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March 14, 2012

Paul Cho, P.G.
Water Resources Control Engineer
California Regional Water Quality Control Board, Site Cleanup Unit IV
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

**Subject: Justification for Calculations of the Proposed Soil Cleanup Goals and Revised Tables
Defense Fuel Support Point Norwalk
15306 Norwalk Boulevard, Norwalk, California
SCP NO. 0286A, Site No. 16638**

Dear Mr. Cho:

Parsons has prepared this letter on behalf of the Defense Logistics Agency (DLA) Energy in response to the March 1st conference call between yourself and Parsons discussing the proposed soil cleanup goals for the Defense Fuel Support Point (DFSP) Norwalk facility in Norwalk, California. This letter addresses your concerns as expressed during the conference call and provides justification for the calculations and screening levels used in determining the site-specific proposed cleanup goals.

As previously noted, all of the screening levels were calculated using the procedures proscribed in the RWQCB's Interim Site Assessment & Cleanup Guidebook¹ (referred to herein as the "Guidebook"). Fuel hydrocarbons (diesel, gasoline, and jet fuel) and BTEX compounds were calculated in compliance with Table 4-1 of the Guidebook.

The Guidebook presents two methods for the calculation of attenuation factors for volatile organic compounds (VOCs). In the previous draft presented to you for consideration, soil cleanup goals were calculated following the methods provided in Table 5-1 of the Guidebook. However, as you noted, this resulted in some soil cleanup goals that appeared to be rather high. Therefore, Parsons re-evaluated the methods presented in the Guidebook and determined that Table 5-1 presented a method for deriving a site-specific attenuation factor that did not account for differences in chemical properties (i.e., differences in the way the chemicals behave in the environment). The Guidebook also presents a method for deriving soil cleanup goals that account for chemical properties. That method was used to revise the soil cleanup goals and is

¹ California Regional Water Quality Control Board, Los Angeles Region, 1996, *Interim Site Assessment & Cleanup Guidebook*, dated May 1996.

Justification for Calculations of the Proposed Soil Cleanup Goals and Revised Tables

explained below. Note that the revised cleanup goals are generally lower than the USEPA Soil Screening Levels (SSLs)² at 1 foot above the water table and some of the revised cleanup goals are even below the USEPA SSLs at 25.5 feet above the water table.

RATIONALE AND METHODOLOGY FOR CALCULATING THE PROPOSED SOIL CLEANUP GOALS

The USEPA Regional Screening Level (RSL) tables provide concentrations of chemicals in soil that are protective of leaching to groundwater and groundwater quality; i.e., the SSLs. The SSLs are essentially calculated by multiplying an attenuation factor by a water quality standard. The attenuation factors in the SSLs are based on a relatively simple leaching model that uses conservative assumptions, including that the contaminant layer is in contact with groundwater. Since the site has contaminants in soils that are up to 25.5 feet from groundwater, the SSLs may be more protective than necessary for some depths and site-specific cleanup goals are warranted. This is supported by USEPA³ (1996; i.e., the document in which the SSL equations were originally presented), which states that “at most sites, higher, but still protective SSLs can be calculated using site-specific data.”

Since the SSLs may be more protective than necessary for the DFSP Norwalk site, soil cleanup goals were calculated following the Guidebook. The Guidebook uses the same general formula as the SSLs to calculate soil cleanup goals, which is as follows:

Soil cleanup goal (mg/kg) = total attenuation factor (AF_T , L/kg) x water quality standard (mg/L).

The water quality standards used to calculate the SSLs and DFSP Norwalk cleanup goals were taken from the hierarchy of sources shown below:

SSL	DFSP Norwalk
1. USEPA MCL ⁴	1. California MCL ⁵
2. Tapwater RSL	2. California NL ⁶
	3. Tapwater RSL ⁷

Note that the California MCLs are equal to or more stringent than the Federal MCLs. California also provides both a NL and a public health goal (PHG) for 1,2,3-trichloropropane. Since the PHG is substantially lower than the NL for 1,2,3-trichloropropane, the PHG was used in the calculation of the cleanup goals.

The method used by the Guidebook to calculate attenuation factors uses 1) physical properties of gravels, sands, silts, and clays measured in the Los Angeles area, 2) physical properties of chemicals (e.g., Henry's Law constant), and 3) average infiltration rates through each soil type (i.e., rate at which water flows through each soil type).

² USEPA Soil Screening Levels. See <http://www.epa.gov/region09/superfund/prg/>

³ USEPA, 1996, Soil Screening Guidance: User's Guide: EPA 540/R-96/018.

⁴ USEPA Maximum Contaminant Levels (MCLs). See <http://water.epa.gov/drink/contaminants/index.cfm>

⁵ See <http://www.cdph.ca.gov/certlic/drinkingwater/Documents/MCLreview/MCLs-DLRs-PHGx.xls>

⁶ Notification Level (NL). See <http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Notificationlevels/notificationlevels.pdf>

⁷ USEPA Regional Screening Levels (RSLs). See <http://www.epa.gov/region09/superfund/prg/>



Justification for Calculations of the Proposed Soil Cleanup Goals and Revised Tables

While the SSLs account for chemical properties, they do not account for distance from the water table, which is important as the amount of contaminant that migrates to groundwater **decreases** with distance. Thus, soil cleanup goals should be higher as the distance from the water table increases. Lithology is also important as water migrates through gravels and sands faster than through silts and clays. The RWQCB took both of these factors into account in the Guidebook, which provides equations to calculate total attenuation factors (AF_T) based on the lithology at the site and the distance from the contaminant to groundwater.

Following the Guidebook (see Appendix A of the Guidebook), the total attenuation factor was calculated as follows:

$$AF_T = \frac{AF_D}{D} \times \left(\frac{Sand_D}{10} + \frac{Silt_D}{5} + Clay_D \right)$$

where:

AF_D = attenuation factor modified by distance above the water table (L/kg)

AF_T = total attenuation factor (L/kg)

$Clay_D$ = thickness of the clay layer (ft)

D = distance to water table (ft)

$Sand_D$ = thickness of the sand layer (ft)

$Silt_D$ = thickness of silt layer (ft)

and

$$AF_D \left(\frac{L}{kg} \right) = D \times [0.1 \times AF_{MAX} - 1] / 40 + 1$$

and

$$AF_{MAX} (\text{unitless}) = 1 + \left(\frac{\rho_b}{\theta_w} \times f_{oc} \times K_{oc} \right) + \left((n - \theta_w) \times \frac{K_H}{\theta_w} \right)$$

where:

ρ_b = soil dry bulk density (2.27 g/ml)

θ_w = volumetric water-filled soil porosity (0.031, unitless)

f_{oc} = fraction of soils that is organic carbon (0.015, unitless)

n = total volumetric soil porosity (0.143, unitless)

K_{oc} = Organic carbon partition coefficient (chemical specific, ml/g)

K_H = Henry's Law constant (chemical specific, unitless)



Justification for Calculations of the Proposed Soil Cleanup Goals and Revised Tables

After substituting in the non-chemical-specific values, AF_{MAX} becomes:

$$\begin{aligned} AF_{MAX} &= 1 + \left(\frac{2.27}{0.031} \times 0.015 \times K_{oc} \right) + \left((0.143 - 0.031) \times \frac{K_H}{0.031} \right) \\ &= 1 + (1.098 \times K_{oc}) + \left(0.112 \times \frac{K_H}{0.031} \right) \end{aligned}$$

While the Guidebook states that AF_T cannot be below 1, that limitation was removed for the calculations presented here. Thus, the soil cleanup goals calculated here may be lower than technically allowed by the guidebook.

The thicknesses of the clay, sand, and silt layers were calculated across the site for each depth where the soil cleanup goals were calculated. Soil types between the ground surface and groundwater generally vary at the DFSP Norwalk site. For the purpose of this exercise, the soil types were calculated using the site boring logs from DPT-41 through DPT-102 located throughout the site, which are the most recent lithology data collected in October and November 2011. Each of these borings was continuously logged, providing relatively high confidence level of the soil types at depth. As a conservative measure, the depths recorded with “no recovery” were assumed to be sand.

The general procedure used in determining soil type thicknesses between the sampling depth and groundwater was to add the thickness (in feet) of clay, sand, and silt. For a sampling depth of 0.5 feet, for example, the total thicknesses of clay, sand, and silt were added between 0.5 and 26 feet. For Boring DPT-41, the thicknesses of clay, sand, and silt were measured to be approximately 1, 16.5, and 8 feet, respectively. This process of determining soil types between 0.5 and 26 feet was conducted for each boring, and inputted into an Excel spreadsheet. This process was repeated for the intervals between groundwater and sampling depths of 5, 10, 15, 20, and 25 feet. The average thicknesses of clay, sand, and silt between each sampling depth and groundwater was calculated by adding the thicknesses of these soil types, and then dividing by the number of borings used.

In addition to soil type, soil type percentages are also required when using the SSLs on Table 4-1 of the Guidebook. The soil type thicknesses are used to determine soil percentages by simply dividing the individual soil type thickness by the length of the soil column being assessed. For example, the percentages of clay, sand, and silt between the 0.5-foot sample and groundwater (using site-wide average values) are calculated as follows:

Clay	0.63'	$0.63' \div 25.5' = 2.47\%$
Sand	18.76'	$18.76' \div 25.5' = 73.57\%$
Silt	$\frac{+ 6.11'}{25.5'}$	$6.11' \div 25.5' = 23.96\%$

The values of AF_D , AF_{MAX} , AF_T , K_{oc} , and K_H , along with the proposed soil cleanup goals are shown in Tables 3 through 8. The USEPA SSLs are shown for comparison.



PROPOSED SOIL REMEDIATION CLEANUP GOALS

A summary of the proposed soil cleanup levels for TPH and BTEX compounds is provided on Table 1 and a detailed breakdown on Table 2 of this report. A summary of the proposed soil cleanup levels for the detected VOCs at the site is provided on Table 1 and a detailed breakdown on Table 3 through Table 8 of this report broken down by depth. These calculations are primarily based on average lithology types and thicknesses between the sampling depths and the underlying groundwater. We believe that the soil cleanup goals presented here are generally very low and are lower than would be calculated using more complicated mathematical models such as VLEACH or SESOIL.

We await your response to this letter confirming the proposed soil cleanup goals for the DFSP Norwalk site. If you have any questions, please call me at 602-734-1083.

Sincerely,

PARSONS



Redwan N Hassan, P.G.
Project Manager

Attachments:

- Tables:
- 1 Summary of Proposed Soil Cleanup Levels
 - 2 Proposed Soil Cleanup Levels for TPH and BTEX by Depth
 - 3 Proposed Soil Cleanup Levels for VOCs from Surface Grade to 0.5 feet Below Ground Surface (25.5 feet Above Groundwater)
 - 4 Proposed Soil Cleanup Levels for VOCs from 0.5 to 5 feet Below Ground Surface (21 feet Above Groundwater)
 - 5 Proposed Soil Cleanup Levels for VOCs from 5 to 10 feet Below Ground Surface (16 feet Above Groundwater)
 - 6 Proposed Soil Cleanup Levels for VOCs from 10 to 15 feet Below Ground Surface (11 feet Above Groundwater)
 - 7 Proposed Soil Cleanup Levels for VOCs from 15 to 20 feet Below Ground Surface (6 feet Above Groundwater)
 - 8 Proposed Soil Cleanup Levels for VOCs from 20 to 25 feet Below Ground Surface (1 feet Above Groundwater)

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Matthew Young, DLA-E
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Attachment -

Tables

Table 1
Summary of Proposed Soil Cleanup Levels
DFSP Norwalk, Norwalk, CA

Constituent	Proposed Soil Cleanup Level (mg/kg) by Depth					
	0.5 feet	5 feet	10 feet	15 feet	20 feet	25 feet
TPH as Gasoline (C4-C12)	500	500	100	100	100	100
TPH as JP-5 (C8-C17)	500	500	100	100	100	100
TPH as Diesel (C5-C25)	1,000	1,000	100	100	100	100
Benzene	0.015	0.013	0.012	0.013	0.011	0.012
Toluene	0.614	0.440	0.391	0.423	0.356	0.367
Ethylbenzene	2.07	1.44	1.19	1.33	1.07	1.10
Xylenes	5.55	3.77	3.09	3.47	2.76	2.84
1,1,2,2-Tetrachloroethane	0.0023	0.0020	0.0015	0.0012	0.0006	0.0002
1,1,2-Trichloroethane	0.0032	0.0029	0.0023	0.0020	0.0012	0.0008
1,2,3-Trichlorobenzene	0.0740	0.0634	0.0467	0.0356	0.0162	0.0034
1,2,3-Trichloropropane	8.74E-07	7.66E-07	5.87E-07	4.79E-07	2.56E-07	1.23E-07
1,2,4-Trimethylbenzene	2.10	1.80	1.34	1.03	0.478	0.120
1,2-Dibromo-3-chloropropane	2.50E-04	2.19E-04	1.68E-04	1.37E-04	7.31E-05	3.52E-05
1,2-Dibromoethane	3.05E-06	2.78E-06	2.27E-06	2.04E-06	1.30E-06	9.60E-07
1,2-Dichloroethane	1.06E-04	1.04E-04	9.37E-05	9.60E-05	7.29E-05	6.92E-05
1,3,5-Trimethylbenzene	2.06	1.77	1.31	1.01	0.470	0.118
2-Butanone	0.557	0.607	0.617	0.713	0.612	0.661
2-Chlorotoluene	0.558	0.481	0.358	0.278	0.132	0.039
2-Hexanone	0.0073	0.0072	0.0065	0.0066	0.0050	0.0047
4-Chlorotoluene	0.547	0.472	0.351	0.273	0.130	0.038
Acetone	0.994	1.17	1.28	1.57	1.42	1.60
Bromomethane	0.0015	0.0014	0.0013	0.0013	0.0010	0.0010
Carbon disulfide	0.049	0.046	0.039	0.038	0.026	0.023
Chlorobenzene	0.119	0.104	0.079	0.063	0.032	0.013
Chloroethane (Ethyl Chloride)	2.23	2.47	2.55	2.98	2.59	2.83
Chloroform	7.38E-05	6.82E-05	5.67E-05	5.25E-05	3.48E-05	2.75E-05
Dichlorodifluoromethane	0.984	0.868	0.672	0.559	0.309	0.167
Diisopropyl Ether (DIPE)	0.449	0.424	0.364	0.350	0.246	0.212
Ethanol	NA	NA	NA	NA	NA	NA
Isopropylbenzene	5.56	4.78	3.53	2.71	1.26	0.303
Methylene Chloride	7.78E-04	7.99E-04	7.61E-04	8.27E-04	6.69E-04	6.82E-04
Methyl-t-Butyl Ether (MTBE)	2.36E-03	2.37E-03	2.19E-03	2.31E-03	1.81E-03	1.78E-03
MTBE (secondary MCL)	9.07E-04	9.10E-04	8.43E-04	8.89E-04	6.97E-04	6.86E-04
Naphthalene	0.270	0.231	0.170	0.130	0.059	0.012
n-Butylbenzene	3.97	3.40	2.50	1.91	0.867	0.179
n-Propylbenzene	2.18	1.87	1.39	1.06	0.489	0.114
p-Isopropyltoluene	2.82	2.42	1.79	1.37	0.636	0.154
sec-Butylbenzene	2.59	2.22	1.64	1.26	0.576	0.129
Styrene	0.463	0.399	0.296	0.229	0.108	0.030
Tert-Butyl Alcohol (TBA)	0.0010	0.0012	0.0013	0.0016	0.0014	0.0016
tert-Butylbenzene	2.07	1.78	1.32	1.01	0.465	0.110
Trichloroethene	0.0070	0.0061	0.0047	0.0038	0.0020	0.0009

mg/kg = milligram per kilogram
NA = not applicable

Table 2
Proposed Soil Cleanup Levels for TPH and BTEX by Depth
 DFSP Norwalk, Norwalk, CA

Screening Levels for Soil at 0.5 feet Below Ground Surface (25.5 feet Above Groundwater)				
Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	
Average Soil Thickness	18.76	6.11	0.63	
Soil Type Percentage	0.74	0.24	0.02	
Constituent	Sand Screening Level (mg/kg)	Silt Screening Level (mg/kg)	Clay Screening Level (mg/kg)	Proposed Cleanup Level (mg/kg)
TPH as Gasoline (C4-C12)	500	500	500	500
TPH as JP-5 (C8-C17)	500	500	500	500
TPH as Diesel (C5-C25)	1,000	1,000	1,000	1,000
Benzene	0.013	0.016	0.071	0.015
Toluene	0.456	0.775	3.74	0.614
Ethylbenzene	1.28	3.19	14.87	2.07
Xylenes	3.42	8.48	40.59	5.55

Screening Levels for Soil at 5 feet Below Ground Surface (21 feet Above Groundwater)				
Soil Types (5 - 26 feet bgs)	Sand	Silt	Clay	
Average Soil Thickness	15.08	5.30	0.62	
Soil Type Percentage	0.72	0.25	0.03	
Constituent	Sand Screening Level (mg/kg)	Silt Screening Level (mg/kg)	Clay Screening Level (mg/kg)	Proposed Cleanup Level (mg/kg)
TPH as Gasoline (C4-C12)	500	500	500	500
TPH as JP-5 (C8-C17)	500	500	500	500
TPH as Diesel (C5-C25)	1,000	1,000	1,000	1,000
Benzene	0.011	0.012	0.049	0.013
Toluene	0.328	0.509	2.56	0.440
Ethylbenzene	0.805	2.22	10.07	1.43
Xylenes	2.05	5.88	27.43	3.77

Table 2
Proposed Soil Cleanup Levels for TPH and BTEX by Depth
 DFSP Norwalk, Norwalk, CA

Screening Levels for Soil at 10 feet Below Ground Surface (16 feet Above Groundwater)				
Soil Types (10 - 26 feet bgs)	Sand	Silt	Clay	
Average Soil Thickness	12.81	2.65	0.53	
Soil Type Percentage	0.80	0.17	0.03	
Constituent	Sand Screening Level (mg/kg)	Silt Screening Level (mg/kg)	Clay Screening Level (mg/kg)	Proposed Cleanup Level (mg/kg)
TPH as Gasoline (C4-C12)	100	100	100	100
TPH as JP-5 (C8-C17)	100	100	100	100
TPH as Diesel (C5-C25)	100	100	100	100
Benzene	0.011	0.011	0.044	0.012
Toluene	0.300	0.450	2.30	0.391
Ethylbenzene	0.700	2.00	9.00	1.19
Xylenes	1.75	5.30	24.50	3.09

Screening Levels for Soil at 15 feet Below Ground Surface (11 feet Above Groundwater)				
Soil Types (15 - 26 feet bgs)	Sand	Silt	Clay	
Average Soil Thickness	8.53	1.94	0.53	
Soil Type Percentage	0.78	0.18	0.05	
Constituent	Sand Screening Level (mg/kg)	Silt Screening Level (mg/kg)	Clay Screening Level (mg/kg)	Proposed Cleanup Level (mg/kg)
TPH as Gasoline (C4-C12)	100	100	100	100
TPH as JP-5 (C8-C17)	100	100	100	100
TPH as Diesel (C5-C25)	100	100	100	100
Benzene	0.011	0.011	0.044	0.013
Toluene	0.300	0.450	2.30	0.423
Ethylbenzene	0.700	2.00	9.00	1.33
Xylenes	1.75	5.30	24.50	3.47

Table 2
Proposed Soil Cleanup Levels for TPH and BTEX by Depth
 DFSP Norwalk, Norwalk, CA

Screening Levels for Soil at 20 feet Below Ground Surface (6 feet Above Groundwater)				
Soil Types (20 - 26 feet bgs)	Sand	Silt	Clay	
Average Soil Thickness	4.72	1.19	0.08	
Soil Type Percentage	0.79	0.20	0.01	
Constituent	Sand Screening Level (mg/kg)	Silt Screening Level (mg/kg)	Clay Screening Level (mg/kg)	Proposed Cleanup Level (mg/kg)
TPH as Gasoline (C4-C12)	100	100	100	100
TPH as JP-5 (C8-C17)	100	100	100	100
TPH as Diesel (C5-C25)	100	100	100	100
Benzene	0.011	0.011	0.044	0.011
Toluene	0.300	0.450	2.30	0.356
Ethylbenzene	0.700	2.00	9.00	1.07
Xylenes	1.75	5.30	24.50	2.75

Screening Levels for Soil at 25 feet Below Ground Surface (1 foot Above Groundwater)				
Soil Types (25 - 26 feet bgs)	Sand	Silt	Clay	
Average Soil Thickness	0.80	0.18	0.02	
Soil Type Percentage	0.80	0.18	0.02	
Constituent	Sand Screening Level (mg/kg)	Silt Screening Level (mg/kg)	Clay Screening Level (mg/kg)	Proposed Cleanup Level (mg/kg)
TPH as Gasoline (C4-C12)	100	100	100	100
TPH as JP-5 (C8-C17)	100	100	100	100
TPH as Diesel (C5-C25)	100	100	100	100
Benzene	0.011	0.011	0.044	0.012
Toluene	0.300	0.450	2.30	0.367
Ethylbenzene	0.700	2.00	9.00	1.10
Xylenes	1.75	5.30	24.50	2.84

Notes:

Screening level calculations based on Interim Site Assessment & Cleanup Guidebook (Table 4-1 and examples).

bgs = below ground surface

mg/kg = milligram per kilogram

Table 3
Proposed Soil Cleanup Levels for VOCs from Surface Grade to 0.5 feet Below Ground Surface
(25.5 feet Above Groundwater)
 DFSP Norwalk, Norwalk, CA

Constituent	Water Quality Standard		AF _{MAX} ¹ (unitless)	K _{oc} ² (mL/g or L/kg)	K _H ² (unitless)	AF _D (L/kg)	AF _T ³ (L/kg)	Proposed Cleanup Level (mg/kg)	USEPA SSL (mg/kg)
	(mg/L)	Source							
1,1,2,2-Tetrachloroethane	0.001	MCL	243	-	-	15.85	2.32	2.32E-03	2.60E-05
1,1,2-Trichloroethane	0.005	MCL	63	-	-	4.38	0.64	3.20E-03	1.60E-03
1,2,3-Trichlorobenzene	0.0052	RSL	1520	1383	0.0511038	97.28	14.22	7.40E-02	1.50E-02
1,2,3-Trichloropropane	0.0000007	PHG	128	115.8	0.0140229	8.54	1.25	8.74E-07	2.80E-07
1,2,4-Trimethylbenzene	0.33	NL	677	614.3	0.2518397	43.50	6.36	2.10E+00	2.10E-02
1,2-Dibromo-3-chloropropane	0.0002	MCL	128	115.8	0.0060098	8.54	1.25	2.50E-04	8.60E-05
1,2-Dibromoethane	0.0000065	RSL	45	39.6	0.026574	3.21	0.47	3.05E-06	1.40E-05
1,2-Dichloroethane	0.0005	MCL	17	-	-	1.45	0.21	1.06E-04	1.40E-03
1,3,5-Trimethylbenzene	0.33	NL	664	602.1	0.3585446	42.67	6.24	2.06E+00	1.20E-01
2-Butanone	4.9	RSL	6.5	-	-	0.78	0.11	5.57E-01	1.00E+00
2-Chlorotoluene	0.14	NL	422	382.9	0.1459526	27.27	3.99	5.58E-01	1.70E-01
2-Hexanone	0.034	RSL	17	14.98	0.0038103	1.48	0.22	7.34E-03	7.90E-03
4-Chlorotoluene	0.14	NL	414	375.3	0.1790679	26.75	3.91	5.47E-01	1.80E-01
Acetone	12	RSL	3.2	-	-	0.57	0.08	9.94E-01	2.40E+00
Bromomethane	0.007	RSL	17	13.22	0.3000818	1.42	0.21	1.45E-03	1.80E-03
Carbon disulfide	0.16	NL	27	21.73	0.5887163	2.08	0.30	4.87E-02	2.10E-01
Chlorobenzene	0.07	MCL	177	-	-	11.65	1.70	1.19E-01	4.90E-02
Chloroethane (Ethyl Chloride)	21	RSL	5.7	-	-	0.73	0.11	2.23E+00	5.90E+00
Chloroform	0.00019	RSL	36	-	-	2.66	0.39	7.38E-05	5.30E-05
Dichlorodifluoromethane	1	NL	100	43.89	14.022895	6.73	0.98	9.84E-01	3.00E-01
Diisopropyl Ether (DIPE)	1.5	RSL	26	22.79	0.1046607	2.05	0.30	4.49E-01	3.70E-01
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	0.77	NL	769	697.8	0.4701554	49.40	7.22	5.56E+00	6.40E-01
Methylene Chloride	0.005	MCL	11	-	-	1.06	0.16	7.78E-04	1.30E-03
Methyl-t-Butyl Ether (MTBE)	0.013	MCL	14	11.56	0.0239984	1.24	0.18	2.36E-03	2.80E-03
MTBE (secondary MCL)	0.005	MCL	14	11.56	0.0239984	1.24	0.18	9.07E-04	2.80E-03
Naphthalene	0.017	NL	1697	1544	0.0179886	108.54	15.87	2.70E-01	4.70E-04
n-Butylbenzene	0.26	NL	1631	1482	0.6500409	104.35	15.26	3.97E+00	2.50E+00
n-Propylbenzene	0.26	NL	896	813.1	0.4292723	57.46	8.40	2.18E+00	9.90E-01
p-Isopropyltoluene ⁴	0.39	RSL	769	697.8	0.4701554	49.40	7.22	2.82E+00	6.40E-01
sec-Butylbenzene	0.26	NL	1064	966.05	0.5680193	68.20	9.97	2.59E+00	NA
Styrene	0.1	MCL	491	446.1	0.1124285	31.69	4.63	4.63E-01	1.10E-01
Tert-Butyl Alcohol (TBA)	0.012	NL	3	2.11	0.0003711	0.57	0.08	1.01E-03	NA
tert-Butylbenzene	0.26	NL	850	770.90	0.4868947	54.52	7.97	2.07E+00	NA
Trichloroethene	0.005	MCL	145	-	-	9.61	1.40	7.02E-03	1.80E-03

Notes:

¹ Taken from the RWQCB's 1996 Interim Site Assessment & Cleanup Guidebook.

² For those chemicals for which the RWQCB, values were taken from the November (2011) RSL tables, except for sec-butylbenzene and tert-butylbenzene, which were taken from the 2004 version of the USEPA Johnson and Ettinger spreadsheets (see http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm) and tert-butyl alcohol, which was taken from EPI Suite v4.1 (see <http://www.epa.gov/oppt/exposure/pubs/episuite.htm>).

³ Calculated using the following soil thicknesses

Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	Total
Average Soil Thickness	18.76	6.11	0.63	25.50

⁴ Isopropylbenzene used as a surrogate for p-Isopropyltoluene.

Table 3
Proposed Soil Cleanup Levels for VOCs from Surface Grade to 0.5 feet Below Ground Surface
(25.5 feet Above Groundwater)
DFSP Norwalk, Norwalk, CA

Definitions:

mg/L = milligram per liter

AF_{MAX} = maximum attenuation factor

K_{OC} = organic carbon partition coefficient

mL/g = milliliter per gram

L/kg = liter per kilogram

K_H = Henry's Law constant

AF_D = attenuation factor modified by distance above the water table

AF_T = total attenuation factor

mg/kg = milligram per kilogram

SSL = soil screening level

MCL = Maximum Contaminant Levels (obtained from the California Department of Public Health (CDPH); dated July 27, 2011)

RSL = Regional Screening Level (obtained from the risk-based screening levels based on EPA's RSLs for tap water; dated November 2011)

PHG = California Public Health Goal

NL = Notification Level (obtained from the Health-Based Advisory Levels from the CDPH; updated December 14, 2011)

NA = not applicable

Table 4
Proposed Soil Cleanup Levels for VOCs from 0.5 to 5 feet Below Ground Surface
(21 feet Above Groundwater)
 DFSP Norwalk, Norwalk, CA

Constituent	Water Quality Standard		AF _{MAX} ¹ (unitless)	K _{oc} ² (mL/g or L/kg)	K _H ² (unitless)	AF _D (L/kg)	AF _T ³ (L/kg)	Proposed Cleanup Level (mg/kg)	USEPA SSL (mg/kg)
	(mg/L)	Source							
1,1,2,2-Tetrachloroethane	0.001	MCL	243	-	-	13.23	2.01	2.01E-03	2.60E-05
1,1,2-Trichloroethane	0.005	MCL	63	-	-	3.78	0.57	2.87E-03	1.60E-03
1,2,3-Trichlorobenzene	0.0052	RSL	1520	1383	0.0511038	80.29	12.19	6.34E-02	1.50E-02
1,2,3-Trichloropropane	0.0000007	PHG	128	115.8	0.0140229	7.21	1.09	7.66E-07	2.80E-07
1,2,4-Trimethylbenzene	0.33	NL	677	614.3	0.2518397	36.00	5.47	1.80E+00	2.10E-02
1,2-Dibromo-3-chloropropane	0.0002	MCL	128	115.8	0.0060098	7.21	1.09	2.19E-04	8.60E-05
1,2-Dibromoethane	0.0000065	RSL	45	39.6	0.026574	2.82	0.43	2.78E-06	1.40E-05
1,2-Dichloroethane	0.0005	MCL	17	-	-	1.37	0.21	1.04E-04	1.40E-03
1,3,5-Trimethylbenzene	0.33	NL	664	602.1	0.3585446	35.32	5.36	1.77E+00	1.20E-01
2-Butanone	4.9	RSL	6.5	-	-	0.82	0.12	6.07E-01	1.00E+00
2-Chlorotoluene	0.14	NL	422	382.9	0.1459526	22.64	3.44	4.81E-01	1.70E-01
2-Hexanone	0.034	RSL	17	14.98	0.0038103	1.39	0.21	7.19E-03	7.90E-03
4-Chlorotoluene	0.14	NL	414	375.3	0.1790679	22.20	3.37	4.72E-01	1.80E-01
Acetone	12	RSL	3.2	-	-	0.64	0.10	1.17E+00	2.40E+00
Bromomethane	0.007	RSL	17	13.22	0.3000818	1.35	0.20	1.43E-03	1.80E-03
Carbon disulfide	0.16	NL	27	21.73	0.5887163	1.89	0.29	4.60E-02	2.10E-01
Chlorobenzene	0.07	MCL	177	-	-	9.77	1.48	1.04E-01	4.90E-02
Chloroethane (Ethyl Chloride)	21	RSL	5.7	-	-	0.77	0.12	2.47E+00	5.90E+00
Chloroform	0.00019	RSL	36	-	-	2.37	0.36	6.82E-05	5.30E-05
Dichlorodifluoromethane	1	NL	100	43.89	14.022895	5.72	0.87	8.68E-01	3.00E-01
Diisopropyl Ether (DIPE)	1.5	RSL	26	22.79	0.1046607	1.86	0.28	4.24E-01	3.70E-01
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	0.77	NL	769	697.8	0.4701554	40.86	6.20	4.78E+00	6.40E-01
Methylene Chloride	0.005	MCL	11	-	-	1.05	0.16	7.99E-04	1.30E-03
Methyl-t-Butyl Ether (MTBE)	0.013	MCL	14	11.56	0.0239984	1.20	0.18	2.37E-03	2.80E-03
MTBE (secondary MCL)	0.005	MCL	14	11.56	0.0239984	1.20	0.18	9.10E-04	2.80E-03
Naphthalene	0.017	NL	1697	1544	0.0179886	89.57	13.60	2.31E-01	4.70E-04
n-Butylbenzene	0.26	NL	1631	1482	0.6500409	86.11	13.07	3.40E+00	2.50E+00
n-Propylbenzene	0.26	NL	896	813.1	0.4292723	47.50	7.21	1.87E+00	9.90E-01
p-Isopropyltoluene ⁴	0.39	RSL	769	697.8	0.4701554	40.86	6.20	2.42E+00	6.40E-01
sec-Butylbenzene	0.26	NL	1064	966.05	0.5680193	56.34	8.55	2.22E+00	NA
Styrene	0.1	MCL	491	446.1	0.1124285	26.27	3.99	3.99E-01	1.10E-01
Tert-Butyl Alcohol (TBA)	0.012	NL	3	2.11	0.00037105	0.65	0.10	1.18E-03	NA
tert-Butylbenzene	0.26	NL	850	770.90	0.48689471	45.07	6.84	1.78E+00	NA
Trichloroethene	0.005	MCL	145	-	-	8.09	1.23	6.14E-03	1.80E-03

Notes:

¹ Taken from the RWQCB's 1996 Interim Site Assessment & Cleanup Guidebook.

² For those chemicals for which the RWQCB, values were taken from the November (2011) RSL tables, except for sec-butylbenzene and tert-butylbenzene, which were taken from the 2004 version of the USEPA Johnson and Ettinger spreadsheets (see http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm) and tert-butyl alcohol, which was taken from EPI Suite v4.1 (see <http://www.epa.gov/oppt/exposure/pubs/episuite.htm>).

³ Calculated using the following soil thicknesses

Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	Total
Average Soil Thickness	15.08	5.30	0.62	21.00

⁴ Isopropylbenzene used as a surrogate for p-Isopropyltoluene.

Table 4
Proposed Soil Cleanup Levels for VOCs from 0.5 to 5 feet Below Ground Surface
(21 feet Above Groundwater)
DFSP Norwalk, Norwalk, CA

Definitions:

mg/L = milligram per liter

AF_{MAX} = maximum attenuation factor

K_{OC} = organic carbon partition coefficient

mL/g = milliliter per gram

L/kg = liter per kilogram

K_H = Henry's Law constant

AF_D = attenuation factor modified by distance above the water table

AF_T = total attenuation factor

mg/kg = milligram per kilogram

SSL = soil screening level

MCL = Maximum Contaminant Levels (obtained from the California Department of Public Health (CDPH); dated July 27, 2011)

RSL = Regional Screening Level (obtained from the risk-based screening levels based on EPA's RSLs for tap water; dated November 2011)

PHG = California Public Health Goal

NL = Notification Level (obtained from the Health-Based Advisory Levels from the CDPH; updated December 14, 2011)

NA = not applicable

Table 5
Proposed Soil Cleanup Levels for VOCs from 5 to 10 feet Below Ground Surface
(16 feet Above Groundwater)
 DFSP Norwalk, Norwalk, CA

Constituent	Water Quality Standard		AF _{MAX} ¹ (unitless)	K _{oc} ² (mL/g or L/kg)	K _H ² (unitless)	AF _D (L/kg)	AF _T ³ (L/kg)	Proposed Cleanup Level (mg/kg)	USEPA SSL (mg/kg)
	(mg/L)	Source							
1,1,2,2-Tetrachloroethane	0.001	MCL	243	-	-	10.31	1.51	1.51E-03	2.60E-05
1,1,2-Trichloroethane	0.005	MCL	63	-	-	3.12	0.46	2.28E-03	1.60E-03
1,2,3-Trichlorobenzene	0.0052	RSL	1520	1383	0.0511038	61.37	8.99	4.67E-02	1.50E-02
1,2,3-Trichloropropane	7E-07	PHG	128	115.8	0.0140229	5.73	0.84	5.87E-07	2.80E-07
1,2,4-Trimethylbenzene	0.33	NL	677	614.3	0.2518397	27.65	4.05	1.34E+00	2.10E-02
1,2-Dibromo-3-chloropropane	0.0002	MCL	128	115.8	0.0060098	5.73	0.84	1.68E-04	8.60E-05
1,2-Dibromoethane	6.5E-06	RSL	45	39.6	0.026574	2.38	0.35	2.27E-06	1.40E-05
1,2-Dichloroethane	0.0005	MCL	17	-	-	1.28	0.19	9.37E-05	1.40E-03
1,3,5-Trimethylbenzene	0.33	NL	664	602.1	0.3585446	27.13	3.97	1.31E+00	1.20E-01
2-Butanone	4.9	RSL	6.5	-	-	0.86	0.13	6.17E-01	1.00E+00
2-Chlorotoluene	0.14	NL	422	382.9	0.1459526	17.47	2.56	3.58E-01	1.70E-01
2-Hexanone	0.034	RSL	17	14.98	0.0038103	1.30	0.19	6.46E-03	7.90E-03
4-Chlorotoluene	0.14	NL	414	375.3	0.1790679	17.14	2.51	3.51E-01	1.80E-01
Acetone	12	RSL	3.2	-	-	0.73	0.11	1.28E+00	2.40E+00
Bromomethane	0.007	RSL	17	13.22	0.3000818	1.26	0.19	1.30E-03	1.80E-03
Carbon disulfide	0.16	NL	27	21.73	0.5887163	1.68	0.25	3.93E-02	2.10E-01
Chlorobenzene	0.07	MCL	177	-	-	7.68	1.12	7.87E-02	4.90E-02
Chloroethane (Ethyl Chloride)	21	RSL	5.7	-	-	0.83	0.12	2.55E+00	5.90E+00
Chloroform	0.00019	RSL	36	-	-	2.04	0.30	5.67E-05	5.30E-05
Dichlorodifluoromethane	1	NL	100	43.89	14.022895	4.59	0.67	6.72E-01	3.00E-01
Diisopropyl Ether (DIPE)	1.5	RSL	26	22.79	0.1046607	1.66	0.24	3.64E-01	3.70E-01
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	0.77	NL	769	697.8	0.4701554	31.35	4.59	3.53E+00	6.40E-01
Methylene Chloride	0.005	MCL	11	-	-	1.04	0.15	7.61E-04	1.30E-03
Methyl-t-Butyl Ether (MTBE)	0.013	MCL	14	11.56	0.0239984	1.15	0.17	2.19E-03	2.80E-03
MTBE (secondary MCL)	0.005	MCL	14	11.56	0.0239984	1.15	0.17	8.43E-04	2.80E-03
Naphthalene	0.017	NL	1697	1544	0.0179886	68.44	10.02	1.70E-01	4.70E-04
n-Butylbenzene	0.26	NL	1631	1482	0.6500409	65.81	9.63	2.50E+00	2.50E+00
n-Propylbenzene	0.26	NL	896	813.1	0.4292723	36.40	5.33	1.39E+00	9.90E-01
p-Isopropyltoluene ⁴	0.39	RSL	769	697.8	0.4701554	31.35	4.59	1.79E+00	6.40E-01
sec-Butylbenzene	0.26	NL	1064	966.05	0.5680193	43.14	6.32	1.64E+00	NA
Styrene	0.1	MCL	491	446.1	0.1124285	20.24	2.96	2.96E-01	1.10E-01
Tert-Butyl Alcohol (TBA)	0.012	NL	3	2.11	0.00037105	0.73	0.11	1.29E-03	NA
tert-Butylbenzene	0.26	NL	850	770.90	0.48689471	34.56	5.06	1.32E+00	NA
Trichloroethene	0.005	MCL	145	-	-	6.40	0.94	4.68E-03	1.80E-03

Notes:

¹ Taken from the RWQCB's 1996 Interim Site Assessment & Cleanup Guidebook.

² For those chemicals for which the RWQCB, values were taken from the November (2011) RSL tables, except for sec-butylbenzene and tert-butylbenzene, which were taken from the 2004 version of the USEPA Johnson and Ettinger spreadsheets (see http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm) and tert-butyl alcohol, which was taken from EPI Suite v4.1 (see <http://www.epa.gov/oppt/exposure/pubs/episuite.htm>).

³ Calculated using the following soil thicknesses

Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	Total
Average Soil Thickness	12.81	2.65	0.53	15.99

⁴ Isopropylbenzene used as a surrogate for p-Isopropyltoluene.

Table 5
Proposed Soil Cleanup Levels for VOCs from 5 to 10 feet Below Ground Surface
(16 feet Above Groundwater)
DFSP Norwalk, Norwalk, CA

Definitions:

mg/L = milligram per liter

AF_{MAX} = maximum attenuation factor

K_{OC} = organic carbon partition coefficient

mL/g = milliliter per gram

L/kg = liter per kilogram

K_H = Henry's Law constant

AF_D = attenuation factor modified by distance above the water table

AF_T = total attenuation factor

mg/kg = milligram per kilogram

SSL = soil screening level

MCL = Maximum Contaminant Levels (obtained from the California Department of Public Health (CDPH); dated July 27, 2011)

RSL = Regional Screening Level (obtained from the risk-based screening levels based on EPA's RSLs for tap water; dated November 2011)

PHG = California Public Health Goal

NL = Notification Level (obtained from the Health-Based Advisory Levels from the CDPH; updated December 14, 2011)

NA = not applicable

Table 6
Proposed Soil Cleanup Levels for VOCs from 10 to 15 feet Below Ground Surface
(11 feet Above Groundwater)
 DFSP Norwalk, Norwalk, CA

Constituent	Water Quality Standard		AF _{MAX} ¹ (unitless)	K _{oc} ² (mL/g or L/kg)	K _H ² (unitless)	AF _D (L/kg)	AF _T ³ (L/kg)	Proposed Cleanup Level (mg/kg)	USEPA SSL (mg/kg)
	(mg/L)	Source							
1,1,2,2-Tetrachloroethane	0.001	MCL	243	-	-	7.41	1.19	1.19E-03	2.60E-05
1,1,2-Trichloroethane	0.005	MCL	63	-	-	2.46	0.40	1.98E-03	1.60E-03
1,2,3-Trichlorobenzene	0.0052	RSL	1520	1383	0.0511038	42.53	6.85	3.56E-02	1.50E-02
1,2,3-Trichloropropane	7E-07	PHG	128	115.8	0.0140229	4.25	0.68	4.79E-07	2.80E-07
1,2,4-Trimethylbenzene	0.33	NL	677	614.3	0.2518397	19.33	3.11	1.03E+00	2.10E-02
1,2-Dibromo-3-chloropropane	0.0002	MCL	128	115.8	0.0060098	4.25	0.68	1.37E-04	8.60E-05
1,2-Dibromoethane	6.5E-06	RSL	45	39.6	0.026574	1.95	0.31	2.04E-06	1.40E-05
1,2-Dichloroethane	0.0005	MCL	17	-	-	1.19	0.19	9.60E-05	1.40E-03
1,3,5-Trimethylbenzene	0.33	NL	664	602.1	0.3585446	18.97	3.05	1.01E+00	1.20E-01
2-Butanone	4.9	RSL	6.5	-	-	0.90	0.15	7.13E-01	1.00E+00
2-Chlorotoluene	0.14	NL	422	382.9	0.1459526	12.33	1.99	2.78E-01	1.70E-01
2-Hexanone	0.034	RSL	17	14.98	0.0038103	1.21	0.19	6.60E-03	7.90E-03
4-Chlorotoluene	0.14	NL	414	375.3	0.1790679	12.11	1.95	2.73E-01	1.80E-01
Acetone	12	RSL	3.2	-	-	0.81	0.13	1.57E+00	2.40E+00
Bromomethane	0.007	RSL	17	13.22	0.3000818	1.18	0.19	1.33E-03	1.80E-03
Carbon disulfide	0.16	NL	27	21.73	0.5887163	1.47	0.24	3.78E-02	2.10E-01
Chlorobenzene	0.07	MCL	177	-	-	5.59	0.90	6.30E-02	4.90E-02
Chloroethane (Ethyl Chloride)	21	RSL	5.7	-	-	0.88	0.14	2.98E+00	5.90E+00
Chloroform	0.00019	RSL	36	-	-	1.72	0.28	5.25E-05	5.30E-05
Dichlorodifluoromethane	1	NL	100	43.89	14.022895	3.47	0.56	5.59E-01	3.00E-01
Diisopropyl Ether (DIPE)	1.5	RSL	26	22.79	0.1046607	1.45	0.23	3.50E-01	3.70E-01
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	0.77	NL	769	697.8	0.4701554	21.88	3.52	2.71E+00	6.40E-01
Methylene Chloride	0.005	MCL	11	-	-	1.03	0.17	8.27E-04	1.30E-03
Methyl-t-Butyl Ether (MTBE)	0.013	MCL	14	11.56	0.0239984	1.10	0.18	2.31E-03	2.80E-03
MTBE (secondary MCL)	0.005	MCL	14	11.56	0.0239984	1.10	0.18	8.89E-04	2.80E-03
Naphthalene	0.017	NL	1697	1544	0.0179886	47.39	7.63	1.30E-01	4.70E-04
n-Butylbenzene	0.26	NL	1631	1482	0.6500409	45.58	7.34	1.91E+00	2.50E+00
n-Propylbenzene	0.26	NL	896	813.1	0.4292723	25.36	4.08	1.06E+00	9.90E-01
p-Isopropyltoluene ⁴	0.39	RSL	769	697.8	0.4701554	21.88	3.52	1.37E+00	6.40E-01
sec-Butylbenzene	0.26	NL	1064	966.05	0.5680193	29.99	4.83	1.26E+00	NA
Styrene	0.1	MCL	491	446.1	0.1124285	14.24	2.29	2.29E-01	1.10E-01
Tert-Butyl Alcohol (TBA)	0.012	NL	3	2.11	0.0003711	0.82	0.13	1.58E-03	NA
tert-Butylbenzene	0.26	NL	850	770.90	0.4868947	24.09	3.88	1.01E+00	NA
Trichloroethene	0.005	MCL	145	-	-	4.71	0.76	3.79E-03	1.80E-03

Notes:

¹ Taken from the RWQCB's 1996 Interim Site Assessment & Cleanup Guidebook.

² For those chemicals for which the RWQCB, values were taken from the November (2011) RSL tables, except for sec-butylbenzene and tert-butylbenzene, which were taken from the 2004 version of the USEPA Johnson and Ettinger spreadsheets (see http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm) and tert-butyl alcohol, which was taken from EPI Suite v4.1 (see <http://www.epa.gov/oppt/exposure/pubs/episuite.htm>).

³ Calculated using the following soil thicknesses

Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	Total
Average Soil Thickness	8.53	1.94	0.53	11.00

⁴ Isopropylbenzene used as a surrogate for p-Isopropyltoluene.

Table 6
Proposed Soil Cleanup Levels for VOCs from 10 to 15 feet Below Ground Surface
(11 feet Above Groundwater)
DFSP Norwalk, Norwalk, CA

Definitions:

mg/L = milligram per liter

AF_{MAX} = maximum attenuation factor

K_{OC} = organic carbon partition coefficient

mL/g = milliliter per gram

L/kg = liter per kilogram

K_H = Henry's Law constant

AF_D = attenuation factor modified by distance above the water table

AF_T = total attenuation factor

mg/kg = milligram per kilogram

SSL = soil screening level

MCL = Maximum Contaminant Levels (obtained from the California Department of Public Health (CDPH); dated July 27, 2011)

RSL = Regional Screening Level (obtained from the risk-based screening levels based on EPA's RSLs for tap water; dated November 2011)

PHG = California Public Health Goal

NL = Notification Level (obtained from the Health-Based Advisory Levels from the CDPH; updated December 14, 2011)

NA = not applicable

Table 7
Proposed Soil Cleanup Levels for VOCs from 15 to 20 feet Below Ground Surface
(6 feet Above Groundwater)
 DFSP Norwalk, Norwalk, CA

Constituent	Water Quality Standard		AF _{MAX} ¹ (unitless)	K _{oc} ² (mL/g or L/kg)	K _H ² (unitless)	AF _D (L/kg)	AF _T ³ (L/kg)	Proposed Cleanup Level (mg/kg)	USEPA SSL (mg/kg)
	(mg/L)	Source							
1,1,2,2-Tetrachloroethane	0.001	MCL	243	-	-	4.49	0.59	5.92E-04	2.60E-05
1,1,2-Trichloroethane	0.005	MCL	63	-	-	1.79	0.24	1.18E-03	1.60E-03
1,2,3-Trichlorobenzene	0.0052	RSL	1520	1383	0.051104	23.62	3.11	1.62E-02	1.50E-02
1,2,3-Trichloropropane	0.0000007	PHG	128	115.8	0.014023	2.77	0.37	2.56E-07	2.80E-07
1,2,4-Trimethylbenzene	0.33	NL	677	614.3	0.25184	10.98	1.45	4.78E-01	2.10E-02
1,2-Dibromo-3-chloropropane	0.0002	MCL	128	115.8	0.00601	2.77	0.37	7.31E-05	8.60E-05
1,2-Dibromoethane	0.0000065	RSL	45	39.6	0.026574	1.52	0.20	1.30E-06	1.40E-05
1,2-Dichloroethane	0.0005	MCL	17	-	-	1.10	0.15	7.29E-05	1.40E-03
1,3,5-Trimethylbenzene	0.33	NL	664	602.1	0.358545	10.79	1.42	4.70E-01	1.20E-01
2-Butanone	4.9	RSL	6.5	-	-	0.95	0.12	6.12E-01	1.00E+00
2-Chlorotoluene	0.14	NL	422	382.9	0.145953	7.17	0.95	1.32E-01	1.70E-01
2-Hexanone	0.034	RSL	17	14.98	0.00381	1.11	0.15	4.99E-03	7.90E-03
4-Chlorotoluene	0.14	NL	414	375.3	0.179068	7.05	0.93	1.30E-01	1.80E-01
Acetone	12	RSL	3.2	-	-	0.90	0.12	1.42E+00	2.40E+00
Bromomethane	0.007	RSL	17	13.22	0.300082	1.10	0.14	1.01E-03	1.80E-03
Carbon disulfide	0.16	NL	27	21.73	0.588716	1.25	0.17	2.65E-02	2.10E-01
Chlorobenzene	0.07	MCL	177	-	-	3.50	0.46	3.23E-02	4.90E-02
Chloroethane (Ethyl Chloride)	21	RSL	5.7	-	-	0.94	0.12	2.59E+00	5.90E+00
Chloroform	0.00019	RSL	36	-	-	1.39	0.18	3.48E-05	5.30E-05
Dichlorodifluoromethane	1	NL	100	43.89	14.0229	2.35	0.31	3.09E-01	3.00E-01
Diisopropyl Ether (DIPE)	1.5	RSL	26	22.79	0.104661	1.25	0.16	2.46E-01	3.70E-01
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	0.77	NL	769	697.8	0.470155	12.37	1.63	1.26E+00	6.40E-01
Methylene Chloride	0.005	MCL	11	-	-	1.01	0.13	6.69E-04	1.30E-03
Methyl-t-Butyl Ether (MTBE)	0.013	MCL	14	11.56	0.023998	1.06	0.14	1.81E-03	2.80E-03
MTBE (secondary MCL)	0.005	MCL	14	11.56	0.023998	1.06	0.14	6.97E-04	2.80E-03
Naphthalene	0.017	NL	1697	1544	0.017989	26.26	3.46	5.89E-02	4.70E-04
n-Butylbenzene	0.26	NL	1631	1482	0.650041	25.28	3.33	8.67E-01	2.50E+00
n-Propylbenzene	0.26	NL	896	813.1	0.429272	14.26	1.88	4.89E-01	9.90E-01
p-Isopropyltoluene ⁴	0.39	RSL	769	697.8	0.470155	12.37	1.63	6.36E-01	6.40E-01
sec-Butylbenzene	0.26	NL	1064	966.05	0.568019	16.79	2.21	5.76E-01	NA
Styrene	0.1	MCL	491	446.1	0.112429	8.21	1.08	1.08E-01	1.10E-01
Tert-Butyl Alcohol (TBA)	0.012	NL	3	2.11	0.000371	0.90	0.12	1.42E-03	NA
tert-Butylbenzene	0.26	NL	850	770.90	0.486895	13.57	1.79	4.65E-01	NA
Trichloroethene	0.005	MCL	145	-	-	3.02	0.40	1.99E-03	1.80E-03

Notes:

¹ Taken from the RWQCB's 1996 Interim Site Assessment & Cleanup Guidebook.

² For those chemicals for which the RWQCB, values were taken from the November (2011) RSL tables, except for sec-butylbenzene and tert-butylbenzene, which were taken from the 2004 version of the USEPA Johnson and Ettinger spreadsheets (see http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm) and tert-butyl alcohol, which was taken from EPI Suite v4.1 (see <http://www.epa.gov/oppt/exposure/pubs/episuite.htm>).

³ Calculated using the following soil thicknesses

Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	Total
Average Soil Thickness	4.72	1.19	0.08	5.99

⁴ Isopropylbenzene used as a surrogate for p-Isopropyltoluene.

Table 7
Proposed Soil Cleanup Levels for VOCs from 15 to 20 feet Below Ground Surface
(6 feet Above Groundwater)
DFSP Norwalk, Norwalk, CA

Definitions:

mg/L = milligram per liter

AF_{MAX} = maximum attenuation factor

K_{OC} = organic carbon partition coefficient

mL/g = milliliter per gram

L/kg = liter per kilogram

K_H = Henry's Law constant

AF_D = attenuation factor modified by distance above the water table

AF_T = total attenuation factor

mg/kg = milligram per kilogram

SSL = soil screening level

MCL = Maximum Contaminant Levels (obtained from the California Department of Public Health (CDPH); dated July 27, 2011)

RSL = Regional Screening Level (obtained from the risk-based screening levels based on EPA's RSLs for tap water; dated November 2011)

PHG = California Public Health Goal

NL = Notification Level (obtained from the Health-Based Advisory Levels from the CDPH; updated December 14, 2011)

NA = not applicable

Table 8
Proposed Soil Cleanup Levels for VOCs from 20 to 25 feet Below Ground Surface
(1 foot Above Groundwater)
 DFSP Norwalk, Norwalk, CA

Constituent	Water Quality Standard		AF _{MAX} ¹ (unitless)	K _{oc} ² (mL/g or L/kg)	K _H ² (unitless)	AF _D (L/kg)	AF _T ³ (L/kg)	Proposed Cleanup Level (mg/kg)	USEPA SSL (mg/kg)
	(mg/L)	Source							
1,1,2,2-Tetrachloroethane	0.001	MCL	243	-	-	1.58	0.22	2.15E-04	2.60E-05
1,1,2-Trichloroethane	0.005	MCL	63	-	-	1.13	0.15	7.70E-04	1.60E-03
1,2,3-Trichlorobenzene	0.0052	RSL	1520	1383	0.0511038	4.78	0.65	3.38E-03	1.50E-02
1,2,3-Trichloropropane	7E-07	PHG	128	115.8	0.0140229	1.30	0.18	1.23E-07	2.80E-07
1,2,4-Trimethylbenzene	0.33	NL	677	614.3	0.2518397	2.67	0.36	1.20E-01	2.10E-02
1,2-Dibromo-3-chloropropane	0.0002	MCL	128	115.8	0.0060098	1.30	0.18	3.52E-05	8.60E-05
1,2-Dibromoethane	6.5E-06	RSL	45	39.6	0.026574	1.09	0.15	9.60E-07	1.40E-05
1,2-Dichloroethane	0.0005	MCL	17	-	-	1.02	0.14	6.92E-05	1.40E-03
1,3,5-Trimethylbenzene	0.33	NL	664	602.1	0.3585446	2.63	0.36	1.18E-01	1.20E-01
2-Butanone	4.9	RSL	6.5	-	-	0.99	0.13	6.61E-01	1.00E+00
2-Chlorotoluene	0.14	NL	422	382.9	0.1459526	2.03	0.28	3.87E-02	1.70E-01
2-Hexanone	0.034	RSL	17	14.98	0.0038103	1.02	0.14	4.71E-03	7.90E-03
4-Chlorotoluene	0.14	NL	414	375.3	0.1790679	2.01	0.27	3.83E-02	1.80E-01
Acetone	12	RSL	3.2	-	-	0.98	0.13	1.60E+00	2.40E+00
Bromomethane	0.007	RSL	17	13.22	0.3000818	1.02	0.14	9.68E-04	1.80E-03
Carbon disulfide	0.16	NL	27	21.73	0.5887163	1.04	0.14	2.27E-02	2.10E-01
Chlorobenzene	0.07	MCL	177	-	-	1.42	0.19	1.35E-02	4.90E-02
Chloroethane (Ethyl Chloride)	21	RSL	5.7	-	-	0.99	0.13	2.83E+00	5.90E+00
Chloroform	0.00019	RSL	36	-	-	1.07	0.14	2.75E-05	5.30E-05
Dichlorodifluoromethane	1	NL	100	43.89	14.022895	1.22	0.17	1.67E-01	3.00E-01
Diisopropyl Ether (DIPE)	1.5	RSL	26	22.79	0.1046607	1.04	0.14	2.12E-01	3.70E-01
Ethanol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	0.77	NL	769	697.8	0.4701554	2.90	0.39	3.03E-01	6.40E-01
Methylene Chloride	0.005	MCL	11	-	-	1.00	0.14	6.82E-04	1.30E-03
Methyl-t-Butyl Ether (MTBE)	0.013	MCL	14	11.56	0.0239984	1.01	0.14	1.78E-03	2.80E-03
MTBE (secondary MCL)	0.005	MCL	14	11.56	0.0239984	1.01	0.14	6.86E-04	2.80E-03
Naphthalene	0.017	NL	1697	1544	0.0179886	5.22	0.71	1.21E-02	4.70E-04
n-Butylbenzene	0.26	NL	1631	1482	0.6500409	5.05	0.69	1.79E-01	2.50E+00
n-Propylbenzene	0.26	NL	896	813.1	0.4292723	3.21	0.44	1.14E-01	9.90E-01
p-Isopropyltoluene ⁴	0.39	RSL	769	697.8	0.4701554	2.90	0.39	1.54E-01	6.40E-01
sec-Butylbenzene	0.26	NL	1064	966.05	0.5680193	3.64	0.49	1.29E-01	NA
Styrene	0.1	MCL	491	446.1	0.1124285	2.20	0.30	3.00E-02	1.10E-01
Tert-Butyl Alcohol (TBA)	0.012	NL	3	2.11	0.0003711	0.98	0.13	1.60E-03	NA
tert-Butylbenzene	0.26	NL	850	770.90	0.4868947	3.10	0.42	1.10E-01	NA
Trichloroethene	0.005	MCL	145	-	-	1.34	0.18	9.10E-04	1.80E-03

Notes:

¹ Taken from the RWQCB's 1996 Interim Site Assessment & Cleanup Guidebook.

² For those chemicals for which the RWQCB, values were taken from the November (2011) RSL tables, except for sec-butylbenzene and tert-butylbenzene, which were taken from the 2004 version of the USEPA Johnson and Ettinger spreadsheets (see http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm) and tert-butyl alcohol, which was taken from EPI Suite v4.1 (see <http://www.epa.gov/oppt/exposure/pubs/episuite.htm>).

³ Calculated using the following soil thicknesses

Soil Types (0.5 - 26 feet bgs)	Sand	Silt	Clay	Total
Average Soil Thickness	0.80	0.18	0.02	1.00

⁴ Isopropylbenzene used as a surrogate for p-Isopropyltoluene.

Table 8
Proposed Soil Cleanup Levels for VOCs from 20 to 25 feet Below Ground Surface
(1 foot Above Groundwater)
DFSP Norwalk, Norwalk, CA

Definitions:

mg/L = milligram per liter

AF_{MAX} = maximum attenuation factor

K_{OC} = organic carbon partition coefficient

mL/g = milliliter per gram

L/kg = liter per kilogram

K_H = Henry's Law constant

AF_D = attenuation factor modified by distance above the water table

AF_T = total attenuation factor

mg/kg = milligram per kilogram

SSL = soil screening level

MCL = Maximum Contaminant Levels (obtained from the California Department of Public Health (CDPH); dated July 27, 2011)

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PHG = California Public Health Goal

NL = Notification Level (obtained from the Health-Based Advisory Levels from the CDPH; updated December 14, 2011)

NA = not applicable