Nickel | 65 |
| Lead | 10,000 |
| Selenium | 5 |
| Zinc | 62 |

Source: Multiple sources compiled by the department of ecology.

**Table 747-4
Petroleum EC Fraction Physical/Chemical Values.**

| Fuel Fraction | Equivalent Carbon Number ¹ | Water Solubility ² (mg/L) | Mol. Wt. ³ (g/mol) | Henry's Constant ⁴ (cc/cc) | GFW ⁵ (mg/mol) | Density ⁶ (mg/l) | Soil Organic Carbon-Water Partitioning Coefficient K _{oc} ⁷ (L/kg) |
|---|---------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|---------------------------|-----------------------------|--|
| ALIPHATICS | | | | | | | |
| EC 5 - 6 | 5.5 | 36.0 | 81.0 | 33.0 | 81,000 | 670,000 | 800 |
| EC > 6 - 8 | 7.0 | 5.4 | 100.0 | 50.0 | 100,000 | 700,000 | 3,800 |
| EC > 8 - 10 | 9.0 | 0.43 | 130.0 | 80.0 | 130,000 | 730,000 | 30,200 |
| EC > 10 - 12 | 11.0 | 0.034 | 160.0 | 120.0 | 160,000 | 750,000 | 234,000 |
| EC > 12 - 16 | 14.0 | 7.6E-04 | 200.0 | 520.0 | 200,000 | 770,000 | 5.37E+06 |
| EC > 16 - 21 | 19.0 | 1.3E-06 | 270.0 | 4,900 | 270,000 | 780,000 | 9.55E+09 |
| EC > 21 - 34 | 28.0 | 1.5E-11 | 400.0 | 100,000 | 400,000 | 790,000 | 1.07E+10 |
| AROMATICS | | | | | | | |
| EC > 8 - 10 | 9.0 | 65.0 | 120.0 | 0.48 | 120,000 | 870,000 | 1,580 |
| EC > 10 - 12 | 11.0 | 25.0 | 130.0 | 0.14 | 130,000 | 900,000 | 2,510 |
| EC > 12 - 16 | 14.0 | 5.8 | 150.0 | 0.053 | 150,000 | 1,000,000 | 5,010 |
| EC > 16 - 21 | 19.0 | 0.51 | 190.0 | 0.013 | 190,000 | 1,160,000 | 15,800 |
| EC > 21 - 34 | 28.0 | 6.6E-03 | 240.0 | 6.7E-04 | 240,000 | 1,300,000 | 126,000 |
| TPH COMPONENTS | | | | | | | |
| Benzene | 6.5 | 1,750 | 78.0 | 0.228 | 78,000 | 876,500 | 62.0 |
| Toluene | 7.6 | 526.0 | 92.0 | 0.272 | 92,000 | 866,900 | 140.0 |
| Ethylbenzene | 8.5 | 169.0 | 106.0 | 0.323 | 106,000 | 867,000 | 204.0 |
| Total Xylenes ⁸ (average of 3) | 8.67 | 171.0 | 106.0 | 0.279 | 106,000 | 875,170 | 233.0 |
| n-Hexane ⁹ | 6.0 | 9.5 | 86.0 | 74.0 | 86,000 | 659,370 | 3,410 |
| MTBE ¹⁰ | | 50,000 | 88.0 | 0.018 | 88,000 | 744,000 | 10.9 |
| Naphthalenes | 11.69 | 31.0 | 128.0 | 0.0198 | 128,000 | 1,145,000 | 1,191 |

Sources:

- 1 **Equivalent Carbon Number.** Gustafson, J.B. et al., *Selection of Representative TPH Fractions Based on Fate and Transport Considerations. Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 3 (1997)* [hereinafter *Criteria Working Group*].
- 2 **Water Solubility.** For aliphatics and aromatics EC groups, *Criteria Working Group*. For TPH components except n-hexane and MTBE, *1996 EPA Soil Screening Guidance: Technical Background Document*.
- 3 **Molecular Weight.** *Criteria Working Group*.
- 4 **Henry's Constant.** For aliphatics and aromatics EC groups, *Criteria Working Group*. For TPH components except n-hexane and MTBE, *1996 EPA Soil Screening Guidance: Technical Background Document*.
- 5 **Gram Formula Weight (GFW).** Based on 1000 x Molecular Weight.
- 6 **Density.** For aliphatics and aromatics EC groups, based on correlation between equivalent carbon number and data on densities of individual hazardous substances provided in *Criteria Working Group*. For TPH components except n-hexane and MTBE, *1996 EPA Soil Screening Guidance: Technical Background Document*.
- 7 **Soil Organic Carbon-Water Partitioning Coefficient.** For aliphatics and aromatics EC groups, *Criteria Working Group*. For TPH components except n-hexane and MTBE, *1996 EPA Soil Screening Guidance: Technical Background Document*.
- 8 **Total Xylenes.** Values for total xylenes are a weighted average of m, o and p xylene based on gasoline composition data from the *Criteria Working Group* (m = 51% of total xylene; o = 28% of total xylene; and p = 21% of total xylene).
- 9 **n-Hexane.** For values other than density, *Criteria Working Group*. For the density value, *Hawley's Condensed Chemical Dictionary*, 11th ed., revised by N. Irving Sax and Richard J. Lewis (1987).
- 10 **MTBE.** *USGS Final Report on Fuel Oxygenates* (March 1996).

**Table 747-5
Residual Saturation Screening Levels
for TPH.**

| Fuel | Screening Level (mg/kg) |
|---|-------------------------|
| Weathered Gasoline | 1,000 |
| Middle Distillates (e.g., Diesel No. 2 Fuel Oil) | 2,000 |
| Heavy Fuel Oils (e.g., No. 6 Fuel Oil) | 2,000 |
| Mineral Oil | 4,000 |
| Unknown Composition or Type | 1,000 |

Note: The residual saturation screening levels for petroleum hydrocarbons specified in Table 747-5 are based on coarse sand and gravelly soils; however, they may be used for any soil type. Screening levels are based on the presumption that there are no preferential pathways for NAPL to flow downward to groundwater. If such pathways exist, more stringent residual saturation screening levels may need to be established.

**Table 749-1
Simplified Terrestrial Ecological
Evaluation - Exposure Analysis Procedure
under WAC 173-340-7492 (2) (a) (ii).^a**

| | |
|---|--------|
| Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest 1/2 acre (1/4 acre if the area is less than 0.5 acre). "Undeveloped land" means land that is not covered by existing buildings, roads, paved areas or other barriers that will prevent wildlife from feeding on plants, earthworms, insects or other food in or on the soil. | |
| 1) From the table below, find the number of points corresponding to the area and enter this number in the box to the right. | |
| Area (acres) | Points |
| 0.25 or less | 4 |
| 0.5 | 5 |
| 1.0 | 6 |
| 1.5 | 7 |
| 2.0 | 8 |
| 2.5 | 9 |
| 3.0 | 10 |
| 3.5 | 11 |
| 4.0 or more | 12 |

| |
|--|
| 2) Is this an industrial or commercial property? See WAC 173-340-7490 (3)(c). If yes, enter a score of 3 in the box to the right. If no, enter a score of 1. |
| 3) Enter a score in the box to the right for the habitat quality of the site, using the rating system shown below ^b . (High = 1, Intermediate = 2, Low = 3) |
| 4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2. See footnote c. |
| 5) Are there any of the following soil contaminants present: Chlorinated dibenzo-p-dioxins/dibenzofurans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4. |
| 6) Add the numbers in the boxes on lines 2 through 5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified terrestrial ecological evaluation may be ended under WAC 173-340-7492 (2)(a)(ii). |

Footnotes:

- a It is expected that this habitat evaluation will be undertaken by an experienced field biologist. If this is not the case, enter a conservative score (1) for questions 3 and 4.
- b Habitat rating system. Rate the quality of the habitat as high, intermediate or low based on your professional judgment as a field biologist. The following are suggested factors to consider in making this evaluation:
Low: Early successional vegetative stands; vegetation predominantly noxious, nonnative, exotic plant species or weeds. Areas severely disturbed by human activity, including intensively cultivated croplands. Areas isolated from other habitat used by wildlife.
High: Area is ecologically significant for one or more of the following reasons: Late-successional native plant communities present; relatively high species diversity; used by an uncommon or rare species; priority habitat (as defined by the Washington department of fish and wildlife); part of a larger area of habitat where size or fragmentation may be important for the retention of some species.
Intermediate: Area does not rate as either high or low.
- c Indicate "yes" if the area attracts wildlife or is likely to do so. Examples: Birds frequently visit the area to feed; evidence of high use by mammals (tracks, scat, etc.); habitat "island" in an industrial area; unusual features of an area that make it important for feeding animals; heavy use during seasonal migrations.

**Table 749-2
Priority Contaminants of Ecological Concern
for Sites that Qualify for the Simplified
Terrestrial Ecological Evaluation Procedure.**

| Priority contaminant | Soil concentration (mg/kg) | |
|---------------------------|------------------------------------|-------------------------------|
| | Unrestricted land use ^b | Industrial or commercial site |
| METALS^c | | |
| Antimony | See note d | See note d |
| Arsenic III | 20 mg/kg | 20 mg/kg |
| Arsenic V | 95 mg/kg | 260 mg/kg |
| Barium | 1,250 mg/kg | 1,320 mg/kg |
| Beryllium | 25 mg/kg | See note d |
| Cadmium | 25 mg/kg | 36 mg/kg |
| Chromium (total) | 42 mg/kg | 135 mg/kg |
| Cobalt | See note d | See note d |
| Copper | 100 mg/kg | 550 mg/kg |
| Lead | 220 mg/kg | 220 mg/kg |
| Magnesium | See note d | See note d |
| Manganese | See note d | 23,500 mg/kg |
| Mercury, inorganic | 9 mg/kg | 9 mg/kg |
| Mercury, organic | 0.7 mg/kg | 0.7 mg/kg |
| Molybdenum | See note d | 71 mg/kg |
| Nickel | 100 mg/kg | 1,850 mg/kg |

| Priority contaminant | Soil concentration (mg/kg) | |
|--|------------------------------------|--|
| | Unrestricted land use ^b | Industrial or commercial site |
| Selenium | 0.8 mg/kg | 0.8 mg/kg |
| Silver | See note d | See note d |
| Tin | 275 mg/kg | See note d |
| Vanadium | 26 mg/kg | See note d |
| Zinc | 270 mg/kg | 570 mg/kg |
| PESTICIDES | | |
| Aldicarb/aldicarb sulfone (total) | See note d | See note d |
| Aldrin | 0.17 mg/kg | 0.17 mg/kg |
| Benzene hexachloride (including lindane) | 10 mg/kg | 10 mg/kg |
| Carbofuran | See note d | See note d |
| Chlordane | 1 mg/kg | 7 mg/kg |
| Chlorpyrifos/chlorpyrifos-methyl (total) | See note d | See note d |
| DDT/DDD/DDE (total) | 1 mg/kg | 1 mg/kg |
| Dieldrin | 0.17 mg/kg | 0.17 mg/kg |
| Endosulfan | See note d | See note d |
| Endrin | 0.4 mg/kg | 0.4 mg/kg |
| Heptachlor/heptachlor epoxide (total) | 0.6 mg/kg | 0.6 mg/kg |
| Hexachlorobenzene | 31 mg/kg | 31 mg/kg |
| Parathion/methyl parathion (total) | See note d | See note d |
| Pentachlorophenol | 11 mg/kg | 11 mg/kg |
| Toxaphene | See note d | See note d |
| OTHER CHLORINATED ORGANICS | | |
| Chlorinated dibenzofurans (total) | 3E-06 mg/kg | 3E-06 mg/kg |
| Chlorinated dibenzo-p-dioxins (total) | 5E-06 mg/kg | 5E-06 mg/kg |
| Hexachlorophene | See note d | See note d |
| PCB mixtures (total) | 2 mg/kg | 2 mg/kg |
| Pentachlorobenzene | 168 mg/kg | See note d |
| OTHER NONCHLORINATED ORGANICS | | |
| Acenaphthene | See note d | See note d |
| Benzo(a)pyrene | 30 mg/kg | 300 mg/kg |
| Bis (2-ethylhexyl) phthalate | See note d | See note d |
| Di-n-butyl phthalate | 200 mg/kg | See note d |
| PETROLEUM | | |
| Gasoline Range Organics | 200 mg/kg | 12,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface. |
| Diesel Range Organics | 460 mg/kg | 15,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface. |

Footnotes:

- a** Caution on misusing these chemical concentration numbers. These values have been developed for use at sites where a site-specific terrestrial ecological evaluation is not required. They are not intended to be protective of terrestrial ecological receptors at every site. Exceedances of the values in this table do not necessarily trigger requirements for cleanup action under this chapter. The table is not intended for purposes such as evaluating sludges or wastes. This list does not imply that sampling must be conducted for each of these chemicals at every site. Sampling should be conducted for those chemicals that might be present based on available information, such as current and past uses of chemicals at the site.

- b Applies to any site that does not meet the definition of industrial or commercial.
- c For arsenic, use the valence state most likely to be appropriate for site conditions, unless laboratory information is available. Where soil conditions alternate between saturated, anaerobic and unsaturated, aerobic states, resulting in the alternating presence of arsenic III and arsenic V, the arsenic III concentrations shall apply.
- d Safe concentration has not yet been established. See WAC 173-340-7492 (2)(c).

Table 749-3

Ecological Indicator Soil Concentrations (mg/kg) for Protection of Terrestrial Plants and Animals^a. For chemicals where a value is not provided, see footnote b.

Note: These values represent soil concentrations that are expected to be protective at any MTCA site and are provided for use in eliminating hazardous substances from further consideration under WAC 173-340-7493 (2)(a)(i). Where these values are exceeded, various options are provided for demonstrating that the hazardous substance does not pose a threat to ecological receptors at a site, or for developing site-specific remedial standards for eliminating threats to ecological receptors. See WAC 173-340-7493 (1)(b)(i), 173-340-7493 (2)(a)(ii) and 173-340-7493(3).

| Hazardous Substance ^b | Plants ^c | Soil biota ^d | Wildlife ^e |
|--|---------------------|-------------------------|-----------------------|
| METALS^f: | | | |
| Aluminum (soluble salts) | 50 | | |
| Antimony | 5 | | |
| Arsenic III | | | 7 |
| Arsenic V | 10 | 60 | 132 |
| Barium | 500 | | 102 |
| Beryllium | 10 | | |
| Boron | 0.5 | | |
| Bromine | 10 | | |
| Cadmium | 4 | 20 | 14 |
| Chromium (total) | 42 ^g | 42 ^g | 67 |
| Cobalt | 20 | | |
| Copper | 100 | 50 | 217 |
| Fluorine | 200 | | |
| Iodine | 4 | | |
| Lead | 50 | 500 | 118 |
| Lithium | 35 ^g | | |
| Manganese | 1,100 ^g | | 1,500 |
| Mercury, inorganic | 0.3 | 0.1 | 5.5 |
| Mercury, organic | | | 0.4 |
| Molybdenum | 2 | | 7 |
| Nickel | 30 | 200 | 980 |
| Selenium | 1 | 70 | 0.3 |
| Silver | 2 | | |
| Technetium | 0.2 | | |
| Thallium | 1 | | |
| Tin | 50 | | |
| Uranium | 5 | | |
| Vanadium | 2 | | |
| Zinc | 86 ^g | 200 | 360 |
| PESTICIDES: | | | |
| Aldrin | | | 0.1 |
| Benzene hexachloride (including lindane) | | | 6 |
| Chlordane | | 1 | 2.7 |
| DDT/DDD/DDE (total) | | | 0.75 |
| Dieldrin | | | 0.07 |

| Hazardous Substance^b | Plants^c | Soil biota^d | Wildlife^e |
|--|---------------------------|-------------------------------|-----------------------------|
| Endrin | | | 0.2 |
| Hexachlorobenzene | | | 17 |
| Heptachlor/ heptachlor epoxide (total) | | | 0.4 |
| Pentachlorophenol | 3 | 6 | 4.5 |
| OTHER CHLORINATED ORGANICS: | | | |
| 1,2,3,4- Tetrachlorobenzene | | 10 | |
| 1,2,3- Trichlorobenzene | | 20 | |
| 1,2,4- Trichlorobenzene | | 20 | |
| 1,2-Dichloropropane | | 700 | |
| 1,4-Dichlorobenzene | | 20 | |
| 2,3,4,5- Tetrachlorophenol | | 20 | |
| 2,3,5,6- Tetrachloroaniline | 20 | 20 | |
| 2,4,5- Trichloroaniline | 20 | 20 | |
| 2,4,5- Trichlorophenol | 4 | 9 | |
| 2,4,6- Trichlorophenol | | 10 | |
| 2,4-Dichloroaniline | | 100 | |
| 3,4-Dichloroaniline | | 20 | |
| 3,4-Dichlorophenol | 20 | 20 | |
| 3-Chloroaniline | 20 | 30 | |
| 3-Chlorophenol | 7 | 10 | |
| Chlorinated dibenzofurans (total) | | | 2E-06 |
| Chloroacetamide | | 2 | |
| Chlorobenzene | | 40 | |
| Chlorinated dibenzo- p-dioxins (total) | | | 2E-06 |
| Hexachlorocyclopent adiene | 10 | | |
| PCB mixtures (total) | 40 | | 0.65 |
| Pentachloroaniline | | 100 | |
| Pentachlorobenzene | | 20 | |
| OTHER NONCHLORINATED ORGANICS: | | | |
| 2,4-Dinitrophenol | 20 | | |
| 4-Nitrophenol | | 7 | |
| Acenaphthene | 20 | | |
| Benzo(a)pyrene | | | 12 |
| Biphenyl | 60 | | |
| Diethylphthalate | 100 | | |
| Dimethylphthalate | | 200 | |
| Di-n-butyl phthalate | 200 | | |
| Fluorene | | 30 | |
| Furan | 600 | | |
| Nitrobenzene | | 40 | |
| N- nitrosodiphenylamin e | | 20 | |
| Phenol | 70 | 30 | |
| Styrene | 300 | | |

| Hazardous Substance ^b | Plants ^c | Soil biota ^d | Wildlife ^e |
|----------------------------------|---------------------|-------------------------|---|
| Toluene | 200 | | |
| PETROLEUM: | | | |
| Gasoline Range Organics | | 100 | 5,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface. |
| Diesel Range Organics | | 200 | 6,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface. |

Footnotes:

- a Caution on misusing ecological indicator concentrations. Exceedances of the values in this table do not necessarily trigger requirements for cleanup action under this chapter. Natural background concentrations may be substituted for ecological indicator concentrations provided in this table. The table is not intended for purposes such as evaluating sludges or wastes. This list does not imply that sampling must be conducted for each of these chemicals at every site. Sampling should be conducted for those chemicals that might be present based on available information, such as current and past uses of chemicals at the site.
- b For hazardous substances where a value is not provided, plant and soil biota indicator concentrations shall be based on a literature survey conducted in accordance with WAC 173-340-7493(4) and calculated using methods described in the publications listed below in footnotes c and d. Methods to be used for developing wildlife indicator concentrations are described in Tables 749-4 and 749-5.
- c Based on benchmarks published in *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants: 1997 Revision*, Oak Ridge National Laboratory, 1997.
- d Based on benchmarks published in *Toxicological Benchmarks for Potential Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process*, Oak Ridge National Laboratory, 1997.
- e Calculated using the exposure model provided in Table 749-4 and chemical-specific values provided in Table 749-5. Where both avian and mammalian values are available, the wildlife value is the lower of the two.
- f For arsenic, use the valence state most likely to be appropriate for site conditions, unless laboratory information is available. Where soil conditions alternate between saturated, anaerobic and unsaturated, aerobic states, resulting in the alternating presence of arsenic III and arsenic V, the arsenic III concentrations shall apply.
- g Benchmark replaced by Washington state natural background concentration.

**Table 749-4
Wildlife Exposure Model for Site-specific Evaluations.^a**

| | |
|--|--|
| Plant | |
| K _{Plant} | Plant uptake coefficient (dry weight basis) |
| | Units: mg/kg plant/mg/kg soil |
| | Value: chemical-specific (see Table 749-5) |
| Soil biota | |
| Surrogate receptor: Earthworm | |
| BAF _{Worm} | Earthworm bioaccumulation factor (dry weight basis) |
| | Units: mg/kg worm/mg/kg soil |
| | Value: chemical-specific (see Table 749-5) |
| Mammalian predator | |
| Surrogate receptor: Shrew (<i>Sorex</i>) | |
| P _{SB (shrew)} | Proportion of contaminated food (earthworms) in shrew diet |
| | Units: unitless |
| | Value: 0.50 |
| FIR _{Shrew, DW} | Food ingestion rate (dry weight basis) |
| | Units: kg dry food/kg body weight - day |
| | Value: 0.45 |
| SIR _{Shrew, DW} | Soil ingestion rate (dry weight basis) |
| | Units: kg dry soil/kg body weight - day |
| | Value: 0.0045 |
| RGAF _{Soil, shrew} | Gut absorption factor for a hazardous substance in soil expressed relative to the gut absorption factor for the hazardous substance in food. |

| | |
|--|--|
| | Units: unitless |
| | Value: chemical-specific (see Table 749-5) |
| T _{Shrew} | Toxicity reference value for shrew |
| | Units: mg/kg - day |
| | Value: chemical-specific (see Table 749-5) |
| Home range | 0.1 Acres |
| Avian predator | |
| Surrogate receptor: American robin (<i>Turdus migratorius</i>) | |
| P _{SB (Robin)} | Proportion of contaminated food (soil biota) in robin diet |
| | Unit: unitless |
| | Value: 0.52 |
| FIR _{Robin, DW} | Food ingestion rate (dry weight basis) |
| | Units: kg dry food/kg body weight - day |
| | Value: 0.207 |
| SIR _{Robin, DW} | Soil ingestion rate (dry weight basis) |
| | Units: kg dry soil/kg body weight - day |
| | Value: 0.0215 |
| RGAF _{Soil, robin} | Gut absorption factor for a hazardous substance in soil expressed relative to the gut absorption factor for the hazardous substance in food. |
| | Units: unitless |
| | Value: chemical-specific (see Table 749-5) |
| T _{Robin} | Toxicity reference value for robin |
| | Units: mg/kg - day |
| | Value: chemical-specific (see Table 749-5) |
| Home range | 0.6 Acres |
| Mammalian herbivore | |
| Surrogate receptor: Vole (<i>Microtus</i>) | |
| P _{Plant, vole} | Proportion of contaminated food (plants) in vole diet |
| | Units: unitless |
| | Value: 1.0 |
| FIR _{Vole, DW} | Food ingestion rate (dry weight basis) |
| | Units: kg dry food/kg body weight - day |
| | Value: 0.315 |
| SIR _{Vole, DW} | Soil ingestion rate (dry weight basis) |
| | Units: kg dry soil/kg body weight - day |
| | Value: 0.0079 |
| RGAF _{Soil, vole} | Gut absorption factor for a hazardous substance in soil expressed relative to the gut absorption factor for the hazardous substance in food. |
| | Units: unitless |
| | Value: chemical-specific (see Table 749-5) |
| T _{Vole} | Toxicity reference value for vole |
| | Units: mg/kg - day |
| | Value: chemical-specific (see Table 749-5) |
| Home range | 0.08 Acres |
| Soil concentrations for wildlife protection^b | |
| (1) Mammalian predator: | |

| |
|---|
| $SC_{MP} = (T_{Shrew}) / [(FIR_{Shrew, DW} \times P_{SB (shrew)} \times BAF_{Worm}) + (SIR_{Shrew, DW} \times RGAF_{Soil, shrew})]$ |
| (2) Avian predator: $SC_{AP} = (T_{Robin}) / [(FIR_{Robin, DW} \times P_{SB (Robin)} \times BAF_{Worm}) + (SIR_{Robin, DW} \times RGAF_{Soil, robin})]$ |
| (3) Mammalian herbivore: $SC_{MH} = (T_{Vole}) / [(FIR_{Vole, DW} \times P_{Plant, vole} \times K_{Plant}) + (SIR_{Vole, DW} \times RGAF_{Soil, vole})]$ |

Footnotes:

- a Substitutions for default receptors may be made as provided for in WAC 173-340-7493(7). If a substitute species is used, the values for food and soil ingestion rates, and proportion of contaminated food in the diet, may be modified to reasonable maximum exposure estimates for the substitute species based on a literature search conducted in accordance with WAC 173-340-7493(4). Additional species may be added on a site-specific basis as provided in WAC 173-340-7493 (2)(a). The department shall consider proposals for modifications to default values provided in this table based on new scientific information in accordance with WAC 173-340-702(14).
- b Use the lowest of the three concentrations calculated as the wildlife value.

**Table 749-5
 Default Values for Selected Hazardous Substances for use with the Wildlife Exposure Model in Table 749-4.^a**

| Hazardous Substance | Toxicity reference value (mg/kg - d) | | | | |
|--|--------------------------------------|--------------------|---------|---------|---------|
| | BAF _{Worm} | K _{Plant} | Shrew | Vole | Robin |
| METALS: | | | | | |
| Arsenic III | 1.16 | 0.06 | 1.89 | 1.15 | |
| Arsenic V | 1.16 | 0.06 | 35 | 35 | 22 |
| Barium | 0.36 | | 43.5 | 33.3 | |
| Cadmium | 4.6 | 0.14 | 15 | 15 | 20 |
| Chromium | 0.49 | | 35.2 | 29.6 | 5 |
| Copper | 0.88 | 0.020 | 44 | 33.6 | 61.7 |
| Lead | 0.69 | 0.0047 | 20 | 20 | 11.3 |
| Manganese | 0.29 | | 624 | 477 | |
| Mercury, inorganic | 1.32 | 0.0854 | 2.86 | 2.18 | 0.9 |
| Mercury, organic | 1.32 | | 0.352 | 0.27 | 0.064 |
| Molybdenum | 0.48 | 1.01 | 3.09 | 2.36 | 35.3 |
| Nickel | 0.78 | 0.047 | 175.8 | 134.4 | 107 |
| Selenium | 10.5 | 0.0065 | 0.725 | 0.55 | 1 |
| Zinc | 3.19 | 0.095 | 703.3 | 537.4 | 131 |
| PESTICIDES: | | | | | |
| Aldrine | 4.77 | 0.007 ^b | 2.198 | 1.68 | 0.06 |
| Benzene hexachloride (including lindane) | 10.1 | | | | 7 |
| Chlordane | 17.8 | 0.011 ^b | 10.9 | 8.36 | 10.7 |
| DDT/DDD/DDE | 10.6 | 0.004 ^b | 8.79 | 6.72 | 0.87 |
| Dieldrin | 28.8 | 0.029 ^b | 0.44 | 0.34 | 4.37 |
| Endrin | 3.6 | 0.038 ^b | 1.094 | 0.836 | 0.1 |
| Heptachlor/heptachlor epoxide | 10.9 | 0.027 ^b | 2.857 | 2.18 | 0.48 |
| Hexachlorobenzene | 1.08 | | | | 2.4 |
| Pentachlorophenol | 5.18 | 0.043 ^b | 5.275 | 4.03 | |
| OTHER CHLORINATED ORGANICS: | | | | | |
| Chlorinated dibenzofurans | 48 | | | | 1.0E-05 |
| Chlorinated dibenzo-p-dioxins | 48 | 0.005 ^b | 2.2E-05 | 1.7E-05 | 1.4E-04 |
| PCB mixtures | 4.58 | 0.087 ^b | 0.668 | 0.51 | 1.8 |
| OTHER NONCHLORINATED ORGANICS: | | | | | |

| Hazardous Substance | Toxicity reference value (mg/kg - d) | | | | |
|---------------------|--------------------------------------|--------------------|-------|------|-------|
| | BAF _{Worm} | K _{Plant} | Shrew | Vole | Robin |
| Benzo(a)pyrene | 0.43 | 0.011 | 1.19 | 0.91 | |

Footnotes:

- a** For hazardous substances not shown in this table, use the following default values. Alternatively, use values established from a literature survey conducted in accordance with WAC 173-340-7493(4) and approved by the department.
- K_{Plant}:** Metals (including metalloid elements): 1.01
Organic chemicals: $K_{Plant} = 10^{(1.588 - (0.578 \log K_{ow}))}$,
where $\log K_{ow}$ is the logarithm of the octanol-water partition coefficient.
- BAF_{Worm}:** Metals (including metalloid elements): 4.6
Nonchlorinated organic chemicals:
 $\log K_{ow} < 5$: 0.7
 $\log K_{ow} > 5$: 0.9
Chlorinated organic chemicals:
 $\log K_{ow} < 5$: 4.7
 $\log K_{ow} > 5$: 11.8
- RGAF_{Soil}** (all receptors): 1.0
Toxicity reference values (all receptors): Values established from a literature survey conducted in accordance with WAC 173-340-7493(4).
Site-specific values may be substituted for default values, as described below:
- K_{Plant}** Value from a literature survey conducted in accordance with WAC 173-340-7493(4) or from empirical studies at the site.
BAF_{Worm} Value from a literature survey conducted in accordance with WAC 173-340-7493(4) or from empirical studies at the site.
RGAF_{Soil} (all receptors): Value established from a literature survey conducted in accordance with WAC 173-340-7493(4).
Toxicity reference values (all receptors): Default toxicity reference values provided in this table may be replaced by a value established from a literature survey conducted in accordance with WAC 173-340-7493(4).
- b** Calculated from $\log K_{ow}$ using formula in footnote a.

**Table 830-1
Required Testing for Petroleum Releases.**

| | Gasoline Range Organics (GRO) (1) | Diesel Range Organics (DRO) (2) | Heavy Oils (DRO) (3) | Mineral Oils (4) | Waste Oils and Unknown Oils (5) |
|---|-----------------------------------|---------------------------------|----------------------|-------------------|---------------------------------|
| Volatile Petroleum Compounds | | | | | |
| Benzene | X ⁽⁶⁾ | X ⁽⁷⁾ | | | X ⁽⁸⁾ |
| Toluene | X ⁽⁶⁾ | X ⁽⁷⁾ | | | X ⁽⁸⁾ |
| Ethyl benzene | X ⁽⁶⁾ | X ⁽⁷⁾ | | | X ⁽⁸⁾ |
| Xylenes | X ⁽⁶⁾ | X ⁽⁷⁾ | | | X ⁽⁸⁾ |
| n-Hexane | X ⁽⁹⁾ | | | | |
| Fuel Additives and Blending Compounds | | | | | |
| Dibromoethane, 1-2 (EDB); and Dichloroethane, 1-2 (EDC) | X ⁽¹⁰⁾ | | | | X ⁽⁸⁾ |
| Methyl tertiary-butyl ether (MTBE) | X ⁽¹¹⁾ | | | | X ⁽⁸⁾ |
| Total lead & other additives | X ⁽¹²⁾ | | | | X ⁽⁸⁾ |
| Other Petroleum Components | | | | | |
| Carcinogenic PAHs | | X ⁽¹³⁾ | X ⁽¹³⁾ | | X ⁽⁸⁾ |
| Naphthalenes | X ⁽¹⁴⁾ | X ⁽¹⁴⁾ | X ⁽¹⁴⁾ | | X ⁽¹⁴⁾ |
| Other Compounds | | | | | |
| Polychlorinated Biphenyls (PCBs) | | | X ⁽¹⁵⁾ | X ⁽¹⁵⁾ | X ⁽⁸⁾ |
| Halogenated Volatile Organic Compounds (VOCs) | | | | | X ⁽⁸⁾ |
| Other | X ⁽¹⁶⁾ | X ⁽¹⁶⁾ | X ⁽¹⁶⁾ | X ⁽¹⁶⁾ | X ⁽¹⁶⁾ |
| Total Petroleum Hydrocarbons Methods | | | | | |

| | Gasoline Range Organics (GRO) (1) | Diesel Range Organics (DRO) (2) | Heavy Oils (DRO) (3) | Mineral Oils (4) | Waste Oils and Unknown Oils (5) |
|--|--|--|-----------------------------|-------------------------|--|
| TPH Analytical Method for Total TPH (Method A Cleanup Levels) (17) | NWTPH-Gx | NWTPH-Dx | NWTPH-Dx | NWTPH-Dx | NWTPH-Gx & NWTPH-Dx |
| TPH Analytical Methods for TPH fractions (Methods B or C) (17) | VPH | EPH | EPH | EPH | VPH and EPH |

Use of Table 830-1: An "X" in the box means that the testing requirement applies to groundwater and soil if a release is known or suspected to have occurred to that medium, unless otherwise specified in the footnotes. A box with no "X" indicates (except in the last two rows) that, for the type of petroleum product release indicated in the top row, analyses for the hazardous substance(s) named in the far-left column corresponding to the empty box are not typically required as part of the testing for petroleum releases. However, such analyses may be required based on other site-specific information. Note that testing for Total Petroleum Hydrocarbons (TPH) is required for every type of petroleum release, as indicated in the bottom two rows of the table. The testing method for TPH depends on the type of petroleum product released and whether Method A or Method B or C is being used to determine TPH cleanup levels. See WAC 173-340-830 for analytical procedures. **The footnotes to this table are important for understanding the specific analytical requirements for petroleum releases.**

Footnotes:

- (1) The following petroleum products are common examples of GRO: automotive and aviation gasolines, mineral spirits, stoddard solvents, and naphtha. To be in this range, 90 percent of the petroleum components need to be quantifiable using the NWTPH-Gx; if NWTPH-HCID results are used for this determination, then 90 percent of the "area under the TPH curve" must be quantifiable using NWTPH-Gx. Products such as jet fuel, diesel No. 1, kerosene, and heating oil may require analysis as both GRO and DRO depending on the range of petroleum components present (range can be measured by NWTPH-HCID). (See footnote 17 on analytical methods.)
- (2) The following petroleum products are common examples of DRO: Diesel No. 2, fuel oil No. 2, light oil (including some bunker oils). To be in this range, 90 percent of the petroleum components need to be quantifiable using the NWTPH-Dx quantified against a diesel standard. Products such as jet fuel, diesel No. 1, kerosene, and heating oil may require analysis as both GRO and DRO depending on the range of petroleum components present as measured in NWTPH-HCID.
- (3) The following petroleum products are common examples of the heavy oil group: Motor oils, lube oils, hydraulic fluids, etc. Heavier oils may require the addition of an appropriate oil range standard for quantification.
- (4) Mineral oil means non-PCB mineral oil, typically used as an insulator and coolant in electrical devices such as transformers and capacitors.
- (5) The waste oil category applies to waste oil, oily wastes, and unknown petroleum products and mixtures of petroleum and nonpetroleum substances. Analysis of other chemical components (such as solvents) than those listed may be required based on site-specific information. Mixtures of identifiable petroleum products (such as gasoline and diesel, or diesel and motor oil) may be analyzed based on the presence of the individual products, and need not be treated as waste and unknown oils.
- (6) When using Method A, testing soil for benzene is required. Furthermore, testing groundwater for BTEX is necessary when a petroleum release to groundwater is known or suspected. If the groundwater is tested and toluene, ethyl benzene or xylene is in the groundwater above its respective Method A cleanup level, the soil must also be tested for that chemical. When using Method B or C, testing the soil for BTEX is required and testing for BTEX in groundwater is required when a release to groundwater is known or suspected.
- (7)(a) For DRO releases from other than home heating oil systems, follow the instructions for GRO releases in Footnote (6).
- (b) For DRO releases from typical home heating oil systems (systems of 1,100 gallons or less storing heating oil for residential consumptive use on the premises where stored), testing for BTEX is not usually required for either groundwater or soil. Testing of the groundwater is also not usually required for these systems; however, if the groundwater is tested and benzene is found in the groundwater, the soil must be tested for benzene.
- (8) Testing is required in a sufficient number of samples to determine whether this chemical is present at concentrations of concern. If the chemical is found to be at levels below the applicable cleanup level, then no further analysis is required.
- (9) Testing for n-hexane is required when VPH analysis is performed for Method B or C. In this case, the concentration of n-hexane should be deleted from its respective fraction to avoid double-counting its concentration. n-Hexane's contribution to overall toxicity is then evaluated using its own reference dose.
- (10) Volatile fuel additives (such as dibromoethane, 1 - 2 (EDB) (CAS# 106-93-4) and dichloroethane, 1 - 2 (EDC) (CAS# 107-06-2)) must be part of a volatile organics analysis (VOA) of GRO contaminated groundwater. If any is found in groundwater, then the contaminated soil must also be tested for these chemicals.
- (11) Methyl tertiary-butyl ether (MTBE) (CAS# 1634-04-4) must be analyzed in GRO contaminated groundwater. If any is found in groundwater, then the contaminated soil must also be tested for MTBE.
- (12)(a) For automotive gasoline where the release occurred prior to 1996 (when "leaded gasoline" was used), testing for lead is required unless it can be demonstrated that lead was not part of the release. If this demonstration cannot be made, testing is required in a sufficient number of samples to determine whether lead is present at concentrations of concern. Other additives and blending compounds of potential environmental significance may need to be considered for testing, including: tertiary-butyl alcohol (TBA); tertiary-amyl methyl ether (TAME); ethyl tertiary-butyl ether (ETBE); ethanol; and methanol. Contact the department for additional testing recommendations regarding these and other additives and blending compounds.
- (b) For aviation gasoline, racing fuels and similar products, testing is required for likely fuel additives (especially lead) and likely blending compounds, no matter when the release occurred.
- (13) Testing for carcinogenic PAHs is required for DRO and heavy oils, except for the following products for which adequate information exists to indicate their absence: Diesel No. 1 and 2, home heating oil, kerosene, jet fuels, and electrical insulating mineral oils. The carcinogenic PAHs include benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, benzo(k)fluoranthene, benzo(a)anthracene, and benzo(b)fluoranthene.
- (14)(a) Except as noted in (b) and (c), testing for the noncarcinogenic PAHs, including the "naphthalenes" (naphthalene, 1-methyl-naphthalene, and 2-methyl-naphthalene) is not required when using Method A cleanup levels, because they are included in the TPH cleanup level.
- (b) Testing of soil for naphthalenes is required under Methods B and C when the inhalation exposure pathway is evaluated.
- (c) If naphthalenes are found in groundwater, then the soil must also be tested for naphthalenes.
- (15) Testing for PCBs is required unless it can be demonstrated that: (1) The release originated from an electrical device manufactured for use in the United States after July 1, 1979; (2) oil containing PCBs was never used in the equipment suspected as the source of the release (examples of equipment where PCBs are likely to be found include transformers, electric motors, hydraulic systems, heat transfer systems, electromagnets, compressors, capacitors, switches and miscellaneous other electrical devices); or, (3) the oil released was recently tested and did not contain PCBs.
- (16) Testing for other possible chemical contaminants may be required based on site-specific information.

- (17) The analytical methods NWTPH-Gx, NWTPH-Dx, NWTPH-HCID, VPH, and EPH are methods published by the department of ecology and available on the department's internet website: <http://www.ecy.wa.gov/programs/tcp/cleanup.html>.

[Statutory Authority: RCW 70.105D.030(2). WSR 07-21-065 (Order 06-10), § 173-340-900, filed 10/12/07, effective 11/12/07. Statutory Authority: Chapter 70.105D RCW. WSR 01-05-024 (Order 97-09A), § 173-340-900, filed 2/12/01, effective 8/15/01.]

Reviser's note: The brackets and enclosed material in the text of the above section occurred in the copy filed by the agency.