Table 4-1
Groundwater Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Volatile Organic Compounds (All in µg/L)	CAS Number	Puerto Rico Water Quality Standard[1]		National Primary Drinking Water Regulations[2]		Cabo Rojo Site Screening Value[3]
1,1,1-Trichloroethane	71-55-6	200		200		200
1,1,2,2-Tetrachloroethane	79-34-5	1.7		NL		1.7
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NL		NL		n/a
1,1,2-Trichloroethane	79-00-5	5		5		5
1,1-Dichloroethane	75-34-3	NL		NL		n/a
1,1-Dichloroethylene	75-35-4	7		7		7
1,2,3-Trichlorobenzene	87-61-6	NL		NL		n/a
1,2,4-Trichlorobenzene	120-82-1	35		70		35
1,2-Dibromo-3-chloropropane	96-12-8	NL		0.2		0.2
1,2-Dibromoethane	106-93-4	NL		0.05		0.05
1,2-Dichlorobenzene	95-50-1	420		600		420
1,2-Dichloroethane	107-06-2	3.8		5		3.8
1,2-Dichloropropane	78-87-5	5		5		5
1,3-Dichlorobenzene	541-73-1	320		NL		320
1,4-Dichlorobenzene	106-46-7	63		75		63
1,4-Dioxane	123-91-1	NL		NL		n/a
2-Butanone	78-93-3	NL		NL		n/a
2-Hexanone	591-78-6	NL		NL		n/a
4-Methyl-2-pentanone	108-10-1	NL		NL		n/a
Acetone	67-64-1	NL		NL		n/a
Benzene	71-43-2	5		5		5
Bromochloromethane	74-97-5	NL		NL		n/a
Bromodichloromethane	75-27-4	5.5		80	c	5.5
Bromoform	75-25-2	43		80	c	43
Bromomethane	74-83-9	47		NL		47
Carbon Disulfide	75-15-0	NL		NL		n/a
Carbon Tetrachloride	56-23-5	2.3		5		2.3
Chlorobenzene	108-90-7	100		100		100
Chloroethane	75-00-3	NL		NL		n/a
Chloroform	67-66-3	57		80	c	57
Chloromethane	74-87-3	NL		NL		n/a
cis-1,2-Dichloroethene	156-59-2	NL		70		70
cis-1,3-Dichloropropene	10061-01-5	3.4	a	NL		3.4
Cyclohexane	110-82-7	NL		NL		n/a
Dibromochloromethane	124-48-1	4		80	c	4
Dichlorodifluoromethane	75-71-8	NL		NL		n/a
Ethylbenzene	100-41-4	530		700		530
Isopropylbenzene	98-82-8	NL		NL		n/a
m,p-Xylene	179601-23-1	NL		10,000	b	10,000
Methyl Acetate	79-20-9	NL		NL		n/a
Methyl Tert-Butyl Ether	1634-04-4	NL		NL		n/a
Methylcyclohexane	108-87-2	NL		NL		n/a
Methylene Chloride	75-09-2	46		5		46
o-Xylene	95-47-6	NL		10,000	b	10,000
Styrene	100-42-5	NL		100		100
Tetrachloroethene	127-18-4	5		5		5
Toluene	108-88-3	1,000		1,000		1000
trans-1,2-Dichloroethene	156-60-5	100		100		100
trans-1,3-Dichloropropene	10061-02-6	3.4	a	NL		3.4
Trichloroethene	79-01-6	5		5		5
Trichlorofluoromethane	75-69-4	NL		NL		n/a
Vinyl Chloride	75-01-4	0.25		2		0.25

Table 4-2
Soil Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Volatile Organic Compounds (All in µg/kg)	CAS Number	Soil Protective of Groundwater (1)			Cabo Rojo Site Screening Value
1,1,1-Trichloroethane	71-55-6	1,400		m	1,400
1,1,2,2-Tetrachloroethane	79-34-5	0.52		r	0.52
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2,600,000		r	2,600,000
1,1,2-Trichloroethane	79-00-5	32		m	32
1,1-Dichloroethane	75-34-3	13.6		r	13.6
1,1-Dichloroethylene	75-35-4	50		m	50
1,2,3-Trichlorobenzene	87-61-6	300		r	300
1,2,4-Trichlorobenzene	120-82-1	4,000		m	4,000
1,2-Dibromo-3-chloropropane	96-12-8	1.7		m	1.72
1,2-Dibromoethane	106-93-4	0.28		m	0.28
1,2-Dichlorobenzene	95-50-1	11,600		m	11,600
1,2-Dichloroethane	107-06-2	28		m	28
1,2-Dichloropropane	78-87-5	34		m	34
1,3-Dichlorobenzene	541-73-1	NL		r	NL
1,4-Dichlorobenzene	106-46-7	1,440		m	1,440
1,4-Dioxane	123-91-1	2.8		r	2.8
2-Butanone	78-93-3	20,000		r	20,000
2-Hexanone	591-78-6	158		r	158
4-Methyl-2-pentanone	108-10-1	4,600		r	4,600
Acetone (2-propanone)	67-64-1	48,000		r	48,000
Benzene	71-43-2	52		m	52
Bromochloromethane	74-97-5	420		r	420
Bromodichloromethane	75-27-4	440		m	440
Bromoform (tribromomethane)	75-25-2	420		m	420
Bromomethane	74-83-9	36		r	36
Carbon disulfide	75-15-0	4,200		r	4,200
Carbon tetrachloride	56-23-5	38		m	38
Chlorobenzene	108-90-7	1,360		m	1,360
Chlorodibromomethane	124-48-1	420		m	420
Chloroethane	75-00-3	118,000		r	118,000
Chloroform	67-66-3	440		m	440
Chloromethane	74-87-3	980		r	980
cis-1,2-Dichloroethylene	156-59-2	420		m	420
cis-1,3-Dichloropropene	10061-01-5	3	a	r	3
Cyclohexane	110-82-7	260,000		r	260,000
Dichlorodifluoromethane	75-71-8	6,000		r	6,000
Ethylbenzene	100-41-4	15,600		m	15,600
Isopropylbenzene	98-82-8	12,800		r	12,800
Methyl acetate	79-20-9	64,000		r	64,000
Methyl tert-butyl ether	1634-04-4	56		r	56
Methylcyclohexane	108-87-2	NL		r	NL
Methylene chloride	75-09-2	26		m	26
m,p-Xylene	179601-23-1	3,600	b	r	3,600
o-Xylene	95-47-6	3,800		r	3,800
Styrene	100-42-5	2,200		m	2,200
Tetrachloroethylene	127-18-4	46		m	46
Toluene	108-88-3	13,800		m	13,800
trans-1,2-Dichloroethylene	156-60-5	580		m	580
trans-1,3-Dichloropropene	10061-02-6	3	a	r	3
Trichloroethylene	79-01-6	36		m	36
Trichlorofluoromethane	75-69-4	13,800		r	13,800
Vinyl chloride (chloroethene)	75-01-4	13.8		m	13.8

Table 4-1
Groundwater Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Notes:

(1) Commonwealth of Puerto Rico, Office of the Governor, Environmental Quality Board, March 2010, Puerto Rico Water Quality Standards Regulation. Screening values are based on water quality standards for Class SG groundwater.

(2) National Primary Drinking Water Regulations (EPA 2009)

(3) Cabo Rojo site screening value is based on the Puerto Rico Water Quality Standards for groundwater, when available. Otherwise, it is based on the Maximum Contaminant Level from National Primary Drinking Water Regulations.

(a) screening value for 1,3-dichloropropene

(b) screening valude for m-xylene

(c) screening value for total trihalomethanes

Acronyms:

µg/L = microgram per liter

EPA = United States Environmental Protection Agency

n/a = value not available

NL = not listed or chemical name listed but no value available

CAS = Chemical Abstract Service

Table 4-2
Soil Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Notes:

(1) Regional Screening Levels for Contaminants at Superfund Sites (EPA November 2013) for protection of groundwater soil screening levels (HI=1), based on a dilution factor of 20. The Maximum Contaminant Level (MCL)-based value is used unless one is not available, in which case the risk-based value is used.

(a) screening value for 1,3-dichloropropene

(b) screening value for m-xylene

Acronyms:

µg/kg = microgram per kilogram

n/a = value not available

EPA = United States Environmental Protection Agency

NL = not listed or chemical name listed but no value available

CAS = Chemical Abstract Service

m = MCL-based value

r = Risk-based value

Table 4-3
Surface Water Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Volatile Organic Compounds (All in µg/L)	CAS No.	Puerto Rico Water Quality Standard (1)		National Recommended Water Quality Criteria (2)		Cabo Rojo Site Screening Value (3)
				Freshwater Aquatic Life Use Chronic Criteria	Human Health for the Consumption of Water + Organism	
1,1,1-Trichloroethane	71-55-6	200		NL	NL	200
1,1,2,2-Tetrachloroethane	79-34-5	1.7		NL	0.17	1.7
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NL		NL	NL	n/a
1,1,2-Trichloroethane	79-00-5	5.0		NL	0.59	5.0
1,1-Dichloroethane	75-34-3	NL		NL	NL	n/a
1,1-Dichloroethylene	75-35-4	7.0		NL	330	7.0
1,2,3-Trichlorobenzene	87-61-6	NL		NL	NL	n/a
1,2,4-Trichlorobenzene	120-82-1	35		NL	35	35
1,2-Dibromo-3-chloropropane	96-12-8	NL		NL	NL	n/a
1,2-Dibromoethane	106-93-4	NL		NL	NL	n/a
1,2-Dichlorobenzene	95-50-1	420		NL	420	420
1,2-Dichloroethane	107-06-2	3.8		NL	0.38	3.8
1,2-Dichloropropane	78-87-5	5.0		NL	0.5	5.0
1,3-Dichlorobenzene	541-73-1	320		NL	320	320
1,4-Dichlorobenzene	106-46-7	63		NL	63	63
2-Butanone	78-93-3	NL		NL	NL	n/a
2-Hexanone	591-78-6	NL		NL	NL	n/a
4-Methyl-2-pentanone	108-10-1	NL		NL	NL	n/a
Acetone	67-64-1	NL		NL	NL	n/a
Benzene	71-43-2	5.0		NL	2.2	5.0
Bromochloromethane	74-97-5	NL		NL	NL	n/a
Bromodichloromethane	75-27-4	5.5		NL	0.55	5.5
Bromoform	75-25-2	43		NL	NL	43
Bromomethane	74-83-9	47		NL	47	47
Carbon Disulfide	75-15-0	NL		NL	NL	n/a
Carbon Tetrachloride	56-23-5	2.3		NL	0.23	2.3
Chlorobenzene	108-90-7	100		NL	130	100
Chloroethane	75-00-3	NL		NL	NL	n/a
Chloroform	67-66-3	57		NL	5.7	57
Chloromethane	74-87-3	NL		NL	NL	n/a
cis-1,2-Dichloroethene	540-59-0	NL		NL	NL	n/a
cis-1,3-Dichloropropene	26952-23-8	3.4	a	NL	NL	3.4
Cyclohexane	110-82-7	NL		NL	NL	n/a
Dibromochloromethane	124-48-1	4.0		NL	0.4	4.0
Dichlorodifluoromethane	75-71-8	NL		NL	NL	n/a
Ethylbenzene	100-41-4	530		NL	530	530
Isopropylbenzene	98-82-8	NL		NL	NL	n/a
Methyl Acetate	79-20-9	NL		NL	NL	n/a
Methyl Tert-Butyl Ether	1634-04-4	NL		NL	NL	n/a
Methylcyclohexane	108-87-2	NL		NL	NL	n/a
Methylene Chloride	75-09-2	46		NL	4.6	46
m,p-Xylene	179601-23-1	NL		NL	NL	n/a
o-Xylene	1330-20-7	NL		NL	NL	n/a
Styrene	100-42-5	NL		NL	NL	n/a
Tetrachloroethene	127-18-4	5.0		NL	0.69	5.0
Toluene	108-88-3	1,000		NL	1300	1,000
trans-1,2-Dichloroethene	156-60-5	100		NL	140	100
trans-1,3-Dichloropropene	10061-02-6	3.4	a	NL	NL	3.4
Trichloroethene	79-01-6	5.0		NL	2.5	5.0
Trichlorofluoromethane	75-69-4	NL		NL	NL	n/a
Vinyl Chloride	75-01-4	0.25		NL	0.025	0.25

Notes:

(1) Commonwealth of Puerto Rico, Office of the Governor, Environmental Quality Board, 2010, Puerto Rico Water Quality Standards Regulation. Screening values are based on water quality standards for Class SD surface water.

(2) National Recommended Water Quality Criteria for Priority Pollutants (EPA 2009)

(3) Cabo Rojo site screening value is based on the Puerto Rico Water Quality Standards when available. Otherwise, it is based on the National recommended Water Quality Criteria.

(a) screening value for 1,3-dichloropropene

Acronyms:

µg/L = microgram per liter

EPA = United States Environmental Protection Agency

n/a = value not available

CAS = Chemical Abstract Service

NL = not listed or chemical name listed but no value available

Table 4-4
Sediment Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Volatile Organic Compounds (All in µg/kg)	CAS No.	Human Health Screening Level (1)		Ecological Screening Level (2)		Cabo Rojo Site Screening Value (3)
1,1,1-Trichloroethane	71-55-6	8,700,000		30		30
1,1,2,2-Tetrachloroethane	79-34-5	560		1,360		560
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	43,000,000		NL		43,000,000
1,1,2-Trichloroethane	79-00-5	1,100		1,240		1,100
1,1-Dichloroethane	75-34-3	3,300		NL		3,300
1,1-Dichloroethylene	75-35-4	240,000		31		31
1,2,3-Trichlorobenzene	87-61-6	49,000		858		858
1,2,4-Trichlorobenzene	120-82-1	22,000		2,100		2,100
1,2-Dibromo-3-chloropropane	96-12-8	5.4		NL		5.4
1,2-Dibromoethane	106-93-4	34		NL		34
1,2-Dichlorobenzene	95-50-1	1,900,000		16.5		16.5
1,2-Dichloroethane	107-06-2	430		NL		430
1,2-Dichloropropane	78-87-5	940		NL		940
1,3-Dichlorobenzene	541-73-1	NL		4,430		4,430
1,4-Dichlorobenzene	106-46-7	2,400		599		599
2-Butanone	78-93-3	28,000,000		NL		28,000,000
2-Hexanone	591-78-6	210,000		NL		210,000
4-Methyl-2-pentanone	108-10-1	5,300,000		NL		5,300,000
Acetone	67-64-1	61,000,000		NL		61,000,000
Benzene	71-43-2	1,100		NL		1,100
Bromochloromethane	74-97-5	160,000		NL		160,000
Bromodichloromethane	75-27-4	270		NL		270
Bromoform	75-25-2	62,000		654		654
Bromomethane	74-83-9	7,300		NL		7,300
Carbon Disulfide	75-15-0	820,000		0.85		0.85
Carbon Tetrachloride	56-23-5	610		64.20		64.2
Chlorobenzene	108-90-7	290,000		8.42		8.42
Chloroethane	75-00-3	15,000,000		NL		15,000,000
Chloroform	67-66-3	290		NL		290
Chloromethane	74-87-3	120,000		NL		120,000
cis-1,2-Dichloroethene	156-59-2	160,000		NL		160,000
cis-1,3-Dichloropropene	10061-01-5	1,700	a	NL		1,700
Cyclohexane	110-82-7	7,000,000		NL		7,000,000
Dibromochloromethane	124-48-1	680		NL		680
Dichlorodifluoromethane	75-71-8	94,000		NL		94,000
Ethylbenzene	100-41-4	5,400		1,100		1,100
Isopropylbenzene	98-82-8	2,100,000		86		86
Methyl Acetate	79-20-9	78,000,000		NL		78,000,000
Methyl Tert-Butyl Ether	1634-04-4	43,000		NL		43,000
Methylcyclohexane	108-87-2	NL		NL		n/a
Methylene Chloride	75-09-2	56,000		NL		56,000
m,p-Xylene	179601-23-1	590,000	b	25		25
o-Xylene	95-47-6	690,000		25		25
Styrene	100-42-5	6,300,000		559		559
Tetrachloroethene	127-18-4	22,000		468		468
Toluene	108-88-3	5,000,000		NL		5,000,000
trans-1,2-Dichloroethene	156-60-5	150,000		1,050		1,050
trans-1,3-Dichloropropene	10061-02-6	1,700	a	NL		1,700
Trichloroethene	79-01-6	910		97		97
Trichlorofluoromethane	75-69-4	790,000		NL		790,000
Vinyl Chloride	75-01-4	60		NL		60

Table 4-4
Sediment Screening Criteria - Volatile Organic Compounds
Cabo Rojo Groundwater Contamination Site
Cabo Rojo, Puerto Rico

Notes:

(1) Regional Screening Levels for Contaminants at Superfund Sites (EPA November 2013) for residential soil, based on a cancer risk of $1x10^{-6}$ and/or a hazard quotient of 1.

(2) Ecological screening values were applied in a hierarchical fashion from the following sources:

1 - Persaud, D., Jaagumagi, R., and Hayton, A. 1993. Guidelines for the protection and management of aquatic sediment quality in Ontario. ISBN 0-7729-9248-7. Ontario Ministry of the Environment, Ottawa, Ontario. 23 p.

2 - United States Environmental Protection Agency, Region 3 Biological Technical Assistance Group. 2006. Freshwater Sediment Screening Benchmarks. August.

(3) Cabo Rojo site screening value is based on the lower value of human health and ecological screening levels.

(a) screening value for 1,3-dichloropropene

(b) screening value for m-xylene

Acronyms:

µg/kg = microgram per kilogram

EPA = United States Environmental Protection Agency

n/a = value not available

NL = not listed or chemical name listed but no value available