OFFICE OF THE UNDER SECRETARY OF DEFENSE
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ACQUISITION,
TECHNOLOGY
AND LOGISTICS

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY OF THE ARMY
(ENVIRONMENT, SAFETY, AND OCCUPATIONAL HEALTH)
DEPUTY ASSISTANT SECRETARY OF THE NAVY
(ENVIRONMENT)
DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE
(ENVIRONMENT, SAFETY, AND OCCUPATIONAL HEALTH)
STAFF DIRECTOR, DEFENSE LOGISTICS AGENCY (DS-E)

SUBJECT: Updated Human Health and Ecological Comparison Values

DoD uses Human Health and Ecological Comparison Values when applying the Munitions Response Site Prioritization Protocol (MRSPP) to evaluate known or suspected hazards to human and ecological receptors at or near eligible Munitions Response Sites (MRS). The Office of the Secretary of Defense (OSD) updated the Comparison Values based on the latest toxicity and ecological screening value sources. Attached are the draft revised narratives and Comparison Values that will replace those contained in the Assistant Deputy Under Secretary of Defense (Environment, Safety, and Occupational Health) Memorandum, *Updated Human Health and Ecological Comparison Values,* July 17, 2007:

- Appendix B-1 – Human Health Comparison Values
- Appendix B-2 – Ambient Water Quality Comparison Values
- Appendix B-3 – Freshwater and Marine Sediment Comparison Values.

Also attached to this memorandum are the DoD Screening Values Calculations spreadsheet that includes the calculations for Appendix B-1 and the list of chemical name and Chemical Abstract System (CAS) number changes.

The DoD Components should not consider these Comparison Values final cleanup goals or action levels. These values do not replace the need to perform a more comprehensive baseline risk assessment, when appropriate. The DoD Components shall use these updated values to determine the relative risks potentially present at new Installation Restoration Program (IRP) sites, new MRSs, or when reapplying the MRSPP to an existing MRS. However, the DoD Components should not consider these updated values new information that triggers reapplying the MRSPP during annual review or reevaluating existing IRP sites.

OSD developed this document with the input and dedicated support of the DoD Components. Your participation continues to advance DoD toward meeting its cleanup goals. Systematically and consistently prioritizing sites requiring cleanup is an important step toward achieving DoD's goals.

These updated screening values are effective immediately. The Cleanup Committee will review the screening values at least annually, or as appropriate, and post them to the DoD Environment, Safety, and Occupational Health Network and Information Exchange (DENIX).

My point of contact on this matter is Deborah Morefield, available at 703-571-9067 or deborah.a.morefield.civ@mail.mil.

Maureen Sullivan
Director
Environment, Safety, and Occupational Health

Attachments:
As stated

APPENDIX B-1: Human Health Comparison Values

The human health Comparison Values (CVs) presented in this appendix evaluate known or suspected hazards to human receptors at or near munitions response sites in accordance with the *Munitions Response Site Prioritization Protocol* (32 CFR Part 179, October 5, 2005). Appendices B-2 and B-3 contain CVs to evaluate ecological receptors using ambient water or sediment sampling data, respectively. Table B-1 applies to Table 21, 22, 23, and 26 in the HHE Module and presents chemical-specific CV concentrations for individual contaminants in soil and tap water that may warrant further investigation or site cleanup. The human health CVs presented in this appendix replace those contained in the Assistant Deputy Under Secretary of Defense (Environment, Safety, and Occupational Health) Memorandum, *Updated Human Health and Ecological Comparison Values,* July 17, 2007.

The DoD Components should not consider these Comparison Values final cleanup goals or action levels. These values do not replace the need to perform a more comprehensive baseline risk assessment, when appropriate. The DoD Components shall use these updated values to determine the relative risks potentially present at new Installation Restoration Program (IRP) sites, new Munitions Response Sites (MRSs), or when reapplying the Munitions Response Site Prioritization Protocol (MRSPP) to an existing MRS. However, the DoD Components should not consider these updated values new information that triggers reapplying the MRSPP during annual review or reevaluating existing IRP sites.

We used the methodology developed by the U.S. Environmental Protection Agency (EPA) for calculating EPA's *Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites* to develop the CVs listed in Figure B-1. The methodology is outlined in EPA's *User's Guide,* available on EPA's RSLs website (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm). We combined current chemical specific toxicity data with standard exposure factors to calculate the human health CVs. We used accepted mathematical models to estimate contaminant concentrations in media (e.g., soil, water) that are considered to be protective of human exposures (including sensitive receptor subpopulations) over a lifetime. A note in the table identifies deviations from this approach for specific CVs.

We selected the chemical specific toxicity values used to develop the CVs presented in this appendix using EPA's hierarchy of toxicological sources for CERCLA sites outlined in OSWER Directive 9285.7-53, *Human Health Toxicity Values in Superfund Risk Assessments*. We used the following hierarchy of toxicological sources to derive these CVs:

1) EPA's Integrated Risk Information System (IRIS).
2) The Provisional Peer Reviewed Toxicity Values (PPRTVs) derived by EPA's Superfund Health Risk Technical Support Center (STSC) for the EPA Superfund program.
3) The Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (MRLs).
4) The California Environmental Protection Agency Office of Environmental Health Hazard Assessment's (OEHHA) Chronic Reference Exposure Levels (RELS) from December 18, 2008 and the Cancer Potency Values from July 21, 2009.
5) Screening toxicity values in appendices to certain PPRTV assessments.
6) The EPA Superfund program's Health Effects Assessment Summary.

We used the standard conservative exposure factors EPA developed for a default residential exposure scenario to calculate CVs for each medium. As relevant, we included three routes of exposure in each calculation – ingestion, dermal contact, and inhalation. The exposure factors used for the calculations for the CVs are listed in Table 1 of EPA's RSLs *Users' Guide*.

CVs are based on either a carcinogenic (ca) or noncarcinogenic (nc) exposure endpoints, depending on which computed value is more conservative. Noncarcinogenic values are calculated by combining default exposure parameters, a target hazard index of 1.0, and noncarcinogenic reference doses (RfDs). Values based on carcinogenic exposure endpoints are calculated by combining default exposure parameters, a target risk level, and cancer slope factors (SFs). The preamble to the CERCLA regulation, the NCP Final Rule states that risk assessment decisions are made depending on other prarticular circumstances at the site. The Preamble to the National Oil and Hazardous Substances Pollution Contingency Plan (55 *FR* 8716, March 8, 1990) defines the remedial action threshold for carcinogens as 10^{-4}. For the purposes of computing the relative risk CVs, DoD uses 10^{-4} as the appropriate target risk level.

By using a target cancer risk level of 10^{-4} when calculating CVs, for certain contaminants, the resulting noncarcinogenic CV may be less (i.e., more conservative) than the carcinogenic CV. As a result, the noncarcinogenic screening level is the risk driver and presented in Table B-1. However, if 10^{-6} was the target cancer risk level, the carcinogenic CVs could be less (i.e., more conservative) than the reported noncarcinogenic CVs in this appendix. Users of the CVs should consider this when CVs are compared with other risk-based screening levels.

We incorporated CVs representing military-unique materials (e.g., explosives, propellants, chemical agent materials, by-products) into the overall, alphabetical listing of materials. This includes munitions constituents identified in U.S. Army Corps of Engineers Environmental and Munitions Center of Expertise, *Technical Guidance for Military Munitions Response Actions, Interim Guidance Document* (20 December 2013). Some of the military-unique materials chemical-specific data, such as the Henry's Law constant, diffusivity in water, or soil-water partitioning coefficient were not available, which are required by the updated equations used to calculate the CVs. Therefore, in cases where sufficient chemical-specific data were not available to allow us to calculate the CVs using the updated equations, we provided the CVs from the 2013 tables to ensure a value remains available rather than providing no value.

We provided the screening criteria for radionuclides at the end of this appendix. The criteria were derived from the U.S. Department of Energy, Oak Ridge National Laboratories' *RAIS PRGs*. All radiological levels presented are based on carcinogenic exposure endpoints and have been adjusted to reflect a 1×10^{-4} excess lifetime cancer risk, as described above.

Analytes are listed in this appendix by their most common names. Therefore, there is no more than one record for each Chemical Abstract System (CAS) number included in this appendix.

Figure B.1.1 Human Health Comparison Values for General Organic and Inorganic Analytes

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Acenaphthene	83-32-9	3.4E+03	nc	4.0E+02	nc	
Acephate	30560-19-1	2.4E+02	nc	6.3E+01	nc	
Acetaldehyde	75-07-0	8.8E+01	nc	1.9E+01	nc	
Acetochlor	34256-82-1	1.2E+03	nc	2.7E+02	nc	
Acetone	67-64-1	6.1E+04	nc	1.2E+04	nc	
Acetone cyanohydrin	75-86-5	5.3E+01	nc	4.2E+00	nc	
Acetonitrile	75-05-8	8.7E+02	nc	1.3E+02	nc	
Acetophenone	98-86-2	7.8E+03	nc	1.5E+03	nc	
Acifluorfen	50594-66-6	8.5E+02	nc	4.7E+02	nc	g
Acrolein	107-02-8	1.5E-01	nc	4.1E-02	nc	
Acrylamide	79-06-1	2.3E+01	c	4.3E+00	ca	
Acrylic acid	79-10-7	3.0E+04	nc	7.8E+03	nc	
Acrylonitrile	107-13-1	1.7E+01	nc	4.1E+00	nc	
Adamsite	578-94-9	3.6E+03	ca	NA	NA	h
Alachlor	15972-60-8	6.1E+02	nc	9.1E+01	ca	
Alar	1596-84-5	2.7E+03	ca	3.7E+02	ca	
Aldicarb	116-06-3	6.1E+01	nc	1.5E+01	nc	
Aldicarb sulfone	1646-88-4	6.1E+01	nc	1.6E+01	nc	
Aldrin	309-00-2	1.8E+00	nc	4.0E-01	c	
Ally	74223-64-6	1.5E+04	nc	3.8E+03	nc	
Allyl alcohol	107-18-6	3.0E+02	nc	7.8E+01	nc	
Allyl chloride	107-05-1	1.8E+00	nc	2.1E+00	nc	
Aluminum	7429-90-5	7.7E+04	nc	1.6E+04	nc	
Aluminum phosphide	20859-73-8	3.1E+01	nc	6.2E+00	nc	
Amdro	67485-29-4	1.8E+01	nc	4.6E+00	nc	
Ametryn	834-12-8	5.5E+02	nc	1.2E+02	nc	
m-Aminophenol	591-27-5	4.9E+03	nc	1.2E+03	nc	
4-Aminopyridine	504-24-5	1.2E+00	nc	7.3E-01	nc	g
Amitraz	33089-61-1	1.5E+02	nc	5.9E+00	nc	
Ammonia	7664-41-7	NA	NA	2.1E+02	nc	i
Ammonium perchlorate	7790-98-9	5.5E+01	nc	1.1E+01	nc	b, c
Ammonium sulfamate	7773-06-0	1.6E+04	nc	3.1E+03	nc	
Aniline	62-53-3	4.3E+02	nc	1.1E+02	nc	
Anthracene	120-12-7	1.7E+04	nc	1.3E+03	nc	
Antimony and compounds	7440-36-0	3.1E+01	nc	6.0E+00	nc	
Antimony pentoxide	1314-60-9	3.9E+01	nc	7.5E+00	nc	
Antimony Potassium Tartrate	11071-15-1	7.0E+01	nc	1.3E+01	nc	
Antimony tetroxide	1332-81-6	3.1E+01	nc	6.0E+00	nc	
Antimony trioxide	1309-64-4	2.8E+05	nc	1.5E+01	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Apollo	74115-24-5	7.9E+02	nc	1.8E+02	nc	
Aramite	140-57-8	1.9E+03	ca	1.1E+02	ca	
Aroclor-1016	12674-11-2	3.9E+00	nc	1.1E+00	nc	
Aroclor-1254	11097-69-1	1.1E+00	nc	3.1E-01	nc	
Aroclor-1221	11104-28-2	1.4E+01	ca	4.1E-01	ca	
Aroclor-1232	11141-16-5	1.4E+01	ca	4.1E-01	ca	
Aroclor-1242	53469-21-9	2.2E+01	ca	3.4E+00	ca	
Aroclor-1248	12672-29-6	2.2E+01	ca	3.4E+00	ca	
Aroclor-1260	11096-82-5	2.2E+01	ca	3.4E+00	ca	
Arsenic	7440-38-2	3.4E+01	nc	4.5E+00	ca	
Arsine	7784-42-1	2.7E-01	nc	5.4E-02	nc	
Assure	76578-14-8	5.5E+02	nc	9.3E+01	nc	
Asulam	3337-71-1	3.1E+03	nc	7.8E+02	nc	
Atrazine	1912-24-9	2.1E+02	ca	2.6E+01	ca	
Avermectin B1	65195-55-3	2.4E+01	nc	6.3E+00	nc	
Azobenzene	103-33-3	5.1E+02	ca	1.0E+01	ca	
Barium	7440-39-3	1.5E+04	nc	2.9E+03	nc	
Barium cyanide	542-62-1	7.8E+03	nc	3.7E+03	nc	g
Baygon	114-26-1	2.4E+02	nc	6.1E+01	nc	
Bayleton	43121-43-3	1.8E+03	nc	4.3E+02	nc	
Baythroid	68359-37-5	1.5E+03	nc	8.7E+01	nc	
Benefin	1861-40-1	1.8E+04	nc	1.2E+03	nc	
Benomyl	17804-35-2	3.1E+03	nc	7.5E+02	nc	
Bentazon	25057-89-0	1.8E+03	nc	4.4E+02	nc	
Benz[a]anthracene	56-55-3	1.5E+01	ca	2.9E+00	ca	
Benzaldehyde	100-52-7	7.8E+03	nc	1.5E+03	nc	
Benzene	71-43-2	8.6E+01	nc	3.0E+01	nc	
Benzenethiol	108-98-5	7.8E+01	nc	1.3E+01	nc	
Benzidine	92-87-5	5.0E-02	ca	9.2E-03	ca	
Benzo[a]pyrene	50-32-8	1.5E+00	ca	2.9E-01	ca	
Benzo[b]fluoranthene	205-99-2	1.5E+01	ca	2.9E+00	ca	
Benzo(j)Fluoranthene	205-82-3	3.8E+01	ca	5.6E+00	ca	
Benzo[k]fluoranthene	207-08-9	1.5E+02	ca	2.9E+01	ca	
Benzoic acid	65-85-0	2.4E+05	nc	5.8E+04	nc	
Benzotrichloride	98-07-7	4.9E+00	ca	2.6E-01	ca	
Benzyl alcohol	100-51-6	6.1E+03	nc	1.5E+03	nc	
Benzyl chloride	100-44-7	2.4E+01	nc	1.9E+00	nc	
Beryllium and compounds	7440-41-7	1.6E+02	nc	1.6E+01	nc	
Bidrin	141-66-2	6.1E+00	nc	1.6E+00	nc	
Biphenthrin (Talstar)	82657-04-3	9.2E+02	nc	2.3E+02	nc	
1,1-Biphenyl	92-52-4	5.1E+01	nc	8.3E-01	nc	
Bis(2-chloroethyl)ether	111-44-4	2.1E+01	ca	1.2E+00	ca	
Bis(2-chloroisopropyl)ether	108-60-1	4.6E+02	ca	3.1E+01	ca	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Bis(chloromethyl)ether	542-88-1	7.7E-03	ca	6.2E-03	ca	
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	1.2E+03	nc	3.1E+02	nc	
Bisphenol A	80-05-7	3.1E+03	nc	5.8E+02	nc	
Boron	7440-42-8	1.6E+04	nc	3.1E+03	nc	
Boron trifluoride	7637-07-2	3.1E+03	nc	6.2E+02	nc	
Bromate	15541-45-4	9.1E+01	ca	9.6E+00	ca	
Bromobenzene	108-86-1	3.0E+02	nc	5.4E+01	nc	
Bromodichloromethane	75-27-4	2.7E+01	ca	1.2E+01	ca	
Bromoform (tribromomethane)	75-25-2	1.2E+03	nc	2.9E+02	nc	
Bromomethane (Methyl bromide)	74-83-9	7.3E+00	nc	7.0E+00	nc	
4-Bromophenyl Phenyl Ether	101-55-3	4.5E+03	nc	2.1E+03	nc	i
Bromophos	2104-96-3	3.1E+02	nc	2.6E+01	nc	
Bromoxynil	1689-84-5	1.2E+03	nc	2.5E+02	nc	
Bromoxynil octanoate	1689-99-2	1.2E+03	nc	1.0E+02	nc	
1,3-Butadiene	106-99-0	1.9E+00	nc	1.6E+00	ca	
N-Butanol	71-36-3	6.1E+03	nc	1.5E+03	nc	
Butyl benzyl phthalate	85-68-7	1.2E+04	nc	1.2E+03	nc	
Butylate	2008-41-5	3.1E+03	nc	3.4E+02	nc	
n-Butylbenzene	104-51-8	3.9E+03	nc	7.8E+02	nc	
sec-Butylbenzene	135-98-9	7.8E+03	nc	1.6E+03	nc	
tert-Butylbenzene	98-06-6	7.8E+03	nc	5.1E+02	nc	
Butylphthalyl butylglycolate	85-70-1	6.1E+04	nc	1.0E+04	nc	
Cacodylic Acid	75-60-5	1.2E+03	nc	3.1E+02	nc	
Cadmium and compounds	7440-43-9	7.0E+01	nc	6.9E+00	NA	
Calcium Cyanide	592-01-8	7.8E+01	nc	1.6E+01	nc	
Caprolactam	105-60-2	3.1E+04	nc	7.7E+03	nc	
Captafol	2425-06-1	1.2E+02	nc	2.4E+01	nc	
Captan	133-06-2	7.9E+03	nc	1.9E+03	nc	
Carbaryl	63-25-2	6.1E+03	nc	1.4E+03	nc	
Carbazole	86-74-8	2.4E+03	ca	3.4E+02	ca	g
Carbofuran	1563-66-2	3.1E+02	nc	7.3E+01	nc	
Carbon disulfide	75-15-0	8.2E+02	nc	7.3E+02	nc	
Carbon tetrachloride	56-23-5	6.1E+01	ca	3.9E+01	ca	
Carbosulfan	55285-14-8	6.1E+02	nc	3.7E+01	nc	
Carboxin	5234-68-4	6.1E+03	nc	1.5E+03	nc	
chloral hydrate	302-17-0	6.1E+03	nc	1.5E+03	nc	
Chloramben	133-90-4	9.2E+02	nc	2.2E+02	nc	
Chloranil	118-75-2	1.2E+02	ca	1.6E+01	ca	
Chlordane	12789-03-6	3.5E+01	nc	7.8E+00	nc	
Chlorimuron, -ethyl	90982-32-4	1.2E+03	nc	3.0E+02	nc	
Chlorine	7782-50-5	7.5E+03	nc	1.6E+03	nc	
2-Chloroacetaldehyde	107-20-0	1.8E+02	ca	2.5E+01	ca	
Chlorine dioxide	10049-04-4	2.3E+03	nc	4.7E+02	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Chloroacetic acid	79-11-8	1.2E+02	nc	3.1E+01	nc	
2-Chloroacetophenone	532-27-4	4.3E+04	nc	5.2E-02	nc	
p-Chloroaniline	106-47-8	2.4E+02	ca	3.2E+01	ca	
Chlorobenzene	108-90-7	2.9E+02	nc	7.2E+01	nc	
Chlorobenzilate	510-15-6	4.4E+02	ca	2.7E+01	ca	
p-Chlorobenzoic acid	74-11-3	1.8E+03	nc	3.9E+02	nc	
4-Chlorobenzotrifluoride	98-56-6	2.1E+02	nc	2.6E+01	nc	
2-Chloro-1,3-butadiene	126-99-8	9.4E-01	ca	1.6E+00	ca	
1-Chlorobutane	109-69-3	3.1E+03	nc	5.2E+02	nc	
1-Chloro-1,1-difluoroethane (HCFC-142b)	75-68-3	5.8E+04	nc	1.0E+05	nc	
Chlorodifluoromethane	75-45-6	5.3E+04	nc	1.0E+05	nc	
Chloroethane	75-00-3	1.4E+04	nc	2.1E+04	nc	
tris(2-Chloroethyl)amine (HN3)	555-77-1	4.3E-01	nc	2.6E-01	nc	a
bis(2-Chloroethyl)ethylamine (HN1)	538-07-8	4.3E-01	nc	2.6E-01	nc	a
2-Chloroethyl Vinyl Ether	110-75-8	2.0E+03	nc	1.5E+02	nc	a
Chloroform	67-66-3	3.0E+01	ca	1.9E+01	ca	
Chloromethane (methyl chloride)	74-87-3	1.2E+02	nc	1.9E+02	nc	
4-Chloro-2-methylaniline	95-69-2	1.8E+02	nc	4.2E+01	nc	
4-Chloro-2-methylaniline hydrochloride	3165-93-3	1.1E+02	ca	1.5E+01	ca	
beta-Chloronaphthalene	91-58-7	6.3E+03	nc	5.5E+02	nc	
o-Chloronitrobenzene	88-73-3	1.6E+02	c	2.0E+01	ca	
p-Chloronitrobenzene	100-00-5	6.1E+01	nc	1.4E+01	nc	
2-Chlorophenol	95-57-8	3.9E+02	nc	7.1E+01	nc	
Chloropicrin	76-06-2	2.1E+00	nc	8.3E-01	nc	
2-Chloropropane	75-29-6	1.7E+02	nc	1.7E+02	nc	a
Chlorothalonil	1897-45-6	9.2E+02	nc	2.1E+02	nc	
o-Chlorotoluene	95-49-8	1.6E+03	nc	1.8E+02	nc	
p-Chlorotoluene	106-43-4	1.6E+03	nc	1.9E+02	nc	
2-Chlorovinyl Arsenous Acid	85090-33-2	6.1E+00	nc	3.7E+00	nc	f
Chlorpropham	101-21-3	1.2E+04	nc	2.2E+03	nc	
Chlorpyrifos	2921-88-2	6.1E+01	nc	6.2E+00	nc	
Chlorpyrifos-methyl	5598-13-0	6.1E+02	nc	8.9E+01	nc	
Chlorsulfuron	64902-72-3	3.1E+03	nc	7.7E+02	nc	
Chlorthiophos	60238-56-4	4.9E+01	nc	2.0E+00	nc	
Total Chromium (1:6 ratio Cr VI:Cr III)	7440-47-3	1.6E+03	nc	NA	NA	g
Chromium III	16065-83-1	1.2E+05	nc	1.6E+04	nc	
Chromium VI	18540-29-9	2.9E+01	ca	3.1E+00	ca	
Chrysene	218-01-9	1.5E+03	ca	2.9E+02	ca	
Cobalt	7440-48-4	2.3E+01	nc	4.7E+00	nc	
Coke Oven Emissions	8007-45-2	4.0E+05	ca	NA	NA	a
Copper and compounds	7440-50-8	3.1E+03	nc	6.2E+02	nc	
Copper Cyanide	544-92-3	3.9E+02	nc	7.8E+01	nc	
trans-Crotonaldehyde	123-73-9	3.4E+01	ca	3.5E+00	ca	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Cumene (isopropylbenzene)	98-82-8	2.1E+03	nc	3.9E+02	nc	
Cyanazine	21725-46-2	5.8E+01	ca	7.6E+00	ca	
Cyanide (free)	57-12-5	2.2E+01	nc	1.4E+00	nc	
Potassium Cyanide	151-50-8	1.6E+02	nc	3.1E+01	nc	
Sodium Cyanide	143-33-9	7.8E+01	nc	1.6E+01	nc	
Cyanogen	460-19-5	7.8E+01	nc	1.6E+01	nc	
Cyanogen bromide	506-68-3	7.0E+03	nc	1.4E+03	nc	
Cyanogen chloride	506-77-4	3.9E+03	nc	7.8E+02	nc	f
Cyclohexane	110-82-7	7.0E+03	nc	1.3E+04	nc	
Cyclohexanone	108-94-1	3.1E+05	nc	7.7E+04	nc	
Cyclohexylamine	108-91-8	1.2E+04	nc	3.0E+03	nc	
Cyhalothrin/Karate	68085-85-8	3.1E+02	nc	7.8E+01	nc	
Cypermethrin	52315-07-8	6.1E+02	nc	1.6E+02	nc	
Cyromazine	66215-27-8	4.6E+02	nc	1.2E+02	nc	
Dacthal	1861-32-1	6.1E+02	nc	9.3E+01	nc	
Dalapon	75-99-0	1.8E+03	nc	4.6E+02	nc	
Danitol	39515-41-8	1.5E+03	nc	4.6E+01	nc	
DDD	72-54-8	2.0E+02	ca	2.7E+00	ca	
DDE	72-55-9	1.4E+02	ca	2.0E+01	ca	
DDT	50-29-3	3.6E+01	nc	7.8E+00	nc	
Decabromodiphenyl ether	1163-19-5	4.3E+02	nc	1.1E+02	nc	
Demeton	8065-48-3	2.4E+00	nc	5.2E-01	nc	
Diallate	2303-16-4	8.0E+02	ca	4.6E+01	ca	
Diazinon	333-41-5	4.3E+01	nc	7.9E+00	nc	
Dibenz[a,h]anthracene	53-70-3	1.5E+00	ca	2.9E-01	ca	
Dibenz(a,h)Acridine	226-36-8	3.8E+01	ca	5.5E+00	nc	a
Dibenz(a,j)Acridine	224-42-0	3.8E+01	ca	5.5E+00	nc	a
7H-Dibenzo(c,g)Carbazole	194-59-2	3.8E+00	ca	5.5E-01	ca	a
Dibenzofuran	132-64-9	7.8E+01	nc	5.8E+00	nc	
Dibenzo(a,e)Pyrene	192-65-4	3.8E+00	ca	5.6E-01	ca	
Dibenzo(a,h)Pyrene	189-64-0	3.8E-01	ca	5.5E-02	nc	a
Dibenzo(a,i)Pyrene	189-55-9	3.8E-01	ca	5.5E-02	nc	a
Dibenzo(a,l)Pyrene	191-30-0	3.8E-01	ca	5.5E-02	nc	a
1,4-Dibromobenzene	106-37-6	6.1E+02	nc	9.8E+01	nc	
Dibromochloromethane	124-48-1	6.8E+01	ca	1.5E+01	ca	
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	5.3E-01	ca	3.2E-02	ca	
1,2-Dibromoethane (EDB)	106-93-4	3.4E+00	ca	6.5E-01	ca	
Dibutyl phthalate	84-74-2	6.1E+03	nc	6.7E+02	nc	
Dicamba	1918-00-9	1.8E+03	nc	4.4E+02	nc	
1,2-Dichlorobenzene	95-50-1	1.9E+03	nc	2.8E+02	nc	
1,3-Dichlorobenzene	541-73-1	5.3E+02	nc	1.8E+02	nc	a
1,4-Dichlorobenzene	106-46-7	2.4E+02	ca	4.2E+01	ca	
3,3-Dichlorobenzidine	91-94-1	1.1E+02	ca	1.1E+01	ca	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
4,4'-Dichlorobenzophenone	90-98-2	5.5E+02	nc	5.7E+01	nc	
1,4-Dichloro-2-butene	764-41-0	7.0E-01	ca	1.2E-01	ca	
Dichlorodifluoromethane	75-71-8	9.4E+01	nc	1.9E+02	nc	
2,2'-Dichlorodiisopropyl ether (bis(2-chloroisopropyl) ether)	39638-32-9	2.9E+02	ca	2.7E+01	ca	a
1,1-Dichloroethane	75-34-3	3.3E+02	ca	2.4E+02	c	
1,2-Dichloroethane (EDC)	107-06-2	3.3E+01	nc	1.3E+01	nc	
1,2-Dichloroethylene (cis)	156-59-2	1.6E+02	nc	2.9E+01	nc	
1,2-Dichloroethene (total)	540-59-0	7.0E+02	nc	1.3E+02	nc	
1,2-Dichloroethylene (trans)	156-60-5	1.5E+02	nc	8.7E+01	nc	
1,1-Dichloroethylene	75-35-4	2.4E+02	nc	2.6E+02	nc	
2,4-Dichlorophenol	120-83-2	1.8E+02	nc	3.5E+01	nc	
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	94-82-6	4.9E+02	nc	9.1E+01	nc	
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94-75-7	6.9E+02	nc	1.3E+02	nc	
1,2-Dichloropropane	78-87-5	1.7E+01	nc	8.3E+00	nc	
2,3-Dichloropropanol	616-23-9	1.8E+02	nc	4.6E+01	nc	
1,3-Dichloropropane	142-28-9	1.6E+03	nc	2.9E+02	nc	
1,3-Dichloropropene	542-75-6	7.7E+01	nc	3.8E+01	nc	
Dichlorvos	62-73-7	3.1E+01	nc	7.7E+00	nc	
Dicofol	115-32-2	1.1E+02	ca	1.5E+01	ca	g
Dicyclopentadiene	77-73-6	3.1E+01	nc	1.2E+01	nc	
Dieldrin	60-57-1	3.0E+00	ca	1.5E-01	c	
Diethylanolamine	111-42-2	1.2E+02	nc	3.1E+01	nc	
Diethyl phthalate	84-66-2	4.9E+04	nc	1.1E+04	nc	
Diethylene glycol, monobutyl ether	112-34-5	1.8E+03	nc	4.7E+02	nc	
Diethylene glycol, monoethyl ether	111-90-0	3.6E+03	nc	9.4E+02	nc	
Diethylformamide	617-84-5	6.1E+01	nc	1.6E+01	nc	
Di(2-ethylhexyl)adipate	103-23-1	3.7E+04	nc	5.6E+03	c	
Diethylstilbestrol	56-53-1	1.4E-01	ca	4.3E-03	ca	
Difenzoquat (Avenge)	43222-48-6	4.9E+03	nc	1.2E+03	nc	
Diflubenzuron	35367-38-5	1.2E+03	nc	2.2E+02	nc	
1,1-Difluoroethane	75-37-6	5.2E+04	nc	8.3E+04	nc	
Diisononyl phthalate	28553-12-0	1.2E+03	nc	7.3E+02	nc	a
Diisopropyl methylphosphonate	1445-75-6	6.3E+03	nc	1.2E+03	nc	
S-(2-diisopropylaminoethyl)-methylphosphonothioic acid	73207-98-4	4.7E-02	nc	2.2E-02	nc	f
Dimethipin	55290-64-7	1.2E+03	nc	3.1E+02	nc	
Dimethoate	60-51-5	1.2E+01	nc	3.1E+00	nc	
3,3'-Dimethoxybenzidine	119-90-4	3.5E+03	ca	4.7E+02	ca	
Dimethylamine	124-40-3	6.7E-02	nc	3.5E-02	nc	a
2,4-Dimethylaniline	95-68-1	1.2E+02	nc	3.0E+01	nc	
2,4-Dimethylaniline hydrochloride	21436-96-4	8.4E+01	ca	1.2E+01	ca	
N-N-Dimethylaniline	121-69-7	1.6E+02	nc	2.7E+01	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
7,12-Dimethylbenzanthracene	57-97-6	4.3E-02	ca	8.6E-03	ca	
3,3'-Dimethylbenzidine	119-93-7	4.4E+00	ca	5.6E-01	ca	
N,N-Dimethylformamide	68-12-2	6.1E+03	nc	1.6E+03	nc	
Dimethylphenethylamine	122-09-8	6.1E+01	nc	3.6E+01	nc	a
1,2-Dimethylhydrazine	540-73-8	8.8E-02	ca	1.2E-02	ca	
2,4-Dimethylphenol	105-67-9	1.2E+03	nc	2.7E+02	nc	
2,6-Dimethylphenol	576-26-1	3.7E+01	nc	8.1E+00	nc	
3,4-Dimethylphenol	95-65-8	6.1E+01	nc	1.4E+01	nc	
Dimethyl phthalate	131-11-3	1.0E+05	nc	3.6E+05	nc	a
Dimethyl terephthalate	120-61-6	7.8E+03	nc	1.4E+03	nc	
4,6-Dinitro-o-cresol	534-52-1	4.9E+00	nc	1.2E+00	nc	
4,6-Dinitro-o-cyclohexyl phenol	131-89-5	1.2E+02	nc	1.7E+01	nc	
1,2-Dinitrobenzene	528-29-0	6.1E+00	nc	1.5E+00	nc	
1,3-Dinitrobenzene	99-65-0	6.1E+00	nc	1.5E+00	nc	
1,4-Dinitrobenzene	100-25-4	6.1E+00	nc	1.5E+00	nc	
2,4-Dinitrophenol	51-28-5	1.2E+02	nc	3.0E+01	nc	
1,6-Dinitropyrene	42397-64-8	3.8E-01	ca	5.5E-02	nc	
1,8-Dinitropyrene	42397-65-9	6.1E+01	ca	NA	nc	g
2,4-Dinitrotoluene	121-14-2	1.2E+02	nc	2.0E+01	ca	
2,6-Dinitrotoluene	606-20-2	1.8E+01	nc	4.2E+00	ca	
Dinitrotoluene, 2-Amino-4,6-	35572-78-2	1.5E+02	nc	3.0E+01	nc	
Dinitrotoluene, 4-Amino-2,6-	19406-51-0	1.5E+02	nc	3.0E+01	nc	
Dinoseb	88-85-7	6.1E+01	nc	1.1E+01	nc	
di-n-Octyl phthalate	117-84-0	6.1E+02	nc	1.6E+02	nc	
1,4-Dioxane	123-91-1	4.9E+02	ca	6.7E+01	ca	
Diphenamid	957-51-7	1.8E+03	nc	4.1E+02	nc	
Diphenylamine	122-39-4	1.5E+03	nc	2.4E+02	nc	
N,N-Diphenyl-1,4 benzenediamine (DPPD)	74-31-7	1.8E+01	nc	2.7E+00	nc	
1,2-Diphenylhydrazine	122-66-7	6.1E+01	ca	6.7E+00	ca	
Diphenyl sulfone	127-63-9	4.9E+01	nc	1.1E+01	nc	
Diquat	85-00-7	1.3E+02	nc	3.4E+01	nc	
Direct black 38	1937-37-7	6.6E+00	ca	9.1E-01	ca	
Direct blue 6	2602-46-2	6.6E+00	ca	9.1E-01	ca	
Direct brown 95	16071-86-6	7.3E+00	ca	1.0E+00	ca	
Disulfoton	298-04-4	2.4E+00	nc	3.8E-01	nc	
1,4-Dithiane	505-29-3	6.1E+02	nc	1.5E+02	nc	g
Diuron	330-54-1	1.2E+02	nc	2.8E+01	nc	
Dodine	2439-10-3	2.4E+02	nc	6.2E+01	nc	
Dysprosium	7429-91-6	7.8E+03	nc	3.6E+03	nc	a
Endosulfan	115-29-7	3.7E+02	nc	7.8E+01	nc	
Endothall	145-73-3	1.2E+03	nc	3.0E+02	nc	
Endrin	72-20-8	1.8E+01	nc	1.9E+00	nc	
Epichlorohydrin	106-89-8	2.0E+01	nc	2.0E+00	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
1,2-Epoxybutane	106-88-7	1.7E+02	nc	4.2E+01	nc	
EPTC (S-Ethyl dipropylthiocarbamate)	759-94-4	2.0E+03	nc	2.9E+02	nc	
Ethephon (2-chloroethyl phosphonic acid)	16672-87-0	3.1E+02	nc	7.8E+01	nc	
Ethion	563-12-2	3.1E+01	nc	3.2E+00	nc	
2-Ethoxyethanol	110-80-5	2.4E+04	nc	6.2E+03	nc	
2-Ethoxyethanol acetate	111-15-9	6.1E+03	nc	1.5E+03	nc	
Ethyl acetate	141-78-6	7.0E+04	nc	1.4E+04	nc	
Ethyl acrylate	140-88-5	1.3E+03	ca	1.4E+02	ca	
Ethyl ether	60-29-7	1.6E+04	nc	3.1E+03	nc	
Ethyl methacrylate	97-63-2	1.5E+03	nc	4.2E+02	nc	
Ethyl methylphosphonic acid (EMPA)	1832-53-7	1.5E+03	nc	9.1E+02	nc	f
Ethyl p-nitrophenyl phenylphosphorothioate	2104-64-5	6.1E-01	nc	3.6E-01	nc	a
o-Ethyl S-(2-diisopropylaminoethyl) Methylphosphonothiolate (VX)	50782-69-9	3.7E-02	nc	2.2E-02	nc	f
Ethylbenzene	100-41-4	5.4E+02	ca	1.3E+02	ca	
Ethylene cyanohydrin	109-78-4	4.3E+03	nc	1.1E+03	nc	
Ethylene glycol	107-21-1	1.2E+05	nc	3.1E+04	nc	
Ethylene glycol, monobutyl ether	111-76-2	6.1E+03	nc	1.5E+03	nc	
Ethylene oxide	75-21-8	1.7E+01	ca	4.4E+00	ca	
Ethylene thiourea (ETU)	96-45-7	4.9E+00	nc	1.2E+00	nc	
Ethylene diamine	107-15-3	5.5E+03	nc	1.4E+03	nc	
Ethylphthalyl ethyl glycolate	84-72-0	1.8E+05	nc	4.5E+04	nc	
Express	101200-48-0	4.9E+02	nc	1.2E+02	nc	
Fenamiphos	22224-92-6	1.5E+01	nc	3.4E+00	nc	
Fluometuron	2164-17-2	7.9E+02	nc	1.9E+02	nc	
Fluoranthene	206-44-0	2.3E+03	nc	6.3E+02	nc	
Fluorene	86-73-7	2.3E+03	nc	2.2E+02	nc	
Fluoride	16984-48-8	3.1E+03	nc	6.2E+02	nc	
Fluorine	7782-41-4	4.7E+03	nc	9.3E+02	nc	
Fluorine (soluble fluoride)	7782-41-5	4.9E+05	nc	NA	NA	
Fluoridone	59756-60-4	4.9E+03	nc	1.1E+03	nc	
Flurprimidol	56425-91-3	1.2E+03	nc	2.6E+02	nc	
Flutolanil	66332-96-5	3.7E+03	nc	7.2E+02	nc	
Fluvalinate	69409-94-5	6.1E+02	nc	1.6E+02	nc	
Folpet	133-07-3	6.1E+03	nc	1.4E+03	nc	
Fomesafen	72178-02-0	2.6E+02	ca	3.4E+01	ca	
Fonofos	944-22-9	1.2E+02	nc	1.8E+01	nc	
Formaldehyde	50-00-0	1.2E+04	nc	3.1E+03	nc	
Formic Acid	64-18-6	4.9E+04	nc	1.4E+04	nc	
Fosetyl-al	39148-24-8	1.8E+05	nc	4.7E+04	nc	
Furan	110-00-9	7.8E+01	nc	1.5E+01	nc	
Furazolidone	67-45-8	1.3E+01	ca	1.8E+00	ca	
Furfural	98-01-1	1.8E+02	nc	4.7E+01	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Quinoline	91-22-5	1.6E+01	ca	2.1E+00	ca	
RDX (Cyclonite)	121-82-4	2.3E+02	nc	4.7E+01	nc	
Resmethrin	10453-86-8	1.8E+03	nc	4.8E+01	nc	
Ronnel	299-84-3	3.1E+03	nc	3.0E+02	nc	
Rotenone	83-79-4	2.4E+02	nc	4.7E+01	nc	
Sarin (GB)	107-44-8	1.2E+00	nc	7.3E-01	nc	f, j
Savey	78587-05-0	1.5E+03	nc	8.1E+01	nc	
Selenious Acid	7783-00-8	3.9E+02	nc	7.8E+01	nc	
Selenium	7782-49-2	3.9E+02	nc	7.8E+01	nc	
Selenourea	630-10-4	3.1E+02	nc	1.8E+02	nc	a
Sethoxydim	74051-80-2	5.5E+03	nc	7.8E+02	nc	
Silver and compounds	7440-22-4	3.9E+02	nc	7.1E+01	nc	
Silver Cyanide	506-64-9	7.8E+03	nc	1.3E+03	nc	
Simazine	122-34-9	3.1E+02	nc	5.2E+01	ca	
Sodium azide	26628-22-8	3.1E+02	nc	6.2E+01	nc	
Sodium diethyldithiocarbamate	148-18-5	1.8E+02	ca	2.5E+01	ca	
Sodium Cyanide	143-33-9	7.8E+01	nc	1.6E+01	nc	
Sodium fluoroacetate	62-74-8	1.2E+00	nc	3.1E-01	nc	
Sodium metavanadate	13718-26-8	7.8E+01	nc	1.6E+01	nc	
Soman (GD)	96-64-0	2.4E-01	nc	1.5E-01	nc	k, m
Strontium, stable	7440-24-6	4.7E+04	nc	9.3E+03	nc	f
Strychnine	57-24-9	1.8E+01	nc	4.6E+00	nc	
Styrene	100-42-5	6.3E+03	nc	1.1E+03	nc	
1,1'-Sulfonylbis (4-chlorobenzene)	80-07-9	4.9E+01	nc	8.3E+00	nc	
Sulfur Mustard (H, HD)	505-60-2	4.3E-01	nc	2.6E-01	nc	f, l
Systhane	88671-89-0	1.5E+03	nc	3.5E+02	nc	
Tabun (GA)	77-81-6	2.4E+00	nc	1.5E+00	nc	f
2,3,7,8-TCDD (dioxin)	1746-01-6	5.1E-05	nc	1.1E-05	nc	
Tebuthiuron	34014-18-1	4.3E+03	nc	1.1E+03	nc	
Temephos	3383-96-8	1.2E+03	nc	3.1E+02	nc	
Terbacil	5902-51-2	7.9E+02	nc	2.0E+02	nc	
Terbufos	13071-79-9	1.5E+00	nc	1.8E-01	nc	
Terbutryn	886-50-0	6.1E+01	nc	1.0E+01	nc	
1,2,4,5-Tetrachlorobenzene	95-94-3	1.8E+01	nc	1.2E+00	nc	
1,1,1,2-Tetrachloroethane	630-20-6	1.9E+02	ca	5.0E+01	ca	
1,1,2,2-Tetrachloroethane	79-34-5	5.6E+01	ca	6.6E+00	ca	
Tetrachloroethylene (PCE)	127-18-4	8.6E+01	nc	3.5E+01	nc	
2,3,4,6-Tetrachlorophenol	58-90-2	1.8E+03	nc	1.7E+02	nc	
p,a,a,a-Tetrachlorotoluene	5216-25-1	2.4E+00	ca	1.1E-01	ca	
Tetrachlorovinphos	961-11-5	1.8E+03	nc	2.4E+02	ca	
Tetraethyldithiopyrophosphate	3689-24-5	3.1E+01	nc	5.3E+00	nc	
1,1,1,2-tetrafluoroethane	811-97-2	1.1E+05	nc	1.7E+05	nc	
Tetrahydrofuran	109-99-9	1.8E+04	nc	3.2E+03	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
tetryl	479-45-8	2.4E+02	nc	6.1E+01	nc	
Thallic oxide	1314-32-5	6.3E+00	nc	2.9E+00	nc	a
Thallium and compounds	7440-28-0	7.8E-01	nc	1.6E-01	nc	
Thiobencarb	28249-77-6	6.1E+02	nc	1.2E+02	nc	
Thiocyanate	463-56-9	1.6E+01	nc	3.1E+00	nc	
Thiodiglycol	111-48-8	5.4E+03	nc	1.1E+03	nc	e
Thiofanox	39196-18-4	1.8E+01	nc	4.1E+00	nc	
Thiophanate-methyl	23564-05-8	4.9E+03	nc	1.2E+03	nc	
1,4-Thioxane	15980-15-1	1.0E+05	sat	2.6E+07	nc	a
Thiram	137-26-8	3.1E+02	nc	7.6E+01	nc	
Tin (inorganic, also see tributyltin oxide)	7440-31-5	4.7E+04	nc	9.3E+03	nc	
Titanium	7440-32-6	1.0E+05	max	1.5E+05	nc	a
Toluene	108-88-3	5.0E+03	nc	9.3E+02	nc	
Toluene-2,4-diamine	95-80-7	1.5E+01	ca	2.1E+00	ca	a
Toluene-2,5-diamine	95-70-5	1.2E+01	nc	3.1E+00	nc	
Toluene-2,6-diamine	823-40-5	1.8E+03	nc	1.1E+03	nc	a
p-Toluidine	106-49-0	2.4E+02	nc	6.0E+01	nc	
Toxaphene	8001-35-2	4.4E+01	ca	1.3E+00	ca	
Tralomethrin	66841-25-6	4.6E+02	nc	1.2E+02	nc	
Triallate	2303-17-5	7.9E+02	nc	8.7E+01	nc	
Triasulfuron	82097-50-5	6.1E+02	nc	1.6E+02	nc	
1,2,4-Tribromobenzene	615-54-3	3.1E+02	nc	3.3E+01	nc	
Tributyl phosphate	126-73-8	6.1E+02	nc	9.3E+01	nc	
Tributyltin oxide (TBTO)	56-35-9	1.8E+01	nc	4.4E+00	nc	
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	4.2E+04	nc	5.3E+04	nc	
2,4,6-Trichloroaniline	634-93-5	1.8E+00	nc	3.0E-01	nc	
2,4,6-Trichloroaniline hydrochloride	33663-50-2	1.7E+03	ca	2.3E+02	ca	
1,2,4-Trichlorobenzene	120-82-1	6.2E+01	nc	3.9E+00	nc	
1,1,1-Trichloroethane	71-55-6	8.7E+03	nc	7.5E+03	nc	
1,1,2-Trichloroethane	79-00-5	8.7E+03	nc	7.5E+03	nc	
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	4.2E+04	nc	5.3E+04	nc	
Trichloroethylene (TCE)	79-01-6	4.4E+00	nc	2.6E+00	nc	
Trichlorofluoromethane	75-69-4	7.8E+02	nc	1.1E+03	nc	
2,4,5-Trichlorophenol	95-95-4	6.1E+03	nc	8.9E+02	nc	
2,4,6-Trichlorophenol	88-06-2	6.1E+01	nc	9.0E+00	nc	
2,4,5-Trichlorophenoxyacetic Acid	93-76-5	6.1E+02	nc	1.2E+02	nc	
2-(2,4,5-Trichlorophenoxy) propionic acid	93-72-1	4.9E+02	nc	8.4E+01	nc	
1,1,2-Trichloropropane	598-77-6	3.9E+02	nc	6.8E+01	nc	
1,2,3-Trichloropropane	96-18-4	5.0E-01	ca	6.5E-02	ca	
1,2,3-Trichloropropene	96-19-5	7.9E-01	nc	6.2E-01	nc	
Tridiphane	58138-08-2	1.8E+02	nc	1.3E+01	nc	
Triethylamine	121-44-8	1.2E+02	nc	1.5E+01	nc	
Trifluralin	1582-09-8	4.6E+02	nc	2.9E+01	nc	

Contaminant	CAS No.	Comparison Value				Note
		Soil (mg/kg)		Water (ug/L)		
Trimellitic Anhydride (TMAN)	552-30-7	8.6E+00	nc	5.1E+00	NA	a
1,2,4-Trimethylbenzene	95-63-6	6.2E+01	nc	1.5E+01	nc	
1,3,5-Trimethylbenzene	108-67-8	7.8E+02	nc	8.7E+01	nc	
Trimethyl phosphate	512-56-1	6.1E+02	nc	1.6E+02	nc	
1,3,5-Trinitrobenzene	99-35-4	2.2E+03	nc	4.6E+02	nc	
2,4,6-Trinitrotoluene (TNT)	118-96-7	3.6E+01	nc	7.6E+00	nc	
Triphenylphosphine oxide	791-28-6	1.2E+03	nc	2.8E+02	nc	
Tris(2-chloroethyl) phosphate	115-96-8	4.3E+02	nc	1.1E+02	nc	
Tris(2-ethylhexyl) phosphate	78-42-2	6.1E+03	nc	1.6E+03	nc	
Uranium (chemical toxicity only)	7440-61-1	2.3E+02	nc	4.7E+01	nc	
Vanadium and compounds	7440-62-2	3.9E+02	nc	6.2E+01	nc	
Vanadium pentoxide	1314-62-1	6.6E+02	nc	1.1E+02	nc	
Vanadyl Sulfate	27774-13-6	1.2E+03	nc	7.3E+02	nc	a
Vernam	1929-77-7	6.1E+01	nc	8.3E+00	nc	
Vinclozolin	50471-44-8	1.5E+03	nc	3.4E+02	nc	
Vinyl acetate	108-05-4	9.7E+02	nc	4.1E+02	nc	
Vinyl bromide (bromoethene)	593-60-2	4.6E+00	nc	6.3E+00	nc	
Vinyl chloride	75-01-4	6.0E+00	c	1.5E+00	c	
Warfarin	81-81-2	1.8E+01	nc	4.4E+00	nc	
m-Xylene	108-38-3	5.9E+02	nc	1.9E+02	nc	
o-Xylene	95-47-6	6.9E+02	nc	1.9E+02	nc	
p-Xylene	106-42-3	6.0E+02	nc	1.9E+02	nc	
Xylenes	1330-20-7	6.3E+02	nc	1.9E+02	nc	
Zinc	7440-66-6	2.3E+04	nc	4.7E+03	nc	
Zinc cyanide	557-21-1	3.9E+03	nc	7.8E+02	nc	
Zinc phosphide	1314-84-7	2.3E+01	nc	4.7E+00	nc	
Zineb	12122-67-7	3.1E+03	nc	7.7E+02	nc	

All values presented in scientific notation (e.g., 2.5E+02 = 2.5 x 10^2 = 250).
mg/kg – milligrams per kilogram; equivalent to parts per million
µg/L – micrograms per Liter; equivalent to parts per billion
NA - no screening value available.

Comparison Values not marked with a footnote were derived using the methodology outlined in the U.S. Environmental Protection Agency, Region 9, *Users' Guide and Background Technical Document for the Preliminary Remediation Goals* updated in December 2004. Carcinogenic values are based on a 1 x 10^{-4} target risk level and noncarcinogenic values are based on a target hazard index of 1.0.

Notes:
[a] CVs could not be calculated because toxicity values and/or chemical-physical parameters were not available for this chemical. Therefore, the original CV from the DOD Human Health Comparison Values developed in 2007, is provided.

[b] Perchlorate is the anion of perchloric acid. Two salts of primary concern are the munitions constituents ammonium perchlorate and potassium perchlorate and the same toxicity data is used for all perchlorates.

[c] Water CVs for perchlorate were established following the DoD Memorandum "Perchlorate Release Management Policy" dated 22 April 2009.

[d] The CV was developed following an alternative approach. For example, the CV for lead in water is based on the Federal Maximum Contaminant Level (MCL).

[e] CVs were calculated using toxicity values from the EPA Superfund program report *Provisional Peer Reviewed Toxicity Values (PPRTVs)* derived by EPA's Superfund Health Risk Technical Support Center (STSC), http://rais.ornl.gov/tools/profile.php.

[f] CVs were calculated using toxicity values from the CHPPM report *Chronic Toxicity Criteria for Human Health Risk Assessment, Version 3*, dated 06 November 2006.

[g] CVs could not be calculated because toxicity values and/or chemical-physical parameters are no longer available for this chemical. Therefore, the original CV from the DOD Relative Risk Site Evaluation Primer, Summer 1997, is provided.

[h] Memorandum, HSHB-ME-SH, US Army Environmental Hygiene Agency, 18 November, 1993, subject: Risk-Based Soil Action Levels, Operational Safe Removal, Phase II, Spring Valley.

[i] US Environmental Protection Agency, Region III, Risk-Based Concentration Table, July, December 1995, October 20, 1995.

[j] Oak Ridge National Labaratory, Draft Data Analysis for Nerve Agent GB, April 1996.

[k] Oak Ridge National Labaratory, Draft Data Analysis for Nerve Agent GD, April 1996.

[l] Oak Ridge National Labaratory, Draft Data Analysis for Sulfur Mustard HD, April 1996.

[m] Oak Ridge National Labaratory, Draft Data Analysis for Nerve Agent VX, April 1996.

Figure B.1.2 Human Health Comparison Values for Radionuclides

Analyte	CAS Number	Soil (pCi/kg)	Water (pCi/L)
Plutonium 236	15411-92-4	3.30E+06	6.40E+01
Plutonium 238	13981-16-3	3.26E+05	3.60E+01
Plutonium 239	15117-48-3	2.85E+05	3.50E+01
Plutonium 240	14119-33-6	2.85E+05	3.50E+01
Plutonium 241	14119-32-5	4.50E+07	2.70E+03
Plutonium 242	13982-10-0	3.00E+05	3.70E+01
Plutonium 243	15706-37-3	7.42E+09	1.00E+04
Plutonium 244	14119-34-7	2.69E+05	3.50E+01
Radium 226	13982-63-3	1.07E+00	1.20E+01
Radon 222	14859-67-7	1.27E+10	5.00E+00*
Thorium 227	15623-47-9	1.14E+07	1.00E+02
Thorium 228	14274-82-9	2.59E+06	4.50E+01
Thorium 229	15594-54-4	3.78E+04	2.10E+01
Thorium 230	14269-63-7	3.80E+05	5.20E+01
Thorium 231	14932-40-2	3.14E+09	2.20E+03
Thorium 232	7440-29-1	3.38E+05	4.70E+01
Thorium 234	15065-10-8	1.37E+08	2.10E+02
Tritium	10028-17-8	7.44E+08	8.30E+04
Uranium 233	13968-55-3	4.74E+05	6.60E+01
Uranium 234	13966-29-5	4.95E+05	6.70E+01
Uranium 235	15117-96-1	2.07E+04	6.80E+01
Uranium 238	7440-61-1	5.52E+05	7.40E+01

Note:
Values derived using the U.S. Department of Energy, Oak Ridge National Laboratories', Risk Assessment Information System (RAIS) Preliminary Remediation Goals (PRGs) calculator and were calculated using a 1 x 10^{-4} target risk level (http://rais.ornl.gov/rad-ssg/radssl1.shtml).

* - Value represents EPA's proposed Maximum Contaminant Level from the *Federal Register* (64 FR 59246) dated November 2, 1999.

APPENDIX B-2: Ambient Water Quality Comparison Values

The ambient water quality Comparison Values (CVs) presented in this appendix replace those contained in the Assistant Deputy Under Secretary of Defense (Environment, Safety, and Occupational Health) Memorandum, *Updated Human Health and Ecological Comparison Values,* July 17, 2007. The DoD Components should use these CVs in conjunction with the Munitions Response Site Prioritization Protocol (32 CFR Part 179, October 5, 2005) to evaluate known or suspected hazards to ecological receptors present in surface water habitats at or near munitions response sites. Appendix B-1 contains CVs to evaluate human receptors and Appendix B-3 contains CVs to evaluate ecological receptors using sediment sampling data. The DoD Components should not equate these CVs to a more comprehensive baseline risk assessment, nor should they use these CVs as final cleanup goals or action levels. Furthermore, they should not use the ambient water quality CVs for annual updates of relative MRS priorities or to reevaluate existing Installation Restoration Program sites.

The DoD Components should use Figure B.2.1 to complete Table 24 in the Health Hazard Evaluation (HHE) module, and must annotate Table 24 to indicate whether they collected contaminant concentration data from freshwater or marine water bodies.

We drew on a variety of ecological screening value sources to assemble a comprehensive set of widely used and accepted screening values for the protection of freshwater and marine ecosystems. These sources primarily include U.S. Environmental Protection Agency (EPA) national and regional guidance documents, and secondarily, other sources such as state ecological risk guidance documents and published scientific literature.

We used EPA's National Recommended Water Quality Criteria (NRWQC) for the protection of aquatic life as the primary source for both freshwater and marine ambient water quality CVs. Under Section 304(a) of the Clean Water Act, EPA develops NRWQC for priority toxic pollutants. States then promulgate water quality standards based on these NRWQC.

EPA Region 3 BTAG Screening Benchmarks was the second source used to compile the CVs. In developing these benchmarks, EPA Region 3 used a number of common ecological screening value sources, including several of the references listed at the end of this appendix. The NRWQC and EPA Region 3 benchmarks comprise the majority of the CVs, but additional sources used are listed at the end of this appendix. In most cases, we used screening values for freshwater and marine chronic exposures in this appendix; however, we used (and identified) acute exposure values where no chronic levels exist.

We derived the CVs for freshwater ambient water quality listed in this appendix from the following hierarchy of sources:

1) Freshwater Criterion Continuous Concentration (CCC) values from EPA, *National Recommended Water Quality Criteria*, 2009 Update.

2) EPA Region 3 Biological Technical Assessment Group (BTAG), *Freshwater Screening Benchmarks*, July 2006.

3) EPA Region 5, *Ecological Screening Levels*, August 22, 2003.

4) Other references that include screening values for freshwater, as listed at the end of this appendix, were consulted for chemicals lacking screening values in the above sources.

We derived the CVs for marine ambient water quality listed in this appendix from the following hierarchy of sources:

1) Saltwater CCC values from EPA, *National Recommended Water Quality Criteria*, 2009 Update.

2) EPA Region 3 BTAG, *Marine Screening Benchmarks*, July 2006.

3) Saltwater Surface Water Screening Values for Hazardous Waste Sites from EPA, *Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment*, updated November 30, 2001.

4) Other references that include screening values for marine ambient water quality, as listed at the end of this appendix, were consulted for chemicals lacking screening values in the above sources.

The analyte list in this appendix includes several chemical groups (e.g., chlorinated benzenes, phthalate esters). For these groups of compounds, we reviewed screening values for analytes within each chemical group and adopted the lowest available value (i.e., most conservative) for the entire group.

CVs representing military-unique materials (e.g., explosives, propellants, chemical agent materials, by-products) have been incorporated into the overall, alphabetical materials listing. This includes munitions constituents identified in U.S. Army Corps of Engineers Environmental and Munitions Center of Expertise, *Technical Guidance for Military Munitions Response Actions,* Interim Guidance Document (20 December 2013).

This appendix lists analytes by their most common names. Therefore, there is no more than one record for each Chemical Abstract System (CAS) number included in this appendix.

Figure B.2.1 Ambient Water Quality Comparison Values

Analyte	CAS Number	Freshwater (µg/L)	Note	Marine (µg/L)	Note
Acenaphthene	83-32-9	5.80E+00	f, P	6.60E+00	i
Acrolein	107-02-8	3.00E+00	a	5.50E-01	i
Acrylonitrile	107-13-1	6.60E+01	h	5.81E+02	i
Aldrin	309-00-2	1.70E-02	h	1.30E-01	i
Aluminum	7429-90-5	8.70E+01	a, e, j	2.71E+00	O
4-Amino-2,6-dinitrotoluene	19406-51-0	3.00E+01	S	3.00E+01	S
2-Amino-4,6-dinitrotoluene	35572-78-2	1.90E+01	S	1.90E+01	S
Ammonium perchlorate	7790-98-9	NA		NA	
Ammonium picrate (AP)	131-74-8	NA		NA	
Anthracene	120-12-7	1.20E-02	f, P	1.80E-01	i
Antimony	7440-36-0	3.00E+01	f	5.00E+02	i
Aroclor 1248	12672-29-6	1.40E-02	a, T	3.00E-02	a, T
Aroclor 1254	11097-69-1	1.40E-02	a, T	3.00E-02	a, T
Aroclor 1260	11096-82-5	1.40E-02	a, T	3.00E-02	a, T
Aroclor 1016	12674-11-2	1.40E-02	a, T	3.00E-02	a, T
Arsenic	7440-38-2	1.50E+02	a, b, y	3.60E+01	a, b, y
Arsenic (III)	22541-54-4	1.50E+02	a, b, y	3.60E+01	a, b, y
Arsine	7784-42-1	NA		NA	
Barium	7440-39-3	4.00E+00	f	5.00E+03	O
Benzene	71-43-2	3.70E+02	f, P	1.10E+02	e, i
Benzidine	92-87-5	3.90E+00	f	NA	
Benzo(a)anthracene	56-55-3	1.80E-02	f, P	5.00E-01	O
Benzo(a)pyrene	50-32-8	1.50E-02	f, P	5.00E-01	O
Benzo(g,h,i)perylene	191-24-2	7.64E+00	h, p	NA	
Benzo(k)fluoranthene	207-08-9	2.70E-02	O	5.00E-01	O
Beryllium	7440-41-7	6.60E-01	f	6.60E-01	O
alpha-BHC	319-84-6	2.20E+00	f, o	2.50E+01	i
beta-BHC	319-85-7	2.20E+00	f, o	NA	
Boron	7440-42-8	1.60E+00	f	1.00E+03	i
Cadmium	7440-43-9	2.50E-01	a, b, c	8.80E+00	a, b
Calcium	7440-70-2	1.16E+05	f	NA	
Carbazole	86-74-8	NA		NA	
Carbon Tetrachloride	56-23-5	1.33E+01	f, P	1.50E+03	i
Chlordane	57-74-9	4.30E-03	a	4.00E-03	a
Chlorinated benzenes	MRSPP-04	7.00E-01	f, t, P	5.40E+00	i, e, u
Chlorinated naphthalenes	MRSPP-03	3.96E-01	h, p, s	NA	
Chlorine	7782-50-5	1.10E+01	a	7.50E+00	a
tris(2-Chloroethyl)amine	555-77-1	NA		NA	
bis(2-Chloroethyl)ethylamine	538-07-8	NA		NA	
Chloroform	67-66-3	1.80E+00	f, P	8.15E+02	i
4-Chlorophenol	106-48-9	2.20E+02	Q	NA	
Chloropicrin	76-06-2	8.49E+00	U	NA	
2-Chlorovinyl arsenous acid	85090-33-2	NA		NA	
2-Chlorovinyl arsenous oxide	3088-37-8	NA		NA	
Chlorpyrifos	2921-88-2	4.10E-02	a	5.60E-03	a

Analyte	CAS Number	Freshwater (µg/L)	Note	Marine (µg/L)	Note
Chromium (III)	16065-83-1	7.40E+01	a, b, c, A	1.03E+02	q, A
Chromium (VI)	7440-47-3	1.10E+01	a, b, A	5.00E+01	a, b, A
Chrysene	218-01-9	7.00E+00	r	NA	
Cobalt	7440-48-4	2.30E+01	f	NA	
Copper	7440-50-8	9.00E+00	f, c, R	3.10E+00	a, b
Cyanide (free)	57-12-5	5.20E+00	a	1.00E+00	a
Cyanogen chloride	506-77-4	NA		NA	
DDD	72-54-8	1.10E-02	f	2.50E-02	i
DDE	72-55-9	4.51E-09	h, p	1.40E-01	i
DDT	50-29-3	1.00E-03	a	1.00E-03	a
Demeton	8065-48-3	1.00E-01	a	1.00E-01	a
Dibenz[a,h]anthracene	53-70-3	5.00E+00	r	5.00E-01	O
Dichlorobenzenes (total)	25321-22-6	5.00E+00	f, g	1.99E+01	i, v
1,2-Dichloroethane (EDC)	107-06-2	1.00E+02	f, P	1.13E+03	i
Dichloroethylenes (total)	25323-30-3	2.50E+01	f, w	6.80E+02	i, x
2,4-Dichlorophenol	120-83-2	1.10E+01	f	NA	
Dichloropropane	26638-19-7	3.60E+02	h, z	2.40E+03	q, z
Dichloropropene	26952-23-8	5.50E-02	f, l	7.90E+00	i, l
Dieldrin	60-57-1	5.60E-02	a	1.90E-03	a
S-(2-diisopropylaminoethyl)-methylphosphonothioic acid	73207-98-4	NA		NA	
Diisopropyl methylphosphonate	1445-75-6	NA		NA	
Dimethyl methylphosphonate	756-79-6	NA		NA	
2,4-Dimethylphenol	105-67-9	1.00E+02	h, p	NA	
3,5-Dinitroaniline	618-87-1	5.90E+01	S	NA	
1,3-Dinitrobenzene	99-65-0	2.20E+01	h	6.68E+01	O
2,4-Dinitrotoluene	121-14-2	4.40E+01	f	3.70E+02	O
2,6-Dinitrotoluene	606-20-2	8.10E+01	f	3.70E+02	O
1,2-Diphenylhydrazine	122-66-7	1.2+01	r	NA	
Di-sec-octyl phthalate [bis (2-ethylhexyl) phthalate)]	117-81-7	1.60E+01	e, f	1.70E+00	O
1,4-Dithiane	505-29-3	NA		NA	
alpha-Endosulfan	959-98-8	5.60E-02	a	8.70E-03	a
beta-Endosulfan	33213-65-9	5.60E-02	a	8.70E-03	a
Endrin	72-20-8	3.60E-02	a	2.30E-03	a
Ethyl benzene	100-41-4	9.00E+01	e, f	2.50E+01	e, i
Ethyl methylphosphonic acid	1832-53-7	NA		NA	
o-Ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate (VX)	50782-69-9	NA		NA	
Ethyldiethanolamine	139-87-7	NA		NA	
Fluoranthene	206-44-0	4.00E-02	f, P	1.60E+00	i
Fluorene	86-73-7	3.00E+00	f, P	2.50E+00	i
Guthion	86-50-0	1.00E-02	a	1.00E-02	a
Haloethers (total)	MRSPP-05	1.50E+00	f, B	NA	

Analyte	CAS Number	Freshwater (µg/L)	Note	Marine (µg/L)	Note
Halomethanes (total)	MRSPP-06	1.80E+00	e, f, C	1.20E+02	i, D
Heptachlor	76-44-8	3.80E-03	a	3.60E-03	a
Heptachlor epoxide	1024-57-3	3.80E-03	a	3.60E-03	a
Hexachlorobenzene	118-74-1	3.00E-04	f	1.00E+01	O
Hexachlorobutadiene	87-68-3	1.30E+00	f, P	3.00E-01	i
Hexachlorocyclohexane (HCH)	608-73-1	1.00E-02	f, P	3.40E-02	Q
Hexachlorocyclopentadiene	77-47-4	7.70E+01	h	7.00E-02	q
Hexachloroethane	67-72-1	1.20E+01	f	9.40E+00	i
Hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine (DNX)	80251-29-2	NA		NA	
Hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX)	5755-27-1	NA		NA	
Hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX)	13980-04-6	NA		NA	
HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)	2691-41-0	1.50E+02	f	NA	
Hydrogen cyanide	74-90-8	5.20E+00	a, K	1.00E+00	a, K
Hydrogen sulfide	7783-06-4	2.00E+00	a	2.00E+00	a
Indeno(1,2,3-cd)pyrene	193-39-5	4.31E+00	h, p	5.00E-01	O
Iron	7439-89-6	1.00E+03	a	NA	
Isophorone	78-59-1	9.20E+02	h	1.29E+02	i
Isopropyl methyl phosphonic acid	1832-54-8	NA		NA	
Lead	7439-92-1	2.50E+00	a, b, c	8.10E+00	a, b
Lewisite (Dichoro(2-chlorovinyl)arsine)	541-25-3	NA		NA	
Lindane	58-89-9	1.00E-02	f, P	1.60E-02	i
Lithium	7439-93-2	1.40E+01	f	NA	
Malathion	121-75-5	1.00E-01	a	1.00E-01	a
Magnesium	7439-95-4	8.20E+04	f	NA	
Manganese	7439-96-5	1.20E+02	f	NA	
Mercury	7439-97-6	7.70E-01	a, b	9.40E-01	a, b
Methoxychlor	72-43-5	3.00E-02	a	3.00E-02	a
2-Methylnaphthalene	91-57-6	4.70E+00	f	4.20E+00	i
4-Chloro-3-methylphenol	59-50-7	3.48E+01	h	NA	
Methylphosphonic acid	993-13-5	NA		NA	
Mirex	2385-85-5	1.00E-03	a	1.00E-03	a
Molybdenum	7439-98-7	7.30E+01	f, P	2.30E+01	Q
Naphthalene	91-20-3	1.10E+00	f, P	1.40E+00	e, i
Nickel	7440-02-0	5.20E+01	a, b, c	8.20E+00	a, b
Nitrobenzene	98-95-3	2.20E+02	h	6.68E+01	i
Nitrocellulose (NC)	9004-70-0	NA		NA	
Nitroglycerine	55-63-0	1.38E+02	f	NA	
Nitroguanidine	556-88-7	2.60E+05	S	NA	
Nitrophenols (total)	MRSPP-09	6.00E+01	f, E	7.17E+01	i, E
Nitrosamines	35576-91-1	1.17E+02	f, F	1.20E+02	i, G

Analyte	CAS Number	Freshwater (µg/L)	Note	Marine (µg/L)	Note
2-Nitrotoluene (o-Nitrotoluene)	88-72-2	4.40E+02	r	NA	
3-Nitrotoluene (m-Nitrotoluene)	99-08-1	7.50E+02	f	NA	
4-Nitrotoluene (p-Nitrotoluene)	99-99-0	1.90E+03	f	NA	
Parathion	56-38-2	1.30E-02	a	1.78E-01	i
Pentachloroethane	76-01-7	5.64E+01	f	2.81E+02	Q
Pentachlorophenol	87-86-5	1.50E+01	a, d	7.90E+00	a
Pentaerythritol tetranitrate (PETN)	78-11-5	8.50E+04	f	8.50E+04	i
Perchlorate	14797-73-0	NA		NA	
Phenanthrene	85-01-8	4.00E-01	f, P	1.50E+00	i
Phenol	108-95-2	4.00E+00	f, P	5.80E+01	i
Phosphorus	7723-14-0	NA		1.00E-01	i
Phthalate esters	MRSPP-10	1.60E+01	f, H, P	3.40E+00	i, J
Picric acid	88-89-1	NA		9.20E+03	S
Pinacolyl methylphosphonic acid	616-52-48	NA		NA	
Polychlorinated biphenyls (PCBs)	1336-36-3	1.40E-02	a, T	3.00E-02	a, T
Potassium	7440-09-7	5.30E+04	f	NA	
Potassium perchlorate	7778-74-7	NA		NA	
Pyrene	129-00-0	2.50E-02	f, P	2.40E-01	i
RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine)	121-82-4	3.60E+02	f	1.19E+04	S
Sarin (Isopropyl methylphosphonofluoridate)	107-44-8	NA		NA	
Selenium	7782-49-2	5.00E+00	a, e	7.10E+01	a, b
Silver	7440-22-4	3.20E+00	a, b, c, k	2.30E-01	i
Sodium	7440-23-5	6.80E+05	f		
Soman (Pinacolyl methylphosphonofluoridate)	96-64-0	NA		NA	
Strontium	7440-24-6	1.50E+03	f		
Sulfur Mustard (bis(2-chloroethyl)sulfide)	505-60-2	NA		NA	
Tabun (Ethyl n, n-dimethylphosphoramido-cyanidate)	77-81-6	NA		NA	
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin	1746-01-6	3.10E-09	f, m	1.20E-05	q
1,1,2,2-Tetrachloroethane	79-34-5	6.10E+02	f	9.02E+01	i
Tetrachloroethanes	25322-20-7	6.10E+02	f, L	9.02E+01	i, L
Tetrachloroethylene (PCE)	127-18-4	1.10E+02	f, P	4.50E+01	i
2,3,5,6-Tetrachlorophenol	935-95-5	1.00E+00	f, n, P	NA	
Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	479-45-8	NA		1.50E+01	S
Thallium	7440-28-0	8.00E-01	f, P	2.13E+01	i

Analyte	CAS Number	Freshwater (µg/L)	Note	Marine (µg/L)	Note
Thiodiglycol	111-48-8	NA		NA	
Thiosulfan [Endosulfan, mixed isomers]	115-29-7	5.60E-02	h	1.00E-03	i
1,4-Thioxane	15980-15-1	NA		NA	
Tin	7440-31-5	7.30E+01	f	NA	
Titanium	7440-32-6	NA		NA	
TNT (2,4,6-Trinitrotoluene)	118-96-7	1.00E+02	f	1.00E+02	i
Toluene	108-88-3	2.00E+00	f, P	2.15E+02	e, i
Toxaphene	8001-35-2	2.00E-04	a	2.00E-04	a
Trichlorinated ethanes	25323-89-1	1.10E+01	f, M	3.12E+02	i, M
1,1,1-Trichloroethane	71-55-6	1.10E+01	f	3.12E+02	i
1,1,2-Trichloroethane	79-00-5	1.20E+03	f	5.50E+02	i
Trichloroethylene (TCE)	79-01-6	2.10E+01	f, P	1.94E+03	i
2,4,5-Trichlorophenol	95-95-4	6.40E+01	r	1.20E+01	i
2,4,6-Trichlorophenol	88-06-2	4.90E+00	f	6.10E+01	i
Triethanolamine	102-71-6	NA		NA	
1,3,5-Trinitrobenzene	99-35-4	1.40E+01	N	3.50E+02	S
Uranium (chemical toxicity only)	7440-61-1	2.60E+00	f	1.00E+02	Q
Vanadium	7440-62-2	2.00E+01	f	NA	
Zinc	7440-66-6	1.20E+02	a, b, c	8.10E+01	a, b
Zirconium	7440-67-7	1.70E+01	f	NA	

All values presented in scientific notation (e.g., 2.5E+02 = 2.5 x 10^2 = 250).
µg/L - micrograms per Liter (equivalent to parts per billion).
NA - no screening value available.

Notes:
[a] U.S. EPA National Recommended Water Quality Criteria, 2009 Update. Except where otherwise noted, freshwater Criterion Continuous Concentration (CCC) values were used for freshwater CVs, and saltwater CCC values were used for marine CVs.
[b] Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column, unless otherwise noted.
[c] Hardness dependent criteria; 100 mg/L $CaCO_3$ was used.
[d] pH dependent criterion; pH = 7.8 was used.
[e] Value is expressed as a total concentration.
[f] U.S. EPA Region 3 BTAG Freshwater Screening Benchmarks, July 2006. Unless otherwise noted, values are expressed in terms of dissolved analyte in the water column. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[g] Applies to the sum of 1,2-, 1,3- and 1,4-dichlorobenzene.
[h] U.S. EPA Region 5 Ecological Screening Levels for Water, August 22, 2003. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[i] U.S. EPA Region 3 BTAG Marine Screening Benchmarks, July 2006. Unless otherwise noted, values are expressed in terms of dissolved analyte in the water column. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[j] Value is applicable at pH 6.5 - 9.0.

[k] Acute value (criterion maximum concentration or CMC) has been used because no chronic value is available.
[l] Value for 1,3-dichloropropylene.
[m] Value based on food chain effects to wildlife, not direct toxicity to aquatic life.
[n] Value for tetrachlorophenols, total.
[o] Value for BHC (non Lindane).
[p] Screening value is based on exposure to mink (*Mustela vison*) or belted kingfisher (*Ceryle alcyon*).
[q] Chronic values from U.S. EPA (2001), EPA Region 4 Waste Management Division Saltwater Surface Screening Values for Hazardous Waste, updated November 30, 2001. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[r] Ecological Benchmarks for Water from TCEQ (2006). This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[s] Value for 2-chloronaphthalene.
[t] Value for 1,2-dichlorobenzene.
[u] Value for 1,2,4-trichlorobenzene.
[v] Value for 1,4-dichlorobenzene.
[w] Value for 1,1-dichloroethylene.
[x] Value for 1,2-dichloroethylene.
[y] Water quality criteria for arsenic were derived from data for arsenic (III).
[z] Value for 1,2-dichloropropane.
[A] In most cases, users should apply the chromium III CV to measurements of total chromium. The chromium VI CV should be used for measurements of chromium VI. Users should apply the chromium VI CV to total chromium measurements only in cases where release of chromium VI is likely, but chromium VI has not yet been measured in surface water.
[B] Value for 4-bromophenyl phenyl ether.
[C] Value for chloroform.
[D] Value for bromomethane.
[E] Value for 4-nitrophenol.
[F] Value for N-nitrosodimethylamine.
[G] Value for N-nitrosodi-n-propylamine.
[H] Value for bis(2-ethylhexyl)phthalate.
[J] Value for di-n-butylphthalate.
[K] Value for free cyanide.
[L] Value for 1,1,2,2-tetrachloroethane.
[M] Value for 1,1,1-trichloroethane.
[N] Value from ORNL (2012), Tier 2 Secondary Chronic Value. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[O] Value from U.S. EPA (1999). This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[P] Original source of EPA Region 3 value is Canadian Environmental Quality Guidelines: Summary Table (Canadian Council of Ministers of the Environment, December 2003). These Canadian values are periodically updated, and the most recent updates (CCME 2012) have been incorporated in this table. Values refer to the total concentration in an unfiltered sample.
[Q] Value from Buchman, M.F. (2008). This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[R] In 2007, EPA published a new water quality criteria document for copper, which uses the Biotic Ligand Model to calculate criteria. For simplicity, the EPA Region 3 value, which is based on the earlier, hardness-dependent criteria, is included here.
[S] Value from Pascoe et al. (2010).
[T] Value for total PCBs (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses).
[U] Value from U.S. EPA (2012). No chronic values were available for this chemical, and CV is based on an acute value for fish.

Additional References Consulted for Ambient Water Quality CVs

Buchman, M.F. 2008. NOAA Screening Quick Reference Tables, NOAA OR&R Report 08-1, Seattle WA, Office of Response and Restoration Division, National Oceanic and Atmospheric Administration, 34 pages.

Canadian Council of Ministers of the Environment (CCME). 2012. Canadian Environmental Quality Guidelines. Summary Table. Update 2012.

Oak Ridge National Laboratory (ORNL). 2012. Risk Assessment Information System: Ecological Benchmark Tool. Accessed August 27, 2012. URL: http://rais.ornl.gov/tools/eco_search.php

Pascoe, G.A., K. Kroeger, D. Leisle, and R.J. Feldpausch. 2010. Munition constituents: Preliminary sediment screening criteria for the protection of marine benthic invertebrates. Chemosphere, 81:807-816.

Suter, G.W. II and C.L. Tsao. 1996. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Freshwater Biota: 1996 Revision. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-96/R2.

Talmage, S.S., D.M. Opresko, C.J. Maxwell, J.E. Welsh, M. Cretella, P.H. Reno, and F.B. Daniel. 1999. Nitroaromatic munition compounds: Environmental effects and screening values. Reviews of Environmental Contamination and Toxicology. 161: 1-156.

Texas Commission on Environmental Quality (TCEQ). 2006. Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised). Remediation Division. January.

U.S. EPA. 2012. Office of Pesticide Programs Aquatic Life Benchmarks. Last updated May 30, 2012. URL: http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm

U.S. EPA. 2001. Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment. Originally published November 1995, last updated November 30, 2001.

U.S. EPA. 1999. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Peer Review Draft. EPA 530-D-99-001A. August 1999.

U.S. EPA. 1996. Ecotox Thresholds. In: ECO Update, Vol. 3, No. 2. Office of Solid Waste and Emergency Response, Washington, D.C. EPA 540/F95/038.

APPENDIX B-3: Freshwater and Marine Sediment Comparison Values

The Comparison Values (CVs) for Freshwater and Marine Sediment presented in this appendix replace those contained in the Assistant Deputy Under Secretary of Defense (Environment, Safety, and Occupational Health) Memorandum, *Updated Human Health and Ecological Comparison Values,* July 17, 2007. The DoD Components should use these CVs in conjunction with the Munitions Response Site Prioritization Protocol (32 CFR Part 179, October 5, 2005) to evaluate known or suspected hazards to ecological receptors in aquatic habitats using sediment sampling data. Appendix B-1 contains CVs to evaluate human receptors and Appendix B-2 has CVs to evaluate ecological receptors using surface water sampling data. The DoD Components should not equate these CVs to a more comprehensive baseline risk assessment, nor should they use these CVs as final cleanup goals or action levels. Furthermore, they should not use the Freshwater and Marine Sediments CVs for annual updates of relative MRS priorities or to reevaluate existing Installation Restoration Program sites.

Figure B.3.1 should be used to complete Table 25 in the Health Hazard Evaluation (HHE) module, and users must annotate Table 25 to indicate whether contaminant concentration data were collected from freshwater or marine water bodies.

For the purposes of ecological risk screening, we drew on a variety of screening value sources to assemble a comprehensive set of widely used and accepted screening values for the protection of freshwater and marine ecosystems. These sources primarily include U.S. Environmental Protection Agency (EPA) national and regional guidance documents, and secondarily, other sources such as state ecological risk guidance documents and published scientific literature.

We derived the CVs for freshwater sediment listed in this appendix from the following hierarchy of sources:

1) EPA Region 3 Biological Technical Assessment Group (BTAG), *Freshwater Sediment Screening Benchmarks*, August 2006.

2) EPA Region 5, *Ecological Screening Levels*, August 22, 2003.

3) Other references that include screening values for freshwater sediments listed at the end of the appendix were consulted for chemicals lacking screening values in the above sources.

The CVs for marine sediments listed in this appendix are also applicable to estuarine sediments, and were derived from the following hierarchy of sources:

1) EPA Region 3 BTAG, *Marine Sediment Screening Benchmarks*, July 2006.

2) Effects Range-Low (ERL) values from National Oceanic Atmospheric Administration (NOAA), *Sediment Quality Guidelines Developed for the National Status and Trends Program*, June 12, 1999.

3) Buchman, M.F., NOAA *Screening Quick Reference Tables (SQuiRT),* NOAA OR&R Report 08-1, Seattle, WA, Office of Response and Restoration Division, 2008. This reference presents multiple values for some chemicals. In these cases, we selected the lowest marine value as a CV.

4) Other references that include screening values for marine sediment quality listed at the end of this appendix were consulted for chemicals lacking screening values in the above sources.

The analyte list in this appendix includes several chemical groups (e.g., chlorinated benzenes and phthalate esters). For these groups of compounds, we reviewed screening values for analytes within each chemical group and adopted the lowest available value (i.e., most conservative) for the entire group.

The CVs representing military-unique materials (e.g., explosives, propellants, chemical agent materials, by-products) have been incorporated into the overall, alphabetical materials list. This includes munitions constituents identified in U.S. Army Corps of Engineers Environmental and Munitions Center of Expertise*, Technical Guidance for Military Munitions Response Actions,* Interim Guidance Document (20 December 2013).

This appendix lists analytes by their most common names. Therefore, there is no more than one record for each Chemical Abstract System (CAS) number included in this appendix.

This appendix presents CVs in units of dry weight sediment. For those developed as organic carbon-normalized values, this appendix presents CVs for 1% organic carbon (OC) in sediment.

Figure B.3.1 Freshwater and Marine Sediment Comparison Values

Analyte	CAS Number	Freshwater (mg/kg dw)	Note	Marine (mg/kg dw)	Note
Acenaphthene	83-32-9	6.71E-03	b, D	6.71E-03	m
Acrolein	107-02-8	1.52E-06	c	NA	
Acrylonitrile	107-13-1	1.20E-03	c	2.22E-03	h, C
Aldrin	309-00-2	2.00E-03	b	9.50E-03	f
Aluminum	7429-90-5	1.40E+04	h	1.80E+04	f
4-Amino-2,6-dinitrotoluene	19406-51-0	3.50E-02	i, F	3.50E-02	i, F
2-Amino-4,6-dinitrotoluene	35572-78-2	1.30E-02	i, F	1.30E-02	i, F
Ammonium perchlorate	7790-98-9	NA		NA	
Ammonium picrate (AP)	131-74-8	NA		NA	
Anthracene	120-12-7	5.72E-02	b	4.69E-02	m
Antimony	7440-36-0	2.00E+00	b	6.30E-01	f
Aroclor 1248	12672-29-6	3.00E-02	k	2.27E-02	d, g
Aroclor 1254	11097-69-1	6.00E-02	k	6.33E-02	m, D
Aroclor 1260	11096-82-5	5.00E-03	k	2.27E-02	d, g
Aroclor 1016	12674-11-2	7.00E-03	k	2.27E-02	d, g
Arsenic	7440-38-2	9.80E+00	b	7.24E+00	m
Arsenic (III)	22541-54-4	9.80E+00	b, l	7.24E+00	m, l
Arsine	7784-42-1	NA		NA	
Barium	7440-39-3	2.00E+01	h	4.80E+01	f
Benzene	71-43-2	1.42E-01	c	1.37E-01	m
Benzidine	92-87-5	NA		NA	
Benzo(a)anthracene	56-55-3	1.08E-01	b	7.48E-02	m
Benzo(a)pyrene	50-32-8	1.50E-01	b	8.88E-02	m
Benzo(g,h,i)perylene	191-24-2	1.70E-01	b	6.70E-02	f
Benzo(k)fluoranthene	207-08-9	2.40E-01	b	7.00E-02	f
Beryllium	7440-41-7	NA		NA	
alpha-BHC	319-84-6	6.00E-03	b	1.36E+00	m
beta-BHC	319-85-7	5.00E-03	b	NA	
Boron	7440-42-8	NA		NA	
Cadmium	7440-43-9	9.90E-01	b	6.80E-01	m
Calcium	7440-70-2	NA		NA	
Carbazole	86-74-8	NA		NA	
Carbon tetrachloride	56-23-5	6.42E-02	b	7.24E+00	m
Chlordane	57-74-9	3.24E-03	b	2.26E-03	m
Chlorinated benzenes	MRSPP-12	8.42E-03	b, e	1.62E-01	e, m
Chlorinated naphthalenes	MRSPP-13	4.17E-01	c, z	NA	
Chlorine	7782-50-5	NA		NA	
tris(2-Chloroethyl)amine	555-77-1	NA		NA	
bis(2-Chloroethyl)ethylamine	538-07-8	NA		NA	
Chloroform	67-66-3	1.21E-01	c	9.54E-02	h, C
4-Chlorophenol	106-48-9	NA		NA	
Chloropicrin	76-06-2	NA		NA	
2-Chlorovinyl arsenous acid	85090-33-2	NA		NA	

Analyte	CAS Number	Freshwater (mg/kg dw)	Note	Marine (mg/kg dw)	Note
2-Chlorovinyl arsenous oxide	3088-37-8	NA		NA	
Chlorpyrifos	2921-88-2	5.19E-03	b	8.30E-03	m
Chromium	7440-47-3	4.34E+01	b	5.23E+01	m
Chromium (III)	16065-83-1	4.34E+01	b, K	5.23E+01	m, K
Chrysene	218-01-9	1.66E-01	b	1.08E-01	m
Cobalt	7440-48-4	5.00E+01	b	1.00E+01	f
Copper	7440-50-8	3.16E+01	b	1.87E+01	m
Cyanide (free)	57-12-5	1.00E-01	b	NA	
Cyanogen chloride	506-77-4	NA		NA	
DDD	72-54-8	4.88E-03	b	1.22E-03	m
DDE	72-55-9	3.16E-03	b	2.07E-03	m
DDT	50-29-3	4.16E-03	b	1.19E-03	m
Demeton	8065-48-3	NA		NA	
Dibenz[a,h]anthracene	53-70-3	3.30E-02	b	6.22E-03	m
Dichlorobenzenes (total)	25321-22-6	1.65E-02	b, j	4.60E-01	m, w
1,2-Dichloroethane (EDC)	107-06-2	2.60E-01	c	4.30E+00	B
Dichloroethylenes (total)	25323-30-3	3.10E-02	b, n	2.78E+00	m, n
2,4-Dichlorophenol	120-83-2	1.17E-01	b	2.08E-04	f
Dichloropropane	26638-19-7	3.33E-01	c, A	2.82E+00	A, B
Dichloropropene	26952-23-8	5.09E-05	b	7.31E-03	m
Dieldrin	60-57-1	1.20E-01	a, i	2.80E-01	a, i
S-(2-diisopropylaminoethyl)-methylphosphonothioic acid	73207-98-4	NA		NA	
Diisopropyl methylphosphonate	1445-75-6	NA		NA	
Dimethyl methylphosphonate	756-79-6	NA		NA	
2,4-Dimethylphenol	105-67-9	2.90E-02	b	1.80E-02	f
3,5-Dinitroaniline	618-87-1	4.26E-02	i, F	4.26E-02	i, F
1,3-Dinitrobenzene	99-65-0	8.61E-03	c	1.38E-02	h, C
2,4-Dinitrotoluene	121-14-2	4.16E-02	b	1.89E-01	h, C
2,6-Dinitrotoluene	606-20-2	3.98E-02	c	1.55E-01	h, C
1,2-Diphenylhydrazine	122-66-7	NA		NA	
Di-sec-octylphthalate [bis(2-ethylhexyl)phthalate]	117-81-7	1.80E-01	b	1.82E-01	m
1,4-Dithiane	505-29-3	NA		NA	
alpha-Endosulfan	959-98-8	2.90E-03	b	2.90E-03	f, i
beta-Endosulfan	33213-65-9	1.40E-02	b	1.40E-02	f, i
Endrin	72-20-8	5.40E-02	a, i	9.90E-03	a, i
Ethylbenzene	100-41-4	1.10E+00	b	3.05E-01	m
Ethyl methylphosphonic acid	1832-53-7	NA		NA	
o-Ethyl S-(2-diisopropylaminoethyl) Methylphosphonothiolate (VX)	50782-69-9	NA		NA	
Ethyldiethanolamine	139-87-7	NA		NA	
Fluoranthene	206-44-0	4.23E-01	b	1.13E-01	m
Fluorene	86-73-7	7.74E-02	b	2.12E-02	m

Analyte	CAS Number	Freshwater (mg/kg dw)	Note	Marine (mg/kg dw)	Note
Guthion	86-50-0	5.05E-05	b	5.05E-05	m
Haloethers (total)	MRSPP-14	1.23E+00	b, p	NA	
Halomethanes (total)	MRSPP-15	6.42E-02	b, q	1.31E+00	m, x
Heptachlor	76-44-8	6.80E-02	b	3.00E-04	f
Heptachlor epoxide	1024-57-3	2.47E-03	b	2.47E-03	b, J
Hexachlorobenzene	118-74-1	2.00E-02	b	6.00E-03	f
Hexachlorobutadiene	87-68-3	2.65E-02	c	1.30E-03	f
Hexachlorocyclohexane (HCH)	608-73-1	3.00E-03	b	3.20E-04	E
Hexachlorocyclopentadiene	77-47-4	9.01E-01	c	1.39E-01	m
Hexachloroethane	67-72-1	1.03E+00	b	8.04E-01	m
Hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine (DNX)	80251-29-2	NA		NA	
Hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX)	5755-27-1	NA		NA	
Hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX)	13980-04-6	NA		NA	
HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)	2691-41-0	3.80E-03	i, F	3.80E-03	i, F
Hydrogen cyanide	74-90-8	1.00E-01	b, L	NA	
Hydrogen sulfide	7783-06-4	NA		NA	
Indeno(1,2,3-cd)pyrene	193-39-5	1.70E-02	b	6.80E-02	f
Iron	7439-89-6	2.00E+04	b	2.20E+05	f
Isophorone	78-59-1	4.32E-01	c	NA	
Isopropyl methyl phosphonic acid	1832-54-8	NA		NA	
Lead	7439-92-1	3.58E+01	b	3.02E+01	m
Lewisite (Dichoro(2-chlorovinyl)arsine)	541-25-3	NA		NA	
Lindane	58-89-9	2.37E-03	b	3.20E-04	m
Lithium	7439-93-2	NA		NA	
Malathion	121-75-5	2.03E-04	b	2.10E-04	m
Magnesium	7439-95-4	NA		NA	
Manganese	7439-96-5	4.60E+02	b	2.60E+02	f
Mercury	7439-97-6	1.80E-01	b	1.30E-01	m
Methoxychlor	72-43-5	1.87E-02	b	2.96E-02	m
2-Methylnaphthalene	91-57-6	2.02E-02	b, D	2.02E-02	m
4-Chloro-3-methylphenol	59-50-7	3.88E-01	c	NA	
Methylphosphonic acid	993-13-5	NA		NA	
Mirex	2385-85-5	7.00E-03	b	NA	
Molybdenum	7439-98-7	NA		NA	
Naphthalene	91-20-3	1.76E-01	b	3.46E-02	m
Nickel	7440-02-0	2.27E+01	b	1.59E+01	m
Nitrobenzene	98-95-3	1.45E-01	c	2.10E-02	f
Nitrocellulose (NC)	9004-70-0	NA		NA	
Nitroglycerine	55-63-0	1.27E+00	i, F	1.27E+00	i, F
Nitroguanidine	556-88-7	3.47E-01	i, F	3.47E-01	i, F

Analyte	CAS Number	Freshwater (mg/kg dw)	Note	Marine (mg/kg dw)	Note
Nitrophenols (total)	MRSPP-18	1.33E-02	c, u	NA	
Nitrosamines	35576-91-1	2.68E+00	b, r	4.22E+02	m, r
2-Nitrotoluene (o-Nitrotoluene)	88-72-2	6.20E+00	i, F	6.20E+00	i, F
3-Nitrotoluene (m-Nitrotoluene)	99-08-1	1.90E+00	i, F	1.90E+00	i, F
4-Nitrotoluene (p-Nitrotoluene)	99-99-0	4.06E+00	b	6.80E-01	i, F
Parathion	56-38-2	7.57E-04	b	1.04E-02	m
Pentachloroethane	76-01-7	8.26E-01	b	NA	
Pentachlorophenol	87-86-5	5.04E-01	b	7.97E+00	m
Pentaerythritol tetranitrate (PETN)	78-11-5	3.25E+02	i, F	3.25E+02	i, F
Perchlorate	14797-73-0	NA		NA	
Phenanthrene	85-01-8	2.04E-01	b	8.67E-02	m
Phenol	108-95-2	4.20E-01	b	1.30E-01	f
Phosphorus	7723-14-0	6.00E+02	k	NA	
Phthalate esters	MRSPP-20	1.80E-01	b, s	1.82E-01	m, s
Picric acid	88-89-1	3.40E+00	i, F	3.40E+00	i, F
Pinacolyl methylphosphonic acid	616-52-48	NA		NA	
Polychlorinated biphenyls (PCBs)	1336-36-3	5.98E-02	b	4.00E-02	m
Potassium	7440-09-7	NA		NA	
Potassium perchlorate	7778-74-7	NA		NA	
Pyrene	129-00-0	1.95E-01	b	1.53E-01	m
RDX (Hexahydro-1,3,5-trinitro-1,3,5-triazine)	121-82-4	1.20E-02	i, F	1.20E-02	i, F
Sarin (Isopropyl methylphosphonofluoridate)	107-44-8	NA		NA	
Selenium	7782-49-2	2.00E+00	b	1.00E+00	f
Silver	7440-22-4	1.00E+00	b	7.30E-01	m
Sodium	7440-23-5	NA		NA	
Soman (Pinacolyl methylphosphonofluoridate)	96-64-0	NA		NA	
Strontium	7440-24-6	NA		NA	
Sulfur Mustard (bis(2-chloroethyl)sulfide)	505-60-2	NA		NA	
Tabun (Ethyl n, n-dimethylphosphoramido-cyanidate)	77-81-6	NA		NA	
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	8.50E-07	b, D, H	8.50E-07	E, H
1,1,2,2-Tetrachloroethane	79-34-5	1.36E+00	b	2.02E-01	m
Tetrachloroethanes	25322-20-7	1.36E+00	b, t	2.02E-01	m, t
Tetrachloroethylene (PCE)	127-18-4	4.68E-01	b	1.90E-01	m
2,3,5,6-Tetrachlorophenol	935-95-5	NA		NA	

Analyte	CAS Number	Freshwater (mg/kg dw)	Note	Marine (mg/kg dw)	Note
Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	479-45-8	6.00E-03	i, F	6.00E-03	i, F
Thallium	7440-28-0	NA		NA	
Thiodiglycol	111-48-8	NA		NA	
Thiosulfan [Endosulfan, mixed isomers]	115-29-7	2.14E-03	b	1.07E-04	m
1,4-Thioxane	15980-15-1	NA		NA	
Tin	7440-31-5	NA		4.80E-02	f
Titanium	7440-32-6	NA		NA	
TNT (2,4,6-Trinitrotoluene)	118-96-7	1.10E-02	i, F	1.10E-02	i, F
Toluene	108-88-3	1.22E+00	c	1.09E+00	m
Total Kjeldahl Nitrogen	MRSPP-21	5.50E+02	k	NA	
Total Organic Carbon (%)	MRSPP-22	NA		NA	
Total Phosphorus	MRSPP-23	6.00E+02	k	NA	
Toxaphene	8001-35-2	1.00E-04	b, D	5.36E-01	m
Trichlorinated ethanes	25323-89-1	3.02E-02	b, v	5.70E-01	m, y
1,1,1-Trichloroethane	71-55-6	3.02E-02	b	8.56E-01	m
1,1,2-Trichloroethane	79-00-5	1.24E+00	b	5.70E-01	m
Trichloroethylene (TCE)	79-01-6	9.69E-02	b	8.95E+00	m
2,4,5-Trichlorophenol	95-95-4	NA		8.19E-01	m
2,4,6-Trichlorophenol	88-06-2	2.13E-01	b	2.65E+00	m
Triethanolamine	102-71-6	NA		NA	
1,3,5-Trinitrobenzene	99-35-4	1.60E-03	i, F	1.60E-03	i, F
Uranium (chemical toxicity only)	7440-61-1	NA		NA	
Vanadium	7440-62-2	NA		5.70E+01	f
Zinc	7440-66-6	1.21E+02	b	1.24E+02	m
Zirconium	7440-67-7	NA		NA	

All values presented in scientific notation (e.g., 2.5E+02 = 2.5 x 10^2 = 250).
mg/kg dw - milligrams per kilogram dry weight (equivalent to parts per million).
NA - no screening value available.

Notes:
[a] U.S. EPA Equilibrium Partitioning Sediment Benchmarks (ESBs). August 2003. Note, for dieldrin and endrin, the EPA ESBs were selected in preference to EPA Region 3 BTAG Benchmarks due to the more rigorous derivation process and peer review used in developing the ESBs. EPA ESBs for other chemicals (e.g. PAHs, metals) were not used herein due to data requirements that may not be met by all installations.
[b] U.S. EPA Region 3 BTAG Freshwater Sediment Screening Benchmarks, August 2006. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[c] U.S. EPA Region 5 Ecological Screening Levels for Sediment, August 22, 2003. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[d] Effects Range – Low (ERL) values from NOAA's Sediment Quality Guidelines developed for the National Status and Trends Program, June 12, 1999. These values were originally reported in Long et al. (1995).

[e] Value for chlorobenzene.
[f] Value from Buchman, M.F. (2008). This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[g] Value for total PCBs.
[h] Value from U.S. EPA (1999). This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[i] Value based on 1% organic carbon content in sediment.
[j] Value for 1,2-dichlorobenzene.
[k] Value is a Lowest Effect Level (LEL) from Persaud et al. (1993).
[l] Value for arsenic.
[m] U.S. EPA Region 3 BTAG Marine Sediment Screening Benchmarks, July 2006. This reference is a compilation of values from numerous sources, and users should refer to this reference for the primary reference citations and additional information.
[n] Value for 1,1-dichloroethylene.
[o] Value for 2,4-dinitrotoluene.
[p] Value for 4-bromophenyl phenyl ether.
[q] Value for tetrachloromethane.
[r] Value for N-nitrosodiphenylamine.
[s] Value for bis(2-ethylhexyl)phthalate.
[t] Value for 1,1,2,2-tetrachloroethane.
[u] Value for p-nitrophenol.
[v] Value for 1,1,1-trichloroethane.
[w] Value for 1,4-dichlorobenzene.
[x] Value for tribromomethane.
[y] Value for 1,1,2-trichloroethane.
[z] Value for 2-chloronaphthalene.
[A] Value for 1,2-dichloropropane.
[B] Value from TCEQ (2006).
[C] Values for organic compounds presented in U.S. EPA (1999) are based on an assumed 4% organic carbon content. Values presented here have been adjusted to 1% organic carbon content for consistency with other sources of screening values.
[D] Original source of EPA Region 3 value is Canadian Environmental Quality Guidelines: Summary Table (Canadian Council of Ministers of the Environment, December 2003). These Canadian values are periodically updated, and the most recent updates (CCME 2012) have been incorporated in this table.
[E] Value from CCME (2012).
[F] Values are the low end of the range for 1% OC from Pascoe et al. (2010); note that because of data limitations, the CVs are considered by the authors to be applicable to both freshwater and marine sediments. In some cases, values from this source were selected in preference to other sources in the hierarchy because this reference provides a more recent compilation of available toxicity data and partitioning coefficients.
[G] Value for 2,6-dinitrotoluene.
[H] Value is for polychlorinated dibenzo-p-dioxins/dibenzo furans, expressed as mg TEQ/kg dry weight. (where TEQ is toxic equivalency concentration). Refer to CCME (2012) for additional information.
[J] Value is the Region 3 BTAG freshwater sediment benchmark for heptachlor epoxide, which is a consensus-based threshold effect concentration (TEC) from MacDonald et al. (2000). EPA Region 3 BTAG recommends a different “marine” value, which is an Interim Sediment Quality Guideline from the Canadian Council of Ministers of the Environment (CCME) and is actually a *freshwater* value that CCME adopted for marine use. Because both the consensus-based TEC and CCME values are derived from freshwater data, DoD elected to use the consensus-based TEC as both the freshwater and marine CV.
[K] Value for chromium.
[L] Value for free cyanide.

Additional References Consulted for Freshwater and Marine Sediment CVs

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URL: http://www.ecy.wa.gov/programs/tcp/smu/sed_chem.htm

Chemical Name and Chemical Abstract System (CAS) Number Changes

The table below contains the chemical name and CAS number changes for figures B.1.1, B.2.1 and B.3.1. The table below identifies the figure with the change, the previous analyte name or CAS number, the proposed new analyte name or CAS number, and the reason for the change.

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.1.1	Aminodinitrotoluene	Omitted	1321-12-6	Omitted	CAS is incorrect and the chemical group is more appropriately represented by 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene
B.1.1	Antimony Potassium Tartrate	No change	28300-74-5	11071-15-1	CAS number corrected for consistency with analyte name
B.1.1	Avermectin B1	No change	71751-41-2	65195-55-3	CAS number corrected for consistency with analyte name
B.1.1	1-Butanol	N-Butaol	71-36-3	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	sec-Butylbenzene	No change	135-9-88	135-9-8-89	CAS number corrected for consistency with analyte name
B.1.1	Captafol	No change	2425-061	2425-06-1	CAS number corrected for consistency with analyte name
B.1.1	Chloroacetaldehyde	2-Chloroacetaldehyde	107-20-20	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	4-Chloroaniline	p-Chloroaniline	106-47-8	No change	Chemical name corrected for consistency with EPA RSLs.

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.1.1	Total Chromium	No change	MRSSPP-01	7440-47-3	CAS number corrected for consistency with analyte name
B.1.1	Crotonaldehyde	Trans-Crotonaldehyde	123-73-9	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	Dibenzo[ah]anthracene	Dibenz[a,h]anthracene	53-70-3	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	NA	Diethylanolamine	NA	111-42-2	Analyte added to B.1.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.1.1	NA	Dinitrotoluene, 2-Amino-4,6-	NA	35572-78-2	Analyte added to B.1.1 based on DoD Component comments
B.1.1	NA	Dinitrotoluene, 4-Amino-2,6-	NA	19406-51-0	Analyte added to B.1.1 based on DoD Component comments
B.1.1	Dinitrotoluene mixture	N/A	25321-14-6	N/A	Analyte deleted based on comments from reviewers.
B.1.1	Dodine	No change	2439-103	2439-10-3	CAS number corrected for consistency with analyte name
B.1.1	Fluorine (soluble fluoride)	No change	16984-48-8	7782-41-5	CAS number corrected for consistency with analyte name

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.1.1	Hydrazine, hydrazine sulfate	Hydrazine	302-01-2	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	Hydrazine, monomethyl	Hydrazine, methyl	60-34-4	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	Hydrogen Sulfide	No change	7783-064	7783-06-4	CAS number corrected for consistency with analyte name
B.1.1	p-Hydroquinone	Hydroquinone	123-31-9	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	Mancozeb	No change	8018-017	8018-01-7	CAS number corrected for consistency with analyte name
B.1.1	Nickel Refinery Dust	No change	MRSPP-02	NA	CAS number corrected for consistency with analyte name
B.1.1	Nickel Subsulfide	No change	NA	NA	Analyte deleted from B.1.1 because it is not a target compound that is ever speciated.
B.1.1	NA	Pentaerythritol tetranitrate (PETN)	NA	78-11-5	Analyte added to B.1.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.1.1 B.2.1 B.3.1	Perchlorate	No change	7601-90-3	14797-73-0	CAS number corrected for consistency with analyte name

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.1.1	Potassium Cyanide	No change	omitted	151-50-8	CAS number corrected for consistency with analyte name
B.1.1	n-Propylbenzene	Propylbenzene	103-65-1	No change	Chemical name corrected for consistency with EPA RSLs.
B.1.1	Propylene glycol, monoethyl ether	No change	52125-53-8	1569-02-4	CAS number corrected for consistency with analyte name
B.1.1	Sodium Cyanide	No change	omitted	143-33-9	CAS number corrected for consistency with analyte name
B.1.1	Thiodiglycol	No change	111-48-8	No change	Toxicity value from CHPPM replaced with PPRTV Appendix toxicity value.
~~B.1.1~~	~~1,1,2-Trichloroethane~~	~~No change~~	~~79-00-5~~	~~omitted~~	~~CAS number corrected for consistency with analyte name~~
~~B.1.1~~	~~Vanadium and Compounds~~	~~No change~~	~~7440-62-2~~	~~NA~~	~~CAS number corrected for consistency with analyte name~~
B.1.1	Vanadium Sulfate	No change	13701-70-7	36907-42-3	CAS number corrected for consistency with analyte name
B.2.1 B.3.1	Arsenic (III)	No change	22569-72-8	22541-54-4	CAS number corrected for consistency with analyte name
B.2.1 B.3.1	Benzo(g,h,i)perylene	No change	198-55-0	191-24-2	CAS number corrected for consistency with analyte name
B.2.1 B.3.1	Chromium (III)	No change	1308-14-1	16065-83-1	CAS number corrected for consistency with analyte name

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.2.1	Dichlorodiphenyl dichloroethane (DDD)	DDD	72-54-8	No change	Analyte name changed for consistency with tables B.1.1 and B.3.1
B.2.1	p,p'-DDE	DDE	72-55-9	No change	Analyte name changed for consistency with tables B.1.1 and B.3.1
B.2.1 B.3.1	Polynuclear aromatic hydrocarbons (total) PAHs (total)	N/A	MRSPP-11 MRSPP-19	N/A	Deleted Total PAHs to avoid double-scoring PAH compounds; Contaminant Hazard Factors should be determined based on individual PAHs only
B.3.1	Polychlorinated biphenyls (PCBs, total)	Polychlorinated biphenyls (PCBs)	1336-36-3	No change	Analyte name changed for consistency with tables B.1.1 and B.2.1
B.2.1	Cyanide	Cyanide (free)	57-12-5	No change	Analyte name changed for consistency with tables B.1.1 and B.2.1
B.2.1 B.3.1	Hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine (DNX)	No change	MRSPP-16 MRSPP-07	80251-29-2	MRSPP number changed to CAS number based on *Military Munitions Response Actions* (June 2007)
B.2.1 B.3.1	Hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX)	No change	MRSPP-17 MRSPP-08	5755-27-1	MRSPP number changed to CAS number based on *Military Munitions Response Actions* (June 2007)

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.2.1 B.3.1	N/A	3,5-Dinitroaniline	N/A	618-87-1	Analyte added to B.2.1 and B.3.1 because it is included in *Military Munitions Response Actions* (June 2007)
B.2.1 B.3.1	N/A	Thiodiglycol	N/A	111-48-8	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Diisopropyl methylphosphonate	N/A	1445-75-6	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	Dimethyl methylphosphonate	No change	756-76-9	756-79-6	Corrected erroneous CAS number
B.2.1 B.3.1	Dinitrotoluene (total)	N/A	25321-14-6	N/A	Analyte deleted based on comments from reviewers.

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.2.1 B.3.1	N/A	Arsine	N/A	7784-42-1	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Boron	N/A	7740-442-8	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Chloropicrin	N/A	76-06-2	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Cyanogen chloride	N/A	506-77-4	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.2.1 B.3.1	N/A	Hydrogen cyanide	N/A	74-90-8	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Lithium	N/A	7439-93-2	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Molybdenum	N/A	7439-98-7	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)
B.2.1 B.3.1	N/A	Tin	N/A	7440-31-5	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)

Applicable Figure	Original Analyte Name	Proposed Analyte Name	Original CAS Number	Proposed CAS Number	Rationale
B.2.1 B.3.1	N/A	Uranium (chemical toxicity only)	N/A	7440-61-1	Analyte added to B.2.1 and B.3.1 because it is included in the *Interim Technical Guidance for Military Munitions Response Actions* (20 December 2013)