

APPENDIX G

Human Health Risk Assessment Tables

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Table G-1. SRC and COPC Screening for Surface Water at Load Line 12

Analyte (mg/L)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^c Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max
									RA	RC	NGT						
Inorganic Compounds																	
Aluminum	7429-90-5	13/ 14	0.079	21.3	3.08	3.37	Yes	Exceeds background	63.895	14.827	73.445	14.827	RC	Yes	Exceeds screening level	L12sw-308	02/15/10
Antimony	7440-36-0	5/ 14	0.0004	0.00094	0.00182	0	Yes	Exceeds background	0.0171	0.0049	0.0065	0.00491	RC	No	Below risk screening criteria	L12sw-309	02/15/10
Arsenic	7440-38-2	8/ 14	0.00046	0.0147	0.0037	0.0032	Yes	Exceeds background	0.0011	0.0012	0.0042	0.0011	RA	Yes	Exceeds screening level	L12sw-309	02/15/10
Barium	7440-39-3	14/ 14	0.0193	0.187	0.0591	0.0475	Yes	Exceeds background	12.131	2.901	10.64	2.901	RC	No	Below risk screening criteria	L12sw-308	02/15/10
Beryllium	7440-41-7	4/ 14	0.000035	0.0012	0.00113	0	Yes	Exceeds background	--	--	--	0.0025	RSL	No	Below risk screening criteria	L12sw-308	02/15/10
Cadmium	7440-43-9	6/ 14	0.000038	0.0017	0.00132	0	Yes	Exceeds background	0.0151	0.0051	0.0041	0.00408	NGT	No	Below risk screening criteria	L12sw-309	02/15/10
Calcium	7440-70-2	14/ 14	23	184	56.4	41.4	No	Essential Nutrient	--	--	--	500	RDA	No	Essential Nutrient	L12-213	10/16/00
Chromium ^d	7440-47-3	10/ 14	0.0006	0.0231	0.00518	0	Yes	Exceeds background	0.0903	0.0303	0.0245	0.0245	NGT	No	Below risk screening criteria	L12sw-308	02/15/10
Cobalt	7440-48-4	11/ 14	0.00019	0.0159	0.00832	0	Yes	Exceeds background	--	--	--	0.0006	RSL	Yes	Exceeds screening level	L12sw-309	02/15/10
Copper	7440-50-8	9/ 14	0.0014	0.0249	0.0103	0.0079	Yes	Exceeds background	2.788	0.614	7.199	0.614	RC	No	Below risk screening criteria	L12sw-308	02/15/10
Iron	7439-89-6	14/ 14	0.5	45.5	7.09	2.56	Yes	Exceeds background	20	4.527	31.296	18	RDA	Yes	Exceeds screening level	L12sw-309	02/15/10
Lead	7439-92-1	9/ 14	0.0003	0.0365	0.0062	0	Yes	Exceeds background	--	--	--	0.015	RSL	Yes	Exceeds screening level	L12sw-308	02/15/10
Magnesium	7439-95-4	14/ 14	2.81	49.5	9.51	10.8	No	Essential Nutrient	--	--	--	200	RDA	No	Essential Nutrient	L12-213	10/16/00
Manganese	7439-96-5	14/ 14	0.029	3.6	0.679	0.391	Yes	Exceeds background	2.476	0.633	1.449	0.633	RC	Yes	Exceeds screening level	L12-213	10/16/00
Nickel	7440-02-0	12/ 14	0.0017	0.0244	0.00878	0	Yes	Exceeds background	1.445	0.312	8.258	0.312	RC	No	Below risk screening criteria	L12sw-308	02/15/10
Potassium	7440-09-7	14/ 14	1.25	6.2	3.3	3.17	No	Essential Nutrient	--	--	--	1750	RDA	No	Essential Nutrient	L12-213	10/16/00
Selenium	7782-49-2	9/ 14	0.00029	0.0064	0.00184	0	Yes	Exceeds background	--	--	--	0.01	RSL	No	Below risk screening criteria	L12-213	10/16/00
Silver	7440-22-4	1/ 14	0.092	0.092	0.00909	0	Yes	Exceeds background	0.348	0.0768	0.9	0.0768	RC	Yes	Exceeds screening level	L12-213	10/16/00
Sodium	7440-23-5	14/ 14	0.94	25	5.22	21.3	No	Essential Nutrient	--	--	--	1200	RDA	No	Essential Nutrient	L12-213	10/16/00
Vanadium	7440-62-2	11/ 14	0.00075	0.0367	0.0109	0	Yes	Exceeds background	0.211	0.0706	0.0572	0.0572	NGT	No	Below risk screening criteria	L12sw-308	02/15/10
Zinc	7440-66-6	11/ 14	0.0102	0.346	0.0765	0.042	Yes	Exceeds background	21.002	4.617	58.216	4.617	RC	No	Below risk screening criteria	L12sw-308	02/15/10
Explosives																	
1,3,5-Trinitrobenzene	99-35-4	1/ 14	0.009	0.009	0.00071	--	Yes	Detected organic	--	--	--	0.059	RSL	No	Below risk screening criteria	L12-213	10/16/00
2,4,6-Trinitrotoluene	118-96-7	1/ 14	0.011	0.011	0.00087	--	Yes	Detected organic	0.0365	0.0078	0.328	0.00782	RC	Yes	Exceeds screening level	L12-213	10/16/00
4-Amino-2,6-Dinitrotoluene	19406-51-0	2/ 14	0.000054	0.00021	0.0001	--	Yes	Detected organic	0.0146	0.0031	0.131	0.00313	RC	No	Below risk screening criteria	L12sw-307	02/15/10
HMX	2691-41-0	1/ 14	0.0019	0.0019	0.00027	--	Yes	Detected organic	3.65	0.782	32.756	0.782	RC	No	Below risk screening criteria	L12-213	10/16/00
Nitrocellulose	9004-70-0	1/ 9	0.15	0.15	0.572	--	Yes	Detected organic	--	--	--	6000	RSL	No	Below risk screening criteria	L12sw-307	02/15/10
PETN	78-11-5	1/ 8	0.001	0.001	0.00058	--	Yes	Detected organic	--	--	--	0.0039	--	No	Below risk screening criteria	L12sw-306	02/15/10
RDX	121-82-4	3/ 14	0.00051	0.0066	0.00068	--	Yes	Detected organic	0.0155	0.0166	0.167	0.0155	RA	No	Below risk screening criteria	L12-213	10/16/00
Tetryl	479-45-8	1/ 14	0.0087	0.0087	0.0007	--	Yes	Detected organic	--	--	--	0.0039	RSL	Yes	Exceeds screening level	L12-213	10/16/00
Anions																	
Nitrate	14797-55-8	7/ 14	0.033	21.1	1.61	--	Yes	Exceeds background	115.16	24.892	584.94	24.892	RC	No	Below risk screening criteria	L12-213	10/16/00

Table G-1. SRC and COPC Screening for Surface Water at Load Line 12 (continued)

Analyte (mg/L)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max
									RA	RC	NGT						
Semi-volatile Organic Compounds																	
Benz(a)anthracene	56-55-3	1/ 14	0.00024	0.00024	0.0052	--	Yes	Detected organic	1E-05	4E-05	3E-05	0.000014	RA	Yes	Exceeds screening level	L12sw-308	02/15/10
Benzo(a)pyrene	50-32-8	1/ 14	0.00022	0.00022	0.00519	--	Yes	Detected organic	8E-07	2E-06	2E-06	8E-07	RA	Yes	Exceeds screening level	L12sw-308	02/15/10
Benzo(b)fluoranthene	205-99-2	1/ 14	0.00032	0.00032	0.0052	--	Yes	Detected organic	8E-06	2E-05	2E-05	0.000008	RA	Yes	Exceeds screening level	L12sw-308	02/15/10
Bis(2-ethylhexyl)phthalate	117-81-7	3/ 14	0.0011	0.096	0.011	--	Yes	Detected organic	0.0035	0.0093	0.0068	0.00349	RA	Yes	Exceeds screening level	L12sw-306	02/15/10
Chrysene	218-01-9	1/ 14	0.00022	0.00022	0.00519	--	Yes	Detected organic	0.0014	0.0038	0.0032	0.00136	RA	No	Below risk screening criteria	L12sw-308	02/15/10
Fluoranthene	206-44-0	2/ 14	0.00033	0.00046	0.00488	--	Yes	Detected organic	--	--	--	0.08	RSL	No	Below risk screening criteria	L12sw-308	02/15/10
Pyrene	129-00-0	2/ 14	0.0003	0.00033	0.00487	--	Yes	Detected organic	2.19	0.469	19.654	0.469	RC	No	Below risk screening criteria	L12sw-308	02/15/10
Pesticides/PCBs																	
delta-BHC	319-86-8	2/ 14	0.000014	0.000067	2.7E-05	--	Yes	Detected organic	--	--	--	--	--	Yes	Detected and no screening criteria	L12sw-307	02/15/10
Volatile Organic Compounds																	
Carbon disulfide	75-15-0	1/ 14	0.00053	0.00053	0.00136	--	Yes	Detected organic	--	--	--	0.081	RSL	No	Below risk screening criteria	L12sw-309	02/15/10
Methylene chloride	75-09-2	2/ 14	0.0018	0.0031	0.00135	--	Yes	Detected organic	0.076	0.0841	0.0464	0.0464	NGT	No	Below risk screening criteria	L12-213	10/16/00

^aBackground criteria for surface water from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^bFacility-Wide Cleanup Goals (FWCUGs) for Resident Adult (RA), Resident Child (RC), and National Guard Trainee (NGT) from *Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE 2010).

^cScreening Level Source:

- NGT = FWCUG for National Guard Trainee
- RDA = Concentration associated with recommended daily allowance of essential nutrient
- RA = FWCUG for Resident Adult
- RC = FWCUG for Resident Child
- RSL = Residential Soil Regional Screening Level

^dFWCUG is the most consevative (smallest) of the FWCUG for hexavalent and trivalent chromium.

^eThe Average Result concentration presented in this table is the arithmetic average. This average concentration is not equivalent to the EPC used in the HHRA.

BHC = Benzene hexachloride
CAS = Chemical Abstract Service
COPC = Chemical of Potential Concern
HQ = Hazard Quotient
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
PCB = Polychlorinated Biphenyl
PETN = Pentaerythritol tetranitrate
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine
SRC = Site-related Contaminant
-- = No value available
Bold = Chemical is a COPC

Table G-2. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 Active Area Channel

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^g Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Collected at Max Detect
									RA	RC	NGT						
Inorganic Compounds																	
Aluminum	7429-90-5	6/ 6	9520	23600	14400	13900	Yes	Exceeds background	52923	7380	3496	3496	NGT	Yes	Exceeds screening level	L12sd-311	02/15/10
Antimony	7440-36-0	4/ 5	0.15	2.8	0.8	0	Yes	Exceeds background	13.6	2.82	175	2.82	RC	No	Below risk screening criteria	L12-213	10/15/00
Arsenic	7440-38-2	6/ 6	6.8	26	13.9	19.5	Yes	Exceeds background	0.425	0.524	2.78	0.425	RA	Yes	Exceeds screening level	L12sd-311	10/15/00
Barium	7440-39-3	6/ 6	58.1	157	98.2	123	Yes	Exceeds background	8966	1413	351	351	NGT	No	Below risk screening criteria	L12sd-313	02/15/10
Beryllium	7440-41-7	6/ 6	0.63	1.5	0.862	0.38	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	L12sd-311	02/15/10
Cadmium	7440-43-9	6/ 6	0.21	1.8	0.71	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria	L12sd-313	02/15/10
Calcium	7440-70-2	6/ 6	2120	20400	8150	5510	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	L12sd-310	02/15/10
Chromium ^d	7440-47-3	6/ 6	16.4	74.6	35.2	18.1	Yes	Exceeds background	90.4	19.9	1.64	1.64	NGT	Yes	Exceeds screening level	L12sd-312	10/15/00
Cobalt ^e	7440-48-4	6/ 6	6.7	30.5	14	9.1	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	L12sd-311	10/15/00
Copper	7440-50-8	6/ 6	17	85.4	41.8	27.6	Yes	Exceeds background	2714	311	25368	311	RC	No	Below risk screening criteria	L12sd-311	10/15/00
Cyanide	57-12-5	1/ 1	2.8	2.8	2.8	0	Yes	Exceeds background	--	--	--	0.27	RSL	Yes	Exceeds screening level	L12-213	10/15/00
Iron	7439-89-6	6/ 6	18200	54900	28700	28200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	L12sd-311	10/15/00
Lead	7439-92-1	6/ 6	16.4	76.1	36.1	27.4	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	L12-213	10/15/00
Magnesium	7439-95-4	6/ 6	2020	7870	3780	2760	No	Essential Nutrient				1000000	RDA	No	Essential Nutrient	L12sd-311	10/15/00
Manganese	7439-96-5	6/ 6	162	1220	552	1950	No	Below background	1482	293	35.1	35.1	NGT	No	Below background	L12sd-311	10/15/00
Mercury	7439-97-6	4/ 6	0.062	0.37	0.113	0.059	Yes	Exceeds background	16.5	2.27	172	2.27	RC	No	Below risk screening criteria	L12-213	10/15/00
Nickel	7440-02-0	6/ 6	18.2	62.1	30.1	17.7	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria	L12sd-311	10/15/00
Potassium	7440-09-7	6/ 6	979	2390	1460	1950	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	L12sd-311	02/15/10
Selenium	7782-49-2	6/ 6	0.94	3	1.86	1.7	Yes	Exceeds background	--	--	--	39	RSL	No	Below risk screening criteria	L12sd-313	10/15/00
Silver	7440-22-4	5/ 6	0.078	397	78.5	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	Yes	Exceeds screening level	L12-213	10/15/00
Sodium	7440-23-5	5/ 6	82.1	1290	393	112	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	L12sd-308	02/15/10
Thallium	7440-28-0	6/ 6	0.17	0.72	0.335	0.89	No	Below background	4.76	0.612	47.7	0.612	RC	No	Below background	L12-213	10/15/00
Vanadium	7440-62-2	6/ 6	15.4	39.4	22.9	26.1	Yes	Exceeds background	156	44.9	2304	44.9	RC	No	Below risk screening criteria	L12sd-311	02/15/10
Zinc	7440-66-6	6/ 6	93.7	452	231	532	No	Below background	19659	2321	187269	2321	RC	No	Below background	L12sd-313	10/15/00
Explosives																	
2,4,6-Trinitrotoluene	118-96-7	3/ 6	0.035	0.18	0.123	--	Yes	Detected organic	21.1	3.65	249	3.65	RC	No	Below risk screening criteria	L12sd-311	04/20/11
HMX	2691-41-0	3/ 6	0.019	0.11	0.116	--	Yes	Detected organic	1909	359	23464	359	RC	No	Below risk screening criteria	L12sd-313	04/20/11
Semi-volatile Organic Compounds																	
1,2,4-Trichlorobenzene	120-82-1	1/ 6	0.064	0.064	0.409	--	Yes	Detected organic	--	--	--	5.8	RSL	No	Below risk screening criteria	L12-213	10/15/00
1,2-Dichlorobenzene	95-50-1	1/ 6	0.092	0.092	0.414	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12-213	10/15/00
2-Methylnaphthalene	91-57-6	2/ 6	0.041	0.054	0.353	--	Yes	Detected organic	--	--	--	24	RSL	No	Below risk screening criteria	L12sd-312	04/20/11
Acenaphthene	83-32-9	1/ 6	0.03	0.03	0.0961	--	Yes	Detected organic	--	--	--	360	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Acenaphthylene ^f	208-96-8	1/ 6	0.061	0.061	0.101	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Anthracene	120-12-7	1/ 6	0.078	0.078	0.104	--	Yes	Detected organic	--	--	--	1800	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Benz(a)anthracene	56-55-3	5/ 6	0.017	0.35	0.105	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	Yes	Exceeds screening level	L12sd-308	02/15/10
Benzo(a)pyrene	50-32-8	5/ 6	0.02	0.41	0.12	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	L12sd-308	02/15/10
Benzo(b)fluoranthene	205-99-2	6/ 6	0.031	0.68	0.171	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	Yes	Exceeds screening level	L12sd-308	02/15/10
Benzo(ghi)perylene ^f	191-24-2	5/ 6	0.018	0.34	0.102	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Benzo(k)fluoranthene	207-08-9	5/ 6	0.015	0.28	0.0907	--	Yes	Detected organic	2.21	6.5	47.7	2.21	RA	No	Below risk screening criteria	L12sd-308	02/15/10
Bis(2-ethylhexyl)phthalate	117-81-7	4/ 6	0.028	0.22	0.187	--	Yes	Detected organic	--	--	--	39	RSL	No	Below risk screening criteria	L12sd-313	04/20/11
Chrysene	218-01-9	5/ 6	0.024	0.46	0.134	--	Yes	Detected organic	--	--	--	16	RSL	No	Below risk screening criteria	L12sd-308	02/15/10

Table G-2. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 Active Area Channel (continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^g Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max
									RA	RC	NGT						
Dibenz(a,h)anthracene	53-70-3	1/ 6	0.085	0.085	0.105	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	L12sd-308	02/15/10
Dibenzofuran	132-64-9	1/ 6	0.012	0.012	0.4	--	Yes	Detected organic	--	--	--	7.3	RSL	No	Below risk screening criteria	L12sd-312	
Fluoranthene	206-44-0	6/ 6	0.037	0.68	0.175	--	Yes	Detected organic	--	--	--	240	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Fluorene	86-73-7	1/ 6	0.024	0.024	0.0951	--	Yes	Detected organic	--	--	--	240	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Indeno(1,2,3-cd)pyrene	193-39-5	5/ 6	0.015	0.31	0.0952	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	Yes	Exceeds screening level	L12sd-308	02/15/10
Naphthalene	91-20-3	2/ 6	0.03	0.033	0.0957	--	Yes	Detected organic	--	--	--	3.8	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Phenanthrene	85-01-8	4/ 6	0.015	0.23	0.102	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
Pyrene	129-00-0	6/ 6	0.028	0.54	0.146	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-308	02/15/10
<i>Pesticides/PCBs</i>																	
PCB-1254	11097-69-1	2/ 6	0.027	0.15	0.0653	--	Yes	Detected organic	0.203	0.12	3.46	0.12	RC	Yes	Exceeds screening level	L12-213	10/15/00
<i>Volatile Organic Compounds</i>																	
Methylene chloride	75-09-2	1/ 1	0.0024	0.0024	0.0024	--	Yes	Detected organic	--	--	--	35	RSL	No	Below risk screening criteria	L12-213	10/15/00

^aBackground criteria for sediment from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^bFacility-Wide Cleanup Goals (FWCUGs) for Resident Adult (RA), Resident Child (RC), and National Guard Trainee (NGT) from *Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE 2010).

^cScreening Level Source:

NGT = FWCUG for National Guard Trainee

RDA = Concentration associated with recommended daily allowance of essential nutrient

RA = FWCUG for Resident Adult

RC = FWCUG for Resident Child

RSL = United States Environmental Protection Agency Residential Regional Screening Level

^dFWCUG is the most conservative (smallest) of the FWCUG for hexavalent and trivalent chromium.

^eNo FWCUG available for cobalt in sediment. Value is FWCUG for cobalt in soil.

^fNo reference dose or cancer potency factors are available for these PAHs, therefore, the RSL value for pyrene was used (NDEP 2006).

^gThe Average Result concentration presented in this table is the arithmetic average. This average concentration is not equivalent to the EPC used in the HHRA.

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

PAH = Polycyclic Aromatic Hydrocarbon

PCB = Polychlorinated Biphenyl

SRC = Site-related Contaminant

-- = No value available

Bold = Chemical is a COPC

Table G-3. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 Former Settling Pond

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^h Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification
									RA	RC	NGT				
Inorganic Compounds															
Aluminum	7429-90-5	1/ 1	17200	17200	17200	13900	Yes	Exceeds background	52923	7380	3496	3496	NGT	Yes	Exceeds screening level
Antimony	7440-36-0	1/ 1	0.21	0.21	0.21	0	Yes	Exceeds background	13.6	2.82	175	2.82	RC	No	Below risk screening criteria
Arsenic	7440-38-2	1/ 1	10.1	10.1	10.1	19.5	No	Below background	0.425	0.524	2.78	0.425	RA	No	Below background
Barium	7440-39-3	1/ 1	104	104	104	123	No	Below background	8966	1413	351	351	NGT	No	Below background
Beryllium	7440-41-7	1/ 1	0.97	0.97	0.97	0.38	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria
Cadmium	7440-43-9	1/ 1	0.31	0.31	0.31	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria
Calcium	7440-70-2	1/ 1	3990	3990	3990	5510	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient
Chromium ^d	7440-47-3	1/ 1	22.7	22.7	22.7	18.1	Yes	Exceeds background	90.4	19.9	1.64	1.64	NGT	Yes	Exceeds screening level
Cobalt ^e	7440-48-4	1/ 1	15.1	15.1	15.1	9.1	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level
Copper	7440-50-8	1/ 1	28.7	28.7	28.7	27.6	Yes	Exceeds background	2714	311	25368	311	RC	No	Below risk screening criteria
Iron	7439-89-6	1/ 1	30600	30600	30600	28200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient
Lead	7439-92-1	1/ 1	18.9	18.9	18.9	27.4	No	Below background	--	--	--	400	RSL	No	Below background
Magnesium	7439-95-4	1/ 1	3720	3720	3720	2760	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient
Manganese	7439-96-5	1/ 1	302	302	302	1950	No	Below background	1482	293	35.1	35.1	NGT	No	Below background
Mercury	7439-97-6	1/ 1	0.065	0.065	0.065	0.059	Yes	Exceeds background	16.5	2.27	172	2.27	RC	No	Below risk screening criteria
Nickel	7440-02-0	1/ 1	29.9	29.9	29.9	17.7	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria
Potassium	7440-09-7	1/ 1	1260	1260	1260	1950	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient
Selenium	7782-49-2	1/ 1	2.1	2.1	2.1	1.7	Yes	Exceeds background	--	--	--	39	RSL	No	Below risk screening criteria
Silver	7440-22-4	1/ 1	0.12	0.12	0.12	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	No	Below risk screening criteria
Sodium	7440-23-5	1/ 1	196	196	196	112	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient
Thallium	7440-28-0	1/ 1	0.27	0.27	0.27	0.89	No	Below background	4.76	0.612	47.7	0.612	RC	No	Below background
Vanadium	7440-62-2	1/ 1	29.3	29.3	29.3	26.1	Yes	Exceeds background	156	44.9	2304	44.9	RC	No	Below risk screening criteria
Zinc	7440-66-6	1/ 1	104	104	104	532	No	Below background	19659	2321	187269	2321	RC	No	Below background

Table G-3. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 Former Settling Pond (continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^h Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification
									RA	RC	NGT				
Semi-volatile Organic Compounds															
2-Methylnaphthalene	91-57-6	1/ 1	0.7	0.7	0.7	--	Yes	Detected organic	--	--	--	24	RSL	No	Below risk screening criteria
3+4-Methylphenol ^l	15831-10-4	1/ 1	0.073	0.073	0.073	--	Yes	Detected organic	--	--	--	630	RSL	No	Below risk screening criteria
Benz(a)anthracene	56-55-3	1/ 1	0.026	0.026	0.026	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria
Benzo(a)pyrene	50-32-8	1/ 1	0.021	0.021	0.021	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	No	Below risk screening criteria
Table G-1. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 Former Settling Pond	205-99-2	1/ 1	0.03	0.03	0.03	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 1	0.063	0.063	0.063	--	Yes	Detected organic	--	--	--	39	RSL	No	Below risk screening criteria
Chrysene	218-01-9	1/ 1	0.03	0.03	0.03	--	Yes	Detected organic	--	--	--	16	RSL	No	Below risk screening criteria
Dibenzofuran	132-64-9	1/ 1	0.13	0.13	0.13	--	Yes	Detected organic	--	--	--	7.3	RSL	No	Below risk screening criteria
Fluoranthene	206-44-0	1/ 1	0.036	0.036	0.036	--	Yes	Detected organic	--	--	--	240	RSL	No	Below risk screening criteria
Naphthalene	91-20-3	1/ 1	0.4	0.4	0.4	--	Yes	Detected organic	--	--	--	3.8	RSL	No	Below risk screening criteria
Phenanthrene ^g	85-01-8	1/ 1	0.14	0.14	0.14	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria
Pyrene	129-00-0	1/ 1	0.035	0.035	0.035	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria

^aBackground criteria for sediment from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^bFacility-Wide Cleanup Goals (FWCUGs) for Resident Adult (RA), Resident Child (RC), and National Guard Trainee (NGT) from *Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE 2010).

^cScreening Level Source:

^dFWCUG is the most conservative (smallest) of the FWCUG for hexavalent and trivalent chromium.

^eNo FWCUG available for cobalt in sediment. Value is FWCUG for cobalt in soil.

^fScreening value is the most conservative (smallest) of the RSLs for 3-methylphenol and 4-methylphenol.

^gNo reference dose or cancer potency factors are available for this PAH, therefore, the RSL value for pyrene was used (NDEP 2006).

^hThe Average Result concentration presented in this table is the arithmetic average. This average concentration is not equivalent to the EPC used in the HHRA.

CAS = Chemical Abstract Service

Table G-4. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 North of Active Area

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^g Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max Detect
									RA	RC	NGT						
Inorganic Compounds																	
Aluminum	7429-90-5	8/ 8	7570	19300	12800	13900	Yes	Exceeds background	52923	7380	3496	3496	NGT	Yes	Exceeds screening level	L12-230	09/30/00
Antimony	7440-36-0	3/ 8	0.1	0.93	0.688	0	Yes	Exceeds background	13.6	2.82	175	2.82	RC	No	Below risk screening criteria	L12-229	09/30/00
Arsenic	7440-38-2	8/ 8	3.8	12.6	7.43	19.5	No	Below background	0.425	0.524	2.78	0.425	RA	No	Below background	ULCPsd-002	08/23/01
Barium	7440-39-3	8/ 8	46.1	129	82.1	123	Yes	Exceeds background	8966	1413	351	351	NGT	No	Below risk screening criteria	L12-230	09/30/00
Beryllium	7440-41-7	5/ 8	0.58	1	0.607	0.38	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	ULCPsd-002	08/23/01
Cadmium	7440-43-9	7/ 8	0.21	1.3	0.64	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria	L12sd-306	02/15/10
Calcium	7440-70-2	8/ 8	1160	4850	2480	5510	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	L12sd-306	02/15/10
Chromium ^d	7440-47-3	8/ 8	10.9	26.2	17.9	18.1	Yes	Exceeds background	90.4	19.9	1.64	1.64	NGT	Yes	Exceeds screening level	ULCPsd-002	08/23/01
Chromium, hexavalent	18540-29-9	1/ 4	1.6	1.6	0.95	--	Yes	Exceeds background	90.4	19.9	1.64	1.64	NGT	No	Below risk screening criteria	L12-231	09/30/00
Cobalt ^e	7440-48-4	8/ 8	7.9	18.6	13.2	9.1	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	L12-223	10/15/00
Copper	7440-50-8	8/ 8	12.8	42.1	20.5	27.6	Yes	Exceeds background	2714	311	25368	311	RC	No	Below risk screening criteria	ULCPsd-002	08/23/01
Iron	7439-89-6	8/ 8	12200	23900	18700	28200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	L12-229	09/30/00
Lead	7439-92-1	8/ 8	14.2	37.9	21.2	27.4	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	ULCPsd-002	08/23/01
Magnesium	7439-95-4	8/ 8	1300	2280	1840	2760	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	L12-223	10/15/00
Manganese	7439-96-5	8/ 8	177	469	299	1950	No	Below background	1482	293	35.1	35.1	NGT	No	Below background	L12-229	09/30/00
Mercury	7439-97-6	8/ 8	0.032	0.17	0.0811	0.059	Yes	Exceeds background	16.5	2.27	172	2.27	RC	No	Below risk screening criteria	L12sd-306	02/15/10
Nickel	7440-02-0	8/ 8	11.9	24.1	16.9	17.7	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria	L12-223	10/15/00
Potassium	7440-09-7	8/ 8	586	1830	1290	1950	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	L12-230	09/30/00
Selenium	7782-49-2	4/ 8	1	1.3	0.752	1.7	No	Below background	--	--	--	39	RSL	No	Below background	L12-224	10/16/00
Silver	7440-22-4	6/ 8	0.096	41.6	8.99	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	Yes	Exceeds screening level	L12sd-306	02/15/10
Sodium	7440-23-5	7/ 8	69.8	177	133	112	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	ULCPsd-002	08/23/01
Thallium	7440-28-0	6/ 8	0.13	0.66	0.399	0.89	No	Below background	4.76	0.612	47.7	0.612	RC	No	Below background	L12-230	09/30/00
Vanadium	7440-62-2	8/ 8	10.6	32.1	22.4	26.1	Yes	Exceeds background	156	44.9	2304	44.9	RC	No	Below risk screening criteria	L12-223	10/15/00
Zinc	7440-66-6	8/ 8	55.7	344	148	532	No	Below background	19659	2321	187269	2321	RC	No	Below background	L12sd-306	02/15/10
Explosives																	
1,3-Dinitrobenzene	99-65-0	1/ 8	0.059	0.059	0.102	--	Yes	Detected organic	--	--	--	0.63	RSL	No	Below risk screening criteria	L12-229	09/30/00
2,4,6-Trinitrotoluene	118-96-7	1/ 8	0.11	0.11	0.109	--	Yes	Detected organic	21.1	3.65	249	3.65	RC	No	Below risk screening criteria	L12sd-306	02/15/10
Semi-volatile Organic Compounds																	
2-Methylnaphthalene	91-57-6	2/ 7	0.01	0.057	0.2	--	Yes	Detected organic	--	--	--	24	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Acenaphthene	83-32-9	1/ 7	0.022	0.022	0.198	--	Yes	Detected organic	--	--	--	360	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Acenaphthylene ^f	208-96-8	1/ 7	0.035	0.035	0.2	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Anthracene	120-12-7	1/ 7	0.052	0.052	0.203	--	Yes	Detected organic	--	--	--	1800	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Table G-1. SRC and COPC	56-55-3	2/ 7	0.044	0.22	0.228	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	L12sd-306	02/15/10
Benzo(a)pyrene	50-32-8	2/ 7	0.06	0.24	0.233	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	L12sd-306	02/15/10
Benzo(b)fluoranthene	205-99-2	4/ 7	0.082	0.35	0.2	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	Yes	Exceeds screening level	L12sd-306	02/15/10
Benzo(ghi)perylene ^f	191-24-2	2/ 7	0.057	0.17	0.222	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Benzo(k)fluoranthene	207-08-9	2/ 7	0.042	0.15	0.217	--	Yes	Detected organic	2.21	6.5	47.7	2.21	RA	No	Below risk screening criteria	L12sd-306	02/15/10
Bis(2-ethylhexyl)phthalate	117-81-7	2/ 7	0.043	0.23	0.232	--	Yes	Detected organic	--	--	--	39	RSL	No	Below risk screening criteria	L12-224	10/16/00
Butyl benzyl phthalate	85-68-7	1/ 7	0.023	0.023	0.243	--	Yes	Detected organic	--	--	--	290	RSL	No	Below risk screening criteria	L12sd-309	02/15/10
Chrysene	218-01-9	2/ 7	0.063	0.25	0.235	--	Yes	Detected organic	--	--	--	16	RSL	No	Below risk screening criteria	L12sd-306	02/15/10

Table G-4. SRC and COPC Screening for Wet Sediment (Discrete Samples) at the Load Line 12 North of Active Area (continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^g Result	Background Criteria ^a	SRC? (yes/no)	SRC Justification	Screening FWCUG ^b (HQ= 0.1 or Risk=1E-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max Detect
									RA	RC	NGT						
Dibenz(a,h)anthracene	53-70-3	2/ 7	0.012	0.042	0.198	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	L12sd-306	02/15/10
Dibenzofuran	132-64-9	1/ 7	0.046	0.046	0.231	--	Yes	Detected organic	--	--	--	7.3	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Fluoranthene	206-44-0	4/ 7	0.071	0.38	0.199	--	Yes	Detected organic	--	--	--	240	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Fluorene	86-73-7	1/ 7	0.017	0.017	0.198	--	Yes	Detected organic	--	--	--	240	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Indeno(1,2,3-cd)pyrene	193-39-5	2/ 7	0.049	0.15	0.218	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	L12sd-306	02/15/10
Naphthalene	91-20-3	1/ 7	0.044	0.044	0.201	--	Yes	Detected organic	--	--	--	3.8	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Phenanthrene ^f	85-01-8	2/ 7	0.03	0.16	0.217	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Pyrene	129-00-0	2/ 7	0.068	0.3	0.243	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	L12sd-306	02/15/10
Volatile Organic Compounds																	
2-Butanone	78-93-3	2/ 6	0.0096	0.017	0.0107	--	Yes	Detected organic	--	--	--	2700	RSL	No	Below risk screening criteria	L12-229	09/30/00
Acetone	67-64-1	1/ 6	0.064	0.064	0.0207	--	Yes	Detected organic	--	--	--	6100	RSL	No	Below risk screening criteria	L12-229	09/30/00
Methylene chloride	75-09-2	2/ 6	0.0032	0.0032	0.00326	--	Yes	Detected organic	--	--	--	35	RSL	No	Below risk screening criteria	L12-223	10/15/00
Toluene	108-88-3	1/ 6	0.0026	0.0026	0.00366	--	Yes	Detected organic	--	--	--	490	RSL	No	Below risk screening criteria	L12-230	09/30/00

^aBackground criteria for sediment from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^bFacility-Wide Cleanup Goals (FWCUGs) for Resident Adult (RA), Resident Child (RC), and National Guard Trainee (NGT) from *Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE 2010).

^cScreening Level Source:

NGT = FWCUG for National Guard Trainee

RDA = Concentration associated with recommended daily allowance of essential nutrient

RA = FWCUG for Resident Adult

RC = FWCUG for Resident Child

RSL = United States Environmental Protection Agency Residential Regional Screening Level

^dFWCUG is the most conservative (smallest) of the FWCUG for hexavalent and trivalent chromium.

^eNo FWCUG available for cobalt in sediment. Value is FWCUG for cobalt in soil.

^fNo reference dose or cancer potency factors are available for these PAHs, therefore, the RSL value for pyrene was used (NDEP 2006).

^gThe Average Result concentration presented in this table is the arithmetic average. This average concentration is not equivalent to the EPC used in the HHRA.

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

PAH = Polycyclic Aromatic Hydrocarbon

SRC = Site-related Contaminant

-- = No value available

Bold = Chemical is a COPC

Table G-5. COC Screening for Surface Water at Load Line 12
Unrestricted Land Use Receptor: Resident (Adult and Child)

COPC	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^c Result	UCL 95	Dist.	EPC	Resident FWCUG ^a		Background Criteria ^b	Exceeds FWCUG?
									HQ=1	Risk=10 ⁻⁵		
Inorganic Compounds												
Aluminum	7429-90-5	13/ 14	0.079	21.3	3.08	29.6	L	21.3	148.274	--	3.37	No
Arsenic	7440-38-2	8/ 14	0.00046	0.0147	0.0037	0.00779	L	0.00779	0.0463	0.011	0.0032	No
Cobalt	7440-48-4	11/ 14	0.00019	0.0159	0.00832	0.0131	X	0.0131	0.006	--	0	Yes
Iron	7439-89-6	14/ 14	0.5	45.5	7.09	13.3	X	13.3	45.269	--	2.56	No
Lead	7439-92-1	9/ 14	0.0003	0.0365	0.0062	0.0336	L	0.0336	0.015	--	0	Yes
Manganese	7439-96-5	14/ 14	0.029	3.6	0.679	5.17	L	3.6	6.326	--	0.391	No
Silver	7440-22-4	1/ 14	0.092	0.092	0.00909	0.0204	D	0.0204	0.768	--	0	No
Explosives												
2,4,6-Trinitrotoluene	118-96-7	1/ 14	0.011	0.011	0.000866	0.00225	D	0.00225	0.0782	0.568	--	No
Tetryl	479-45-8	1/ 14	0.0087	0.0087	0.000702	0.00179	D	0.00179	0.039	--	--	No
Semi-volatile Organic Compounds												
Benz(a)anthracene	56-55-3	1/ 14	0.00024	0.00024	0.0052	0.00636	D	0.00024	--	0.000136	--	Yes
Benzo(a)pyrene	50-32-8	1/ 14	0.00022	0.00022	0.00519	0.00636	D	0.00022	--	0.000008	--	Yes
Benzo(b)fluoranthene	205-99-2	1/ 14	0.00032	0.00032	0.0052	0.00636	D	0.00032	--	0.000079	--	Yes
Bis(2-ethylhexyl)phthalate	117-81-7	3/ 14	0.0011	0.096	0.011	0.0226	D	0.0226	0.223	0.0349	--	No
Pesticides/PCBs												
delta-BHC	319-86-8	2/ 14	0.000014	0.000067	0.0000272	0.0000328	D	0.0000328	--	--	--	Yes

All units in mg/L.

^aFacility-Wide Cleanup Goals (FWCUGs) for Resident (Adult and Child) from Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant (USACE 2010).

^bBackground criteria for surface water from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^cThe Average Result concentration presented in this table is the arithmetic average. This average concentration is not equivalent to the EPC used in the HHRA.

UCL 95 = 95% upper confidence limit of the mean

Dist.: N=normal distribution, t statistic used for UCL 95 calculation

L=lognormal distribution, L and statistic used for UCL 95 calculation

D=fewer than 5 or 50% detects, t statistic used for UCL 95 calculation

X=distribution neither normal nor lognormal, t statistic used for UCL 95 calculation

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

HQ = Hazard Quotient

PAH = Polycyclic Aromatic Hydrocarbon

RA = Resident adult

RC = Resident Child

SRC = Site-related Contaminant

-- = No value available

Bold = EPC exceeds FWCUG

Table G-6. Sum-of-Ratios for Carcinogens
COC Screening for Surface Water at Load Line 12
Unrestricted Land Use Receptor: Resident (Adult and Child)

COPC	CAS Number	EPC	Resident FWCUG ^a : Risk=10 ⁻⁵	Background Criteria ^b	Ratio	Percent Contribution to SOR if > 1
Arsenic	7440-38-2	0.00779	0.011	0.0032	0.7	2%
2,4,6-Trinitrotoluene	118-96-7	0.00225	0.568	--	<0.1	<0.1%
Benz(a)anthracene	56-55-3	0.00024	0.000136	--	2	5%
Benzo(a)pyrene	50-32-8	0.00022	0.000008	--	28	79%
Benzo(b)fluoranthene	205-99-2	0.00032	0.000079	--	4	12%
bis(2-ethylhexyl)phthalate	53-70-3	0.0226	0.0349	--	0.6	2%
Sum-of-Ratios					35	

All units in mg/L.

^aFacility-Wide Cleanup Goals (FWCUGs) for Resident (Adult and Child) from Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant

^bBackground criteria for surface water from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

CAS = Chemical Abstract Service

COC = Chemical of Concern

EPC = Exposure Point Concentration

SOR = Sum-of-Ratios

-- = No value available

Bold = SOR greater than 1

Table G-7. Sum-of-Ratios for Noncarcinogens
COC Screening for Surface Water at Load Line 12
Unrestricted Land Use Receptor: Resident (Adult and Child)

COPC	CAS Number	EPC	FWCUG ^a : HQ = 1	Critical effect or Target Organ	Background Criteria ^b	Ratio
Aluminum	7429-90-5	21.3	148.274	Neurotoxicity in Offspring	3.37	0.1
Arsenic	7440-38-2	0.00779	0.0463	Skin	0.0032	0.2
Cobalt	7440-48-4	0.0131	0.006	Thyroid	0	2
Iron	7439-89-6	13.3	45.269	Gastrointestinal	2.56	0.3
Manganese	7439-96-5	3.6	6.326	Central Nervous System	0.391	0.6
Silver	7440-22-4	0.0204	0.768	Gastrointestinal, skin,	0	<0.1
2,4,6-Trinitrotoluene	118-96-7	0.00225	0.0782	Liver	--	<0.1
Tetryl	479-45-8	0.00179	0.039	Blood	--	<0.1
bis(2-ethylhexyl)phthalate	117-81-7	0.0226	0.223	Liver	--	0.1
Sum-of-Ratios						4
Sum-of-Ratios Skin [arsenic, silver]						0.2
Sum-of-Ratios Gastrointestinal [iron, silver]						0.3
Sum-of-Ratios Liver [2,4,6-trinitrotoluene, bis(2-ethylhexyl)phthalate]						0.1

All units in mg/L.

^aFacility-Wide Cleanup Goals (FWCUGs) for Resident (Adult and Child) from Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant (USACE 2010).

^bBackground criteria for surface water from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

CAS = Chemical Abstract Service

COC = Chemical of Concern

EPC = Exposure Point Concentration

HI = Hazard Index

SOR = Sum-of-Ratios

Bold = SOR greater than 1

Table G-8. COC Screening for Wet Sediment (Discrete Samples) at the Load Line 12
Unrestricted Land Use Receptor: Resident (Adult and Child)

COPC	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average ^e Result	UCL 95	Dist.	EPC	Resident FWCUG ^a		Background Criteria ^b	Exceeds FWCUG?
									HQ=1	Risk=10 ⁻⁵		
Active Area Channel												
Aluminum	7429-90-5	6/ 6	9520	23600	14400	20600	L	20600	73798	--	13900	No
Arsenic	7440-38-2	6/ 6	6.8	26	13.9	25.1	L	25.1	20.2	4.25	19.5	Yes
Chromium ^c	7440-47-3	6/ 6	16.4	74.6	35.2	55.9	X	55.9	81,473	--	18.1	No
Cobalt ^d	7440-48-4	6/ 6	6.7	30.5	14	27.6	L	27.6	1313	8030	9.1	No
Cyanide	57-12-5	1/ 1	2.8	2.8	2.8	--	D	2.8	2.7	--	0	Yes
Silver	7440-22-4	5/ 6	0.078	397	78.5	1.16E+14	L	397	386	--	0	Yes
Benz(a)anthracene	56-55-3	5/ 6	0.017	0.35	0.105	1.37	L	0.35	--	2.21	--	No
Benzo(a)pyrene	50-32-8	5/ 6	0.02	0.41	0.12	1.48	L	0.41	--	0.221	--	Yes
Benzo(b)fluoranthene	205-99-2	6/ 6	0.031	0.68	0.171	2.38	L	0.68	--	2.21	--	No
Dibenz(a,h)anthracene	53-70-3	1/ 6	0.085	0.085	0.105	0.166	D	0.085	--	0.221	--	No
Indeno(1,2,3-	193-39-5	5/ 6	0.015	0.31	0.0952	1.27	L	0.31	--	2.21	--	No
PCB-1254	11097-69-1	2/ 6	0.027	0.15	0.0653	0.105	D	0.105	1.2	2.03	--	No
Former Settling Pond												
Aluminum	7429-90-5	1/1	17200	17200	17200	--	D	17200	73798	--	13900	No
Chromium ^c	7440-47-3	1/1	22.7	22.7	22.7	--	D	22.7	81,473	--	18.1	No
Cobalt ^d	7440-48-4	1/1	15.1	15.1	15.1	--	D	15.1	1313	8030	9.1	No
North of Active Area												
Aluminum	7429-90-5	8/ 8	7570	19300	12800	15500	N	15500	73798	--	13900	No
Chromium ^c	7440-47-3	8/ 8	10.9	26.2	17.9	21.6	N	21.6	81,473	--	18.1	No
Cobalt ^d	7440-48-4	8/ 8	7.9	18.6	13.2	16.6	L	16.6	8030	1313	9.1	No
Silver	7440-22-4	6/ 8	0.096	41.6	8.99	1420	L	41.6	386	--	0	No
Benzo(a)pyrene	50-32-8	2/ 7	0.06	0.24	0.233	0.292	D	0.24	--	0.221	--	Yes
Benzo(b)fluoranthene	205-99-2	4/ 7	0.082	0.35	0.2	0.278	N	0.278	--	2.21	--	No
Dibenz(a,h)anthracene	53-70-3	2/ 7	0.012	0.042	0.198	0.285	D	0.042	--	0.221	--	No

All units in mg/kg.

^aFacility-Wide Cleanup Goals (FWCUGs) for Resident (Adult and Child) from Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant (USACE 2010).

^bBackground criteria for sediment from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^cUsing the lines of evidence presented in Section 7.2.4.1, FWCUGs for trivalent chromium were identified as being appropriate for use at Load Line 12.

^dNo FWCUG available for cobalt in sediment. Value is FWCUG for cobalt in soil.

^eThe Average Result concentration presented in this table is the arithmetic average. This average concentration is not equivalent to the EPC used in the HHRA.

UCL 95 = 95% upper confidence limit of the mean

Dist.: N=normal distribution, t statistic used for UCL 95 calculation

L=lognormal distribution, Land statistic used for UCL 95 calculation

D=fewer than 5 or 50% detects, t statistic used for UCL 95 calculation

X=distribution neither normal nor lognormal, t statistic used for UCL 95 calculation

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

HQ = Hazard Quotient

PCB = Polychlorinated Biphenyl

SRC = Site-related Contaminant

-- = No value available

Bold = EPC exceeds FWCUG

Table G-9. Sum-of-Ratios for Carcinogens
COC Screening for Wet Sediment at Load Line 12
Unrestricted Land Use Receptor: Resident (Adult and Child)

COPC	CAS Number	EPC	Resident FWCUG ^a : Risk=1E-5	Background Criteria ^b	Ratio	Percent Contribution to SOR if > 1
Active Area Channel						
Arsenic	7429-90-5	25.1	4.25	19.5	NA	--
Cobalt ^c	7440-48-4	13.6	8030	9.1	<0.1	<0.1%
Benz(a)anthracene	56-55-3	0.35	2.21	--	0.2	5%
Benzo(a)pyrene	50-32-8	0.41	0.221	--	2	62%
Benzo(b)fluoranthene	205-99-2	0.68	2.21	--	0.3	10%
Dibenz(a,h)anthracen	53-70-3	0.085	0.221	--	0.4	13%
Indeno(1,2,3-	193-39-5	0.31	2.21	--	0.1	5%
PCB-1254	11097-69-1	0.15	1.2	--	0.1	4%
Sum-of-Ratios					3	
North of Active Area						
Cobalt ^c	7440-48-4	16.6	1313	9.1	<0.1	NA
Benzo(a)pyrene	50-32-8	0.24	0.221	--	1	NA
Benzo(b)fluoranthene	205-99-2	0.278	2.21	--	0.1	NA
Dibenz(a,h)anthracen	53-70-3	0.042	0.221	--	0.2	NA
Sum-of-Ratios					1	

All units in mg/kg.

^aFacility-Wide Cleanup Goals (FWCUGs) for Resident (Adult and Child) from Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant (USACE 2010).

^bBackground criteria for sediment from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^cNo FWCUG available for cobalt in sediment. Value is FWCUG for cobalt in soil.

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

NA = Not applicable

PCB = Polychlorinated Biphenyl

SOR = Sum-of-Ratios

-- = No value available

Bold = SOR greater than 1

Table G-10. Sum-of-Ratios for Non-Carcinogens
COC Screening for Wet Sediment at Load Line 12

COPC	CAS Number	EPC	Resident FWCUG ^a : HQ = 1	Critical effect or Target Organ	Background Criteria ^b	Ratio	Percent Contribution to SOR if > 1
Active Area Channel							
Aluminum	7429-90-5	20600	73798	Neurotoxicity in offspring	13900	0.3	8%
Arsenic	7440-38-2	25.1	20.2	Skin	19.5	1	34%
Chromium ^c	7440-47-3	55.9	81,473	NOAEL	18.1	<0.1	<0.1%
Cobalt ^d	7440-48-4	27.6	1313	Thyroid	9.1	<0.1	1%
Cyanide	57-12-5	2.8	2.7	Thyroid, Reproductive	0	1	28%
Silver	7440-22-4	397	386	Gastrointestinal, skin, mucous membranes	0	1	28%
PCB-1254	11097-69-1	0.105	2.03	Ocular exudates, prominent meibomian gland	--	0.1	1%
Sum-of-Ratios						4	
Sum-of-Ratios Skin [arsenic, silver, chromium]						2	
	Arsenic					1	55%
	Silver					1	45%
	Chromium					<0.1	<0.1%
Sum-of-Ratios Reproductive [aluminum, cyanide, chromium]						1	--
Sum-of-Ratios Thyroid [cobalt, cyanide, chromium]						1	--
Former Settling Pond							
Aluminum	7429-90-5	17200	73798	Neurotoxicity in offspring	13900	0.2	NA
Chromium ^c	7440-47-3	22.7	81,473	NOAEL	18.1	<0.1	NA
Cobalt ^d	7440-48-4	15.1	8030	Thyroid	9.1	<0.1	NA
Sum-of-Ratios						0.2	
North of Active Area							
Aluminum	7429-90-5	15500	73798	Neurotoxicity in offspring	13900	0.2	NA
Chromium ^c	7440-47-3	21.6	81,473	NOAEL	18.1	<0.1	NA
Cobalt ^d	7440-48-4	16.6	8030	Thyroid	9.1	<0.1	NA
Silver	7440-22-4	41.6	386	Gastrointestinal, skin, mucous membranes	0	0.1	NA
Sum-of-Ratios						0.3	

mg/kg.

^aFacility-Wide Cleanup Goals (FWCUGs) for Resident (Adult and Child) from Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant

^bBackground criteria for sediment from final facility-wide background values for RVAAP, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^cUsing the lines of evidence presented in Section 7.2.4.1, FWCUGs for trivalent chromium were identified as being appropriate for use at Load Line 12.

^dNo FWCUG available for cobalt in sediment. Value is FWCUG for cobalt in soil.

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

NA = Not applicable

NOAEL = No Observable Adverse Effect Level

PCB = Polychlorinated Biphenyl

SOR = Sum-of-Ratios

-- = No value available

Bold = SOR greater than 1