Keweenaw Bay Indian Community
TRIBAL CODE TITLE TWENTY
HAZARDOUS SUBSTANCES CONTROL ORDINANCE

APPENDIX A

GROUNDWATER CLEANUP LEVELS

The following chart indicates the minimum cleanup levels for groundwater, in terms of amount of individual hazardous substance per unit volume, for the hazardous substances listed. These cleanup levels shall remain in effect until amended by the Department and approved by the Tribal Council. The Department may also establish more stringent cleanup levels for a specific site, when, based on a site-specific evaluation, the Department determines that such levels are necessary to protect human health and the environment.

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
Acenaphthene	83329	38
Acenaphthylene	208968	52
Acetaldehyde	75070	130
Acetate (A)	71501	(A)
Acetic acid (A)	64197	(A)
Acetone	67641	730
Acetonitrile	75058	140
Acetophenone	98862	1500
Acrolein	107028	120
Acrylamide	79061	0.12
Acrylic acid	79107	3900
Acrylonitrile (D)	107131	1.2 (D)
Alachlor	15972608	2.0
Aldicarb	116063	3.0
Aldicarb sulfone	1646884	2.0
Aldicarb sulfoxide	1646873	4.0
Aldrin (D)	309002	0.01 (D)
Aluminum	7429905	50
Ammonia	7664417	10,000
t-Amyl methyl ether (TAME)	994058	190
Aniline	62533	4.0
Anthracene	120127	43
Antimony	7440360	1.7
Arsenic	7440382	10
Asbestos	1332214	7.0E+6 f/ml

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
Atrazine	1912249	3.0
Azobenzene	103333	23
Barium (A)	7440393	(A)
Benzene	71432	5.0
Benzidine (D)	92875	0.0037 (D)
Benzo(a)anthracene	56553	2.1
Benzo(b)fluoranthene	205992	1.5
Benzo(k)fluoranthene (D)	207089	0.8 (D)
Benzo(g,h,i)perylene (D)	191242	0.26 (D)
Benzo(a)pyrene (D)	50328	1.0 (D)
Benzoic acid	65850	32000
Benzyl alcohol	100516	10000
Benzyl chloride	100447	7.7
Beryllium (A)	7440417	(A)
bis(2-Chloroethoxy)ethane	112265	1.89E+7
bis(2-Chloroethyl)ether (D)	111444	2.0 (D)
bis(2-Ethylhexyl)phthalate	117817	6.0
Boron	7440428	500
Bromate	15541454	0.5
Bromobenzene	108861	18
Bromodichloromethane	75274	80
Bromoform	75252	80
Bromomethane	74839	10
n-Butanol	71363	950
2-Butanone (MEK)	78933	2200
n-Butyl acetate	123864	550
t-Butyl alcohol	75650	3900
Butyl benzyl phthalate	85687	6.9
n-Butylbenzene	104518	80
sec-Butylbenzene	135988	80
t-Butylbenzene	98066	80
Cadmium (A)	7440439	(A)
Camphene	79925	440
Caprolactam	105602	5800
Carbaryl	63252	700
Carbazole (D)	86748	10 (D)
Carbofuran	1563662	40
Carbon disulfide	75150	800
Carbon tetrachloride	56235	5.0

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
Chlordane (D)	57749	2.0 (D)
Chloride	16887006	50000
Chlorobenzene	108907	25
p-Chlorobenzene sulfonic acid	98668	7300
1-Chloro-1,1-difluoroethane	75683	15000
Chloroethane	75003	170
Chloroform	67663	80
Chloromethane	74873	260
4-Chloro-3-methylphenol	59507	7.4
beta-Chloronaphthalene	91587	1800
2-Chlorophenol	95578	18
o-Chlorotoluene	95498	150
Chlorpyrifos (D)	2921882	2.0 (D)
Chromium (III) (A) (B)	16065831	(A)
Chromium (VI)	18540299	11
Chrysene	218019	1.6
Cobalt	7440484	40
Copper (A)	7440508	(A)
Cyanazine	21725462	0.93
Cyanide	57125	5.2
Cyclohexanone	108941	1500
Dacthal	1861321	73
Dalapon	75990	200
4-4’-DDD	72548	9.1
4-4’-DDE	72559	4.3
4-4’-DDT (D)	50293	1.1E-5 (D)
Decabromodiphenyl ether	1163195	30
Di-n-butyl phthalate	84742	9.7
Di(2-ethylhexyl) adipate	103231	400
Di-n-octyl phthalate	117840	130
Diacetone alcohol	123422	1.0E+9
Diazinon (D)	333415	1.3 (D)
Dibenzo(a,h)anthracene (D)	53703	0.21 (D)
Dibenzofuran	132649	4.0
Dibromochloromethane	124481	80
Dibromochloropropane	96128	0.2
Dibromomethane	74953	80
Dicamba	1918009	220
1,2-Dichlorobenzene	95501	13

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
1,3-Dichlorobenzene	541731	6.6
1,4-Dichlorobenzene	106467	17
3,3'-Dichlorobenzidine (D)	91941	0.2 (D)
Dichlorodifluoromethane	75718	1700
1,1-Dichloroethane	75343	740
1,2-Dichloroethane	107062	5.0
1,1-Dichloroethylene	75354	7.0
cis-1,2-Dichloroethylene	156592	70
trans-1,2-Dichloroethylene	156605	100
2,6-Dichloro-4-nitroaniline	99309	2200
2,4-Dichlorophenol	120832	11
2,4-Dichlorophenoxyacetic acid	94757	70
1,2-Dichloropropane	78875	5.0
1,3-Dichloropropene	542756	3.3
Dichlorovos	62737	1.6
Dicyclohexyl phthalate	84617	4000
Dieldrin (D)	60571	0.02 (D)
Diethyl ether	60297	10
Diethyl phthalate	84662	110
Diethylene glycol monobutyl ether	112345	88
Diisopropyl ether	108203	30
Diisopropylamine	108189	5.6
Dimethyl phthalate	131113	73000
N,N-Dimethylacetamide	127195	180
N,N-Dimethylaniline	121697	16
Dimethylformamide	68122	700
2,4-Dimethylphenol	105679	370
2,6-Dimethylphenol	576261	4.4
3,4-Dimethylphenol	95658	10
Dimethylsulfoxide	67685	1.9E+5
2,4-Dinitrotoluene	121142	7.7
Dinoseb (D)	88857	7.0 (D)
1,4-Dioxane	123911	34
Diquat (D)	85007	6 (D)
Diuron	330541	31
Endosulfan (D)	115297	0.029 (D)
Endothall	145733	100
Endrin	72208	2.0
Epichlorohydrin (D)	106898	2.0 (D)

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
Ethanol	64175	1.9E+6
Ethyl acetate	141786	6600
Ethyl-tert-butyl ether (ETBE)	637923	49
Ethylbenzene	100414	18
Ethylene dibromide	106934	0.05
Ethylene glycol	107211	15000
Ethylene glycol monobutyl ether	111762	3700
Fluoranthene	206440	1.6
Fluorene	86737	12
Fluorine (soluble fluoride)	7782414	2,000
Formaldehyde	50000	120
Formic acid	64186	10000
1-Formylpiperidine	2591868	80
Gentian violet	548629	15
Glyphosate	1071836	700
Heptachlor (D)	76448	0.01 (D)
Heptachlor epoxide	1024573	0.2
n-Heptane	142825	2700
Hexabromobenzene	87821	0.17
Hexachlorobenzene (C-66) (D)	118741	0.0003 (D)
Hexachlorobutadiene (C-46)	87683	0.053
alpha-Hexachlorocyclohexane	319846	0.43
beta-Hexachlorocyclohexane	319857	0.88
Hexachlorocyclopentadiene (C-56)	77474	50
Hexachloroethane	67721	5.3
n-Hexane	110543	3000
2-Hexanone	591786	1000
Indeno(1,2,3-cd)pyrene (D)	193395	0.022 (D)
Iron	7439896	300
Isobutyl alcohol	78831	2300
Isophorone	78591	310
Isopropyl alcohol	67630	470
Isopropyl benzene	98828	28
Lead (A)	7439921	(A)
Lindane (D)	58899	0.03 (D)
Lithium	7439932	170
Magnesium	7439954	4.0E+5
Manganese (A)	7439965	(A)
Mercury (Total)	Varies	0.0013

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
Methanol	67561	3700
Methoxychlor	72435	40
2-Methoxyethanol	109864	7.3
2-Methyl-4-chlorophenoxyacetic acid	94746	7.3
2-Methyl-4,6-dinitrophenol (D)	534521	2.6 (D)
N-Methyl-morpholine	109024	20
Methyl parathion	298000	1.8
4-Methyl-2-pentanone (MIBK)	108101	1800
Methyl-tert-butyl ether (MTBE)	1634044	40
Methylcyclopentane	96377	22000
4,4'-Methylene-bis-2- chloroaniline	101144	1.1
Methylene chloride	75092	5.0
2-Methylnaphthalene	91576	19
Methylphenols (D)	1319773	25 (D)
Metolachlor	51218452	15
Metribuzin	21087649	180
Mirex (D)	2385855	6.8E-6 (D)
Molybdenum	7439987	73
Naphthalene	91203	11
Nickel (A)	7440020	(A)
Nitrate	14797558	10,000
Nitrite	14797650	1,000
Nitrobenzene	98953	3.4
2-Nitrophenol	88755	20
n-Nitroso-di-n-propylamine (D)	621647	0.19 (D)
N-Nitrosodiphenylamine	86306	270
Oxamyl	23135220	200
Oxo-hexyl acetate	88230357	73
Pendimethalin	40487421	280
Pentachlorobenzene (D)	608935	0.019 (D)
Pentachloronitrobenzene	82688	32
Pentachlorophenol (A)	87865	(A)
pH	NA	6.5 to 8.5
Phenanthrene (D)	85018	2.0 (D)
Phenol	108952	450
Phenytoin	57410	17
Phosphorus (Total)	7723140	63000
Phthalic acid	88993	14000
Phthalic anhydride	85449	15000

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
Picloram	1918021	46
Piperidine	110894	3.2
Polybrominated biphenyls	67774327	0.03
Polychlorinated biphenyls (PCBs) (D)	1336363	2.6E-05 (D)
Prometon	1610180	160
Propachlor	1918167	95
Propazine	139402	200
Propionic acid	79094	12000
Propyl alcohol	71238	1400
n-Propylbenzene	103651	80
Propylene glycol	57556	150000
Pyrene	129000	140
Pyridine (D)	110861	7.3 (D)
Selenium	7782492	5.0
Silver (D)	7440224	0.2 (D)
Silvex (2,4,5-TP)	93721	30
Simazine	122349	4.0
Sodium	17341252	120000
Sodium azide (D)	26628228	7.3 (D)
Strontium	7440246	4600
Styrene	100425	20
Sulfate	14808798	2.50E+05
Tebuthiuron	34014181	510
2,3,7,8-Tetrabromodibenzo-p-dioxin	50585416	0.00996
1,2,4,5-Tetrachlorobenzene	95943	2.8
2,3,7,8-Tetrachlorodibenzo-p-dioxin (D)	1746016	3.10E-09 (D)
1,1,1,2-Tetrachloroethane	630206	77
1,1,2,2-Tetrachloroethane	79345	3.2
Tetrachloroethylene	127184	5.0
Tetrahydrofuran	109999	95
Tetranitromethane	509148	580
Thallium	7440280	1.2
Toluene	108883	270
p-Toluidine	106490	15
Total dissolved solids (TDS)	NA	5.00E+05
Mineral Oil		500ug/L
Toxaphene (D)	8001352	6.80E-05 (D)
Triallate	2303175	95
Tributylamine	102829	10

Hazardous Substance	CAS Number	Cleanup Level (ug/L)
1,2,4-Trichlorobenzene	120821	70
1,1,1-Trichloroethane	71556	89
1,1,2-Trichloroethane	79005	5.0
Trichloroethylene	79016	5.0
Trichlorofluoromethane	75694	2600
2,4,5-Trichlorophenol	95954	730
2,4,6-Trichlorophenol	88062	5.0
1,2,3-Trichloropropane	96184	42
1,1,2-Trichloro-1,2,2-trifluoroethane	76131	32
Triethanolamine	102716	3700
Triethylene glycol	112276	4300
3-Trifluoromethyl-4-nitrophenol	88302	4500
Trifluralin	1582098	37
2,2,4-Trimethyl pentane	540841	2300
1,2,4-Trimethylbenzene	95636	17
1,3,5-Trimethylbenzene	108678	45
Triphenyl phosphate	115866	1200
Tris(2,3-Dibromopropyl)phosphate	126727	0.71
Vanadium	7440622	4.5
Vinyl acetate	108054	640
Vinyl chloride	75014	.25
White phosphorus	12185103	0.11
Xylenes	1330207	41
Zinc (A)	7440666	(A)
Total Petroleum Hydrocarbons (TPH) (C)		
Gasoline Range Organics (Benzene present in groundwater) (C)		800ug/L
Gasoline Range Organics (No detectable benzene in groundwater) (C)		1000ug/L
Diesel Range Organics (C)		500ug/L
Heavy Oils (C)		500ug/L

(A) In circumstances where impacted groundwater is hydraulically connected to surface water, the appropriate cleanup standard for the Hazardous Substance may be dependent on the pH or water hardness, or both, of the receiving water (surface water). In such cases, the final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving water. Where water hardness exceeds 400 mg CaCO3/L, use 400 mg CaCO3/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The applicable cleanup standard shall be the lesser of the calculated FCV and the residential drinking water value (RDWV).

Hazardous Substance	FCV Formula (ug/L)	FCV Conversion Factor (CF)	RDWV
Acetate	EXP(0.2732*(pH) + 7.0362)	NA	4200
Acetic Acid	EXP(0.2732*(pH) + 7.0362)	NA	4200
Barium	EXP(1.0629*(LnH)+1.1869)	NA	2000
Beryllium	EXP(2.5279*(LnH)-10.7689)	NA	4.0
Cadmium	(EXP(0.7852*(LnH)-2.715))*CF	1.101672-((LnH)*(0.041838))	5.0
Chromium (III)	(EXP(0.819*(LnH)+0.6848))*CF	0.86	100
Copper	(EXP(0.8545*(LnH)-1.702)) *CF	0.96	1000
Lead	(EXP(0.9859*(LnH)-1.270))*CF	1.46203-((LnH)*(0.14571))	4.0
Manganese	EXP(0.8784*(LnH)+3.5385)	NA	50
Nickel	(EXP(0.846*(LnH)+0.0584))*CF	0.997	100
Pentachlorophenol	EXP(1.005*(pH)-5.134)	NA	1.0
Zinc	(EXP(0.8473*(LnH)+0.884))*CF	0.986	2400

EXP(x) = The base of the natural logarithm raised to power x (ex).

LnH = The natural logarithm of water hardness in mg CaCO3/L.

* = The multiplication symbol.

(B) Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.

(C) 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.

1. 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.

2. 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.

3. 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.

4. 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.

(D) Calculated criteria is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

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APPENDIX B

SOIL CLEANUP LEVELS

The following chart indicates the minimum cleanup levels for soil, in terms of amount of individual hazardous substance per unit volume, for the hazardous substances listed. These cleanup levels shall remain in effect until amended by the Department and approved by the Tribal Council. The Department may also establish more stringent cleanup levels for a specific site, when, based on a site-specific evaluation, the Department determines that such levels are necessary to protect human health and the environment.

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
Acenaphthene	83329	8700
Acenaphthylene	208968	5900
Acetaldehyde	75070	2600
Acetate (A)	71501	(A)
Acetic acid (A)	64197	(A)
Acetone	67641	15000
Acetonitrile	75058	2800
Acetophenone	98862	30000
Acrolein	107028	310
Acrylamide	79061	10
Acrylic acid	79107	78000
Acrylonitrile	107131	40
Alachlor	15972608	52
Aldicarb	116063	60
Aldicarb sulfone	1646884	40
Aldicarb sulfoxide	1646873	80
Aldrin	309002	1000
Aluminum	7429905	1000
Ammonia	7664417	6.7E+9
t-Amyl methyl ether (TAME)	994058	3900
Aniline	62533	80
Anthracene	120127	41000
Antimony	7440360	1200
Arsenic	7440382	4600
Asbestos	1332214	68000

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
Atrazine	1912249	60
Azobenzene	103333	4200
Barium (A)	7440393	(A)
Benzene	71432	100
Benzidine	92875	6.0
Benzo(a)anthracene	56553	20000
Benzo(b)fluoranthene	205992	20000
Benzo(k)fluoranthene	207089	2.0E+5
Benzo(g,h,i)perylene	191242	2.5E+6
Benzo(a)pyrene	50328	2000
Benzoic acid	65850	6.4E+5
Benzyl alcohol	100516	2.0E+5
Benzyl chloride	100447	150
Beryllium (A)	7440417	(A)
bis(2-Chloroethyl)ether	111444	100
bis(2-Ethylhexyl)phthalate	117817	2.8E+6
Boron	7440428	10000
Bromate	15541454	200
Bromobenzene	108861	550
Bromodichloromethane (D)	75274	1200 (D)
Bromoform (D)	75252	1,600 (D)
Bromomethane	74839	200
n-Butanol	71363	19000
2-Butanone (MEK)	78933	260000
n-Butyl acetate	123864	11000
t-Butyl alcohol	75650	78000
Butyl benzyl phthalate	85687	13000
n-Butylbenzene	104518	1600
sec-Butylbenzene	135988	1600
t-Butylbenzene	98066	1600
Cadmium	7440439	(A)
Camphene	79925	3700
Caprolactam	105602	1.2E+5
Carbaryl	63252	14000
Carbazole	86748	1100
Carbofuran	1563662	800
Carbon disulfide	75150	16000
Carbon tetrachloride	56235	100
Chlordane	57749	31000

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
Chloride	16887006	1.0E+5
Chlorobenzene	108907	500
p-Chlorobenzene sulfonic acid	98668	1.5E+5
1-Chloro-1,1-difluoroethane	75683	3.0E+5
Chloroethane	75003	3400
2-Chloroethyl vinyl ether	110758	1.9E+6
Chloroform (D)	67663	1,600 (D)
Chloromethane	74873	2300
4-Chloro-3-methylphenol	59507	280
beta-Chloronaphthalene	91587	6.2E+5
2-Chlorophenol	95578	360
o-Chlorotoluene	95498	3300
Chlorpyrifos	2921882	130
Chromium (III) (A, B)	16065831	(A)
Chromium (VI)	18540299	3300
Chrysene	218019	2.0E+6
Cobalt	7440484	800
Copper (A)	7440508	(A)
Cyanazine	21725462	40
Cyanide	57125	100
Cyclohexanone	108941	17000
Dacthal	1861321	50000
Dalapon	75990	4000
4-4'-DDD	72548	95000
4-4'-DDE	72559	45000
4-4'-DDT	50293	57000
Decabromodiphenyl ether	1163195	1.4E+5
Di-n-butyl phthalate	84742	11000
Di(2-ethylhexyl) adipate	103231	9.6E+5
Di-n-octyl phthalate	117840	6.9E+6
Diazinon	333415	72
Dibenzo(a,h)anthracene	53703	2000
Dibenzofuran	132649	1700
Dibromochloromethane (D)	124481	1,600 (D)
Dibromochloropropane	96128	4.0
Dibromomethane	74953	1600
Dicamba	1918009	4400
1,2-Dichlorobenzene	95501	280
1,3-Dichlorobenzene	541731	170

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
1,4-Dichlorobenzene	106467	360
3,3'-Dichlorobenzidine	91941	7.4
Dichlorodifluoromethane	75718	95000
1,1-Dichloroethane	75343	15000
1,2-Dichloroethane	107062	100
1,1-Dichloroethylene	75354	62
cis-1,2-Dichloroethylene	156592	1400
trans-1,2-Dichloroethylene	156605	2000
2,6-Dichloro-4-nitroaniline	99309	44000
2,4-Dichlorophenol	120832	220
2,4-Dichlorophenoxyacetic acid	94757	1400
1,2-Dichloropropane	78875	100
1,3-Dichloropropene	542756	66
Dichlorovos	62737	32
Dieldrin	60571	1100
Diethyl ether	60297	200
Diethyl phthalate	84662	2200
Diethylene glycol monobutyl ether	112345	1800
Diisopropyl ether	108203	600
Diisopropylamine	108189	110
Dimethyl phthalate	131113	7.9E+5
N,N-Dimethylacetamide	127195	3600
N,N-Dimethylaniline	121697	320
Dimethylformamide	68122	14000
2,4-Dimethylphenol	105679	7400
2,6-Dimethylphenol	576261	88
3,4-Dimethylphenol	95658	200
Dimethylsulfoxide	67685	3.8E+6
2,4-Dinitrotoluene	121142	430
Dinoseb	88857	43
1,4-Dioxane	123911	680
Diquat	85007	400
Diuron	330541	620
Endosulfan	115297	1.4E+6
Endothall	145733	3.8E+6
Endrin	72208	65000
Epichlorohydrin	106898	100
Ethanol	64175	1.1E+8
Ethyl acetate	141786	1.3E+5

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
Ethyl-tert-butyl ether (ETBE)	637923	980
Ethylbenzene	100414	360
Ethylene dibromide	106934	1.0
Ethylene glycol	107211	3.0E+5
Ethylene glycol monobutyl ether	111762	74000
Fluoranthene	206440	5500
Fluorene	86737	5300
Fluorine (soluble fluoride)	7782414	40000
Formaldehyde	50000	2400
Formic acid	64186	1.4E+5
1-Formylpiperidine	2591868	1600
Gentian violet	548629	300
Glyphosate	1071836	1.1E+7
Heptachlor	76448	5600
Heptachlor epoxide	1024573	3100
n-Heptane	142825	2.4E+5
Hexabromobenzene	87821	5400
Hexachlorobenzene (C-66)	118741	350
Hexachlorobutadiene (C-46)	87683	91
alpha-Hexachlorocyclohexane	319846	18
beta-Hexachlorocyclohexane	319857	37
Hexachlorocyclopentadiene (C-56)	77474	30000
Hexachloroethane	67721	310
n-Hexane	110543	44,000
2-Hexanone	591786	20000
Indeno(1,2,3-cd)pyrene	193395	20000
Iron	7439896	6000
Isobutyl alcohol	78831	46000
Isophorone	78591	6200
Isopropyl alcohol	67630	9400
Isopropyl benzene	98828	3200
Lead (A)	7439921	(A)
Lindane	58899	7.0
Lithium	7439932	3400
Magnesium	7439954	8.0E+6
Manganese (A)	7439965	(A)
Mercury (Total)	Varies	1.2
Methanol	67561	74000
Methoxychlor	72435	16000

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
2-Methoxyethanol	109864	150
2-Methyl-4-chlorophenoxyacetic acid	94746	390
2-Methyl-4,6-dinitrophenol	534521	400
N-Methyl-morpholine	109024	400
Methyl parathion	298000	46
4-Methyl-2-pentanone (MIBK)	108101	36000
Methyl-tert-butyl ether (MTBE)	1634044	800
Methylcyclopentane	96377	92000
4,4'-Methylene-bis-2- chloroaniline (MBOCA)	101144	6800
Methylene chloride	75092	100
2-Methylnaphthalene	91576	4200
Methylphenols	1319773	600
Metolachlor	51218452	300
Metribuzin	21087649	3600
Mirex	2385855	9600
Molybdenum	7439987	1500
Naphthalene	91203	730
Nickel (A)	7440020	(A)
Nitrate (E)	14797558	2.0E+5 (E)
Nitrite (E)	14797650	20,000 (E)
Nitrobenzene	98953	68
2-Nitrophenol	88755	400
n-Nitroso-di-n-propylamine	621647	100
N-Nitrosodiphenylamine	86306	5400
Oxamyl	23135220	4000
Oxo-hexyl acetate	88230357	1500
Pendimethalin	40487421	1.1E+6
Pentachlorobenzene	608935	9500
Pentachloronitrobenzene	82688	37000
Pentachlorophenol (A)	87865	(A)
Pentane	109660	2.4E+5
Phenanthrene	85018	2100
Phenol	108952	9000
Phenytoin	57410	830
Phosphorus	7723140	1,3E+6
Phthalic acid	88993	2.8E+5
Phthalic anhydride	85449	3.0E+5
Picloram	1918021	920

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
Piperidine	110894	64
Polybrominated biphenyls	67774327	1200
Polychlorinated biphenyls (PCBs)	1336363	4000
Prometon	1610180	4900
Propachlor	1918167	1900
Propazine	139402	4000
Propionic acid	79094	2.4E+5
Propyl alcohol	71238	28000
n-Propylbenzene	103651	1600
Propylene glycol	57556	3.0E+6
Pyrene	129000	4.8E+5
Pyridine	110861	400
Selenium	7782492	400
Silver	7440224	27
Silvex (2,4,5-TP)	93721	2200
Simazine	122349	80
Sodium	17341252	2.5E+6
Sodium azide	26628228	1000
Strontium	7440246	92000
Styrene	100425	530
Sulfate	14808798	5.0E+6
Tebuthiuron	34014181	10000
1,2,4,5-Tetrachlorobenzene	95943	3300
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	0.09
1,1,1,2-Tetrachloroethane	630206	1500
1,1,2,2-Tetrachloroethane	79345	64
Tetrachloroethylene	127184	100
Tetrahydrofuran	109999	1900
Thallium	7440280	1400
Toluene	108883	5400
p-Toluidine	106490	300
Toxaphene	8001352	8200
Triallate	2303175	95000
Tributylamine	102829	7800
1,2,4-Trichlorobenzene	120821	4200
1,1,1-Trichloroethane	71556	1800
1,1,2-Trichloroethane	79005	100
Trichloroethylene	79016	100
Trichlorofluoromethane	75694	52000

Hazardous Substance	CAS Number	Cleanup Level (ug/kg)
2,4,5-Trichlorophenol	95954	39000
2,4,6-Trichlorophenol	88062	100
1,2,3-Trichloropropane	96184	840
1,1,2-Trichloro-1,2,2-trifluoroethane	76131	1700
Triethanolamine	102716	74000
Triethylene glycol	112276	1.1E+5
3-Trifluoromethyl-4-nitrophenol	88302	1.1E+5
Trifluralin	1582098	1.9E+5
2,2,4-Trimethylpentane	540841	19000
1,2,4-Trimethylbenzene	95636	570
1,3,5-Trimethylbenzene	108678	1100
Triphenyl phosphate	115866	1.1E+5
tris(2,3-Dibromopropyl)phosphate	126727	930
Vanadium	7440622	72000
Vinyl acetate	108054	13000
Vinyl chloride	75014	20
White phosphorus	12185103	2.2
Xylenes	1330207	820
Zinc (A)	7440666	(A)
Total Petroleum Hydrocarbons (TPH) (C)		
Gasoline mixtures without benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture (C)		100mg/kg
All other gasoline mixtures (C)		30mg/kg
Diesel Range Organics (C)		2000mg/kg
Heavy Oils (C)		2000mg/kg
Mineral Oil (C)		4000mg/kg

(A) In circumstances where impacted groundwater is hydraulically connected to surface water, the appropriate cleanup standard for the Hazardous Substance may be dependent on the pH or water hardness, or both, of the receiving water (surface water). In such cases, the final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving water. Where water hardness exceeds 400 mg CaCO3/L, use 400 mg CaCO3/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The applicable cleanup standard shall be the lesser of the calculated FCV and the residential drinking water value (RDWV).

Hazardous Substance	FCV Formula (ug/L)	FCV Conversion Factor (CF)	RDWV
Acetate	EXP(0.2732*(pH) + 7.0362)	NA	4200
Acetic Acid	EXP(0.2732*(pH) + 7.0362)	NA	4200

Hazardous Substance	FCV Formula (ug/L)	FCV Conversion Factor (CF)	RDWV
Barium	EXP(1.0629*(LnH)+1.1869)	NA	2000
Beryllium	EXP(2.5279*(LnH)-10.7689)	NA	4.0
Cadmium	(EXP(0.7852*(LnH)-2.715))*CF	1.101672-((LnH)*(0.041838))	5.0
Chromium (III)	(EXP(0.819*(LnH)+0.6848))*CF	0.86	100
Copper	(EXP(0.8545*(LnH)-1.702)) *CF	0.96	1000
Lead	(EXP(0.9859*(LnH)-1.270))*CF	1.46203-((LnH)*(0.14571))	4.0
Manganese	EXP(0.8784*(LnH)+3.5385)	NA	50
Nickel	(EXP(0.846*(LnH)+0.0584))*CF	0.997	100
Pentachlorophenol	EXP(1.005*(pH)-5.134)	NA	1.0
Zinc	(EXP(0.8473*(LnH)+0.884))*CF	0.986	2400

EXP(x) = The base of the natural logarithm raised to power x (ex).

LnH = The natural logarithm of water hardness in mg CaCO3/L.

* = The multiplication symbol.

(B) Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.

(C) 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.

a. Gasoline range organics means organic compounds measured using method NWTPH-Gx. Examples are aviation and automotive gasoline. 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.

b. 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.

c. 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.

d. 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.

(D) Concentrations of trihalomethanes shall be added together to determine the compliance with the drinking water protection criterion of 1,600 ug/kg.

(E) The concentrations of all potential sources of nitrate-nitrogen (e.g., ammonia-N, nitrate-N, nitrite-N) in groundwater shall not, when added together, exceed the nitrate drinking water criterion of 10,000 ug/L. Soil concentrations of all potential sources of nitrate-nitrogen shall not, when added together, exceed the nitrate drinking water protection criterion of 2.0E+5 ug/kg.

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APPENDIX C

SEDIMENT CLEANUP LEVELS

The following charts, chart 1 and chart 2, indicate the minimum numerical cleanup levels for contamination in sediments caused by the listed hazardous substances. Chart 1 indicates the sediment cleanup levels for the protection of human health. These cleanup levels are given in pg of contaminant/kg of organic carbon. Chart 2 indicates the sediment cleanup levels for the protection of sediment dwelling organisms. The cleanup levels in chart 2 are given in the units shown in the chart. To the extent that there are two sediment standards for the same compound the lower standard shall control. In addition, any remedial action must also comply with the below narrative standards for sediments.

These sediment cleanup levels shall remain in effect until amended by the Department and approved by the Tribal Council. The Department may also establish more stringent cleanup levels for a specific site, when, based on a site-specific evaluation, the Department determines that such levels are necessary to protect human health and the environment.

(1) Sediment Cleanup Levels Chart for the Protection of Human Health

Hazardous Substance	Sediment Cleanup Levels (µg/kg OC)
Polycyclic Aromatic Hydrocarbons	
Benzo(a)pyrene	21.6
Dibenz[a,h]anthracene	21.6
Benz[a] anthracene	21.6
Chrysene	13.8
Benzo(b)fluoranthene	21.6
Benzo(k)fluoranthene	21.6
Indeno(1,2,3 cd)pyrene	21.6
Polychlorinated Biphenyls	
Aroclor 1016	1.54
Aroclor 1242	0.533
Aroclor 1248	0.533
Aroclor 1254	0.533

Hazardous Substance	Sediment Cleanup Levels (µg/kg OC)
Aroclor 1260	0.533
Total PCBs	0.533
Pesticides	
Aldrin	0.0408
Chlordane	0.533
Dieldrin	0.0439
p,p-DDD	2.85
p,p-DDE	1.72
p,p-DDT	2.04
Total DDT	2.54
Endosulfan	11300
Endrin	172
Heptachlor	0.408
Heptachlor epoxide	0.204
Alpha hexachlorocyclohexane(HCH)	0.295
Beta HCH	1.00
Technical HCH	1.03
Lindane (gamma HCH)	1.44
Mirex	17.8
Toxaphene	5.08
Dioxins and Furans	
1,2,3,4,6,7,8 Heptachlorodibenzo p-dioxin	3.76
1,2,3,4,6,7,8 Heptachlorodibenzofuran	3.76
1,2,3,4,7,8,9 Heptachlorodibenzofuran	3.76
1,2,3,4,7,8 Hexachlorodibenzo-p-dioxin	0.0144
1,2,3,4,7,8 Hexachlorodibenzofuran	0.0144
1,2,3,6,7,8 Hexachlorodibenzo-p-dioxin	0.0144
1,2,3,6,7,8 Hexachlorodibenzofiaran	0.0144
1,2,3,7,8,9 Hexachlorodibenzo-p-dioxin	0.0144
1,2,3,7,8,9 Hexachlorodibenzofuran	0.0144
1,2,3,7,8 Pentachlorodibenzo-p-dioxin	0.00288
1,2,3,7,8 Pentachlorodibenzofuran	0.00815

Hazardous Substance	Sediment Cleanup Levels (µg/kg OC)
2,3,4,6,7,8 Hexachlorodibenzofuran	0.0144
2,3,4,7,8 Pentachlorodibenzofuran	0.000972
2,3,7,8 Tetrachlorodibenzo-p-dioxin	0.0000470
2,3,7,8 Tetrachlorodibenzofuran	0.00408
Octachlorodibenzodioxin	37.6
Octachlorodibenzofuran	37.6

OC = organic carbon; NS = no sediment quality standard is derived. Standards to be developed as more data become available.

(2) Sediment Cleanup Levels Chart for the Protection of Sediment dwelling Organisms

Hazardous Substance	Sediment Cleanup Levels
Metals (in mg/kg DW)	
Arsenic	9.79
Cadmium	0.99
Chromium	43.4
Copper	31.6
Lead	35.8
Mercury	0.18
Nickel	22.7
Zinc	121
Polycyclic Aromatic Hydrocarbons (ug/kg DW)	
Anthracene	57.2
Dibenz[a,h]anthracene	33.0
Fluorene	77.4
Naphthalene	176
Phenanthrene	204
Benz[a]anthracene	108
Benzo(a)pyrene	150

Chrysene	166
Fluoranthene	423
Pyrene	195
Total PAHs	1610
Polychlorinated Biphenyls (ug/kg DW)	
Total PCBs	59.8
Organochlorine Pesticides (ug/kg DW)	
Chlordane	3.24
Dieldrin	1.90
Sum DDD	4.88
Sum DDE	3.16
Sum DDT	4.16
Total DDTs	5.28
Endrin	2.22
Heptachlor Epoxide	2.47
Lindane (gamma-BHC)	2.37

DW = dry weight

(1) Narrative Standards for Sediments

Remedial actions must also comply with the following narrative standards for sediments:

In the case of a substance for which there is no numerical standard in Chart I, the following narrative standard shall apply:

> Bioaccumulative substances shall not occur in sediments, either singly or in combination, at concentrations that cause, or can reasonably be expected to cause, injury to human health or biological resources including sediment-dwelling organisms.

In the case of a substance for which there is no numerical standard in Chart II, the following narrative standard shall apply:

> Toxic substances shall not occur in sediments, either singly or in combination, at concentrations that cause, or can reasonably be expected to cause, injury to human health or biological resources including sediment-dwelling organisms.

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