

APPENDIX G

Human Health Risk Assessment Tables

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Table G-1. SRC and COPC Screening for Surface Soil (0-1 ft bgs Discrete Samples) at Load Line 6

Analyte (mg/kg)	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=10-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max Detect
									RA	RC	NGT						
Former Production Area																	
Metals																	
Aluminum	7429-90-5	44/ 44	1990	17000	11300	17700	No	Below background	52923	7380	3496	3496	NGT	No	Below background	LL6ss-004	11/25/2003
Antimony	7440-36-0	9/ 44	0.085	0.3	0.226	0.96	No	Below background	13.6	2.82	175	2.82	RC	No	Below background	LL6ss-001	3/12/2002
Arsenic	7440-38-2	44/ 44	3.2	41	11.7	15.4	Yes	Exceeds background	0.425	0.524	2.78	0.425	RA	Yes	Exceeds screening level	LL6ss-007	11/14/2003
Barium	7440-39-3	44/ 44	30	153	75.1	88.4	Yes	Exceeds background	8966	1413	351	351	NGT	No	Below risk screening criteria	LL6ss-076	2/22/2010
Beryllium	7440-41-7	44/ 44	0.2	1.3	0.592	0.88	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	LL6ss-076	2/22/2010
Cadmium	7440-43-9	14/ 44	0.053	6.8	0.336	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	Yes	Exceeds screening level	LL6ss-002	3/12/2002
Calcium	7440-70-2	44/ 44	890	184000	15800	15800	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-002	3/12/2002
Chromium ^d	7440-47-3	44/ 44	5.8	23	15.7	17.4	Yes	Exceeds background	19694	8147	329763	8147	RC	No	Below risk screening criteria	LL6ss-033	11/18/2003
Cobalt	7440-48-4	44/ 44	3.6	23.9	9.27	10.4	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	LL6ss-076	2/22/2010
Copper	7440-50-8	44/ 44	6.8	627	34.9	17.7	Yes	Exceeds background	2714	311	25368	311	RC	Yes	Exceeds screening level	LL6ss-002	3/12/2002
Iron	7439-89-6	44/ 44	9940	40200	23300	23100	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	LL6ss-073	2/22/2010
Lead	7439-92-1	44/ 44	8.1	180	33.5	26.1	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	LL6ss-034	11/14/2003
Magnesium	7439-95-4	44/ 44	787	7600	3160	3030	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-033	11/18/2003
Manganese	7439-96-5	44/ 44	120	1820	453	1450	Yes	Exceeds background	1482	293	35.1	35.1	NGT	Yes	Exceeds screening level	LL6ss-078	2/22/2010
Mercury	7439-97-6	40/ 44	0.013	0.6	0.0548	0.036	Yes	Exceeds background	16.5	2.27	172	2.27	RC	No	Below risk screening criteria	LL6ss-017	11/19/2003
Nickel	7440-02-0	44/ 44	10	46.6	20.4	21.1	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria	LL6sb-069	2/25/2010
Potassium	7440-09-7	44/ 44	430	2800	1220	927	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-033	11/18/2003
Selenium	7782-49-2	20/ 44	0.45	1.8	0.556	1.4	Yes	Exceeds background	--	--	--	39	RSL	No	Below risk screening criteria	LL6ss-076	2/22/2010
Silver	7440-22-4	2/ 44	0.029	0.034	0.155	0	No	<5% Detected	324	38.6	3105	38.6	RC	No	<5% Detected	LL6sb-070	3/1/2010
Sodium	7440-23-5	22/ 44	26.6	1400	342	123	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-012	11/25/2003
Thallium	7440-28-0	9/ 44	0.15	0.33	0.2	0	Yes	Exceeds background	4.76	0.612	47.7	0.612	RC	No	Below risk screening criteria	LL6sd-011	12/2/2003
Vanadium	7440-62-2	44/ 44	5.6	30.6	19.8	31.1	No	Below background	156	44.9	2304	44.9	RC	No	Below background	LL6sb-070	3/1/2010
Zinc	7440-66-6	44/ 44	39	200	74.7	61.8	Yes	Exceeds background	19659	2321	187269	2321	RC	No	Below risk screening criteria	LL6sd-010	12/1/2003
Explosives																	
HMX	2691-41-0	1/ 17	0.19	0.19	0.104	--	Yes	Detected organic	1909	359	23464	359	RC	No	Below risk screening criteria	LL6ss-003	3/12/2002
Nitrocellulose	9004-70-0	6/ 8	0.72	10.1	3.13	--	Yes	Detected organic	--	--	--	19000000	RSL	No	Below risk screening criteria	LL6ss-010	1/14/2004
Semi-volatile Organic Compounds																	
2-Methylnaphthalene	91-57-6	1/ 8	0.0099	0.0099	0.0524	--	Yes	Detected organic	238	30.6	2384	30.6	RC	No	Below risk screening criteria	LL6sd-010	12/1/2003
Acenaphthene	83-32-9	1/ 14	0.0046	0.0046	0.00683	--	Yes	Detected organic	--	--	--	360	RSL	No	Below risk screening criteria	LL6ss-023	11/19/2003
Anthracene	120-12-7	2/ 14	0.0092	0.017	0.00796	--	Yes	Detected organic	--	--	--	1800	RSL	No	Below risk screening criteria	LL6ss-078	2/22/2010
Benz(a)anthracene	56-55-3	10/ 14	0.0049	0.059	0.0187	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6ss-078	2/22/2010
Benzo(a)pyrene	50-32-8	9/ 14	0.0037	0.054	0.0176	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	LL6ss-078	2/22/2010
Benzo(b)fluoranthene	205-99-2	10/ 14	0.004	0.078	0.0229	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6ss-078	2/22/2010
Benzo(ghi)perylene ^e	191-24-2	8/ 14	0.0065	0.032	0.0129	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	LL6ss-078	2/22/2010
Benzo(k)fluoranthene	207-08-9	6/ 14	0.0042	0.033	0.0125	--	Yes	Detected organic	2.21	6.5	47.7	2.21	RA	No	Below risk screening criteria	LL6sd-010	12/1/2003
Bis(2-ethylhexyl)phthalate	117-81-7	3/ 8	0.027	0.11	0.0757	--	Yes	Detected organic	--	--	--	39	RSL	No	Below risk screening criteria	LL6ss-020	12/2/2003
Chrysene	218-01-9	10/ 14	0.0047	0.062	0.02	--	Yes	Detected organic	22.1	65	477	22.1	RA	No	Below risk screening criteria	LL6ss-078	2/22/2010
Dibenz(a,h)anthracene	53-70-3	2/ 14	0.013	0.028	0.00951	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	LL6ss-020	12/2/2003
Fluoranthene	206-44-0	10/ 14	0.0072	0.16	0.0393	--	Yes	Detected organic	276	163	5087	163	RC	No	Below risk screening criteria	LL6ss-078	2/22/2010
Indeno(1,2,3-cd)pyrene	193-39-5	5/ 14	0.015	0.03	0.0119	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6ss-078	2/22/2010
Phenanthrene ^e	85-01-8	9/ 14	0.0077	0.069	0.018	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	LL6ss-078	2/22/2010
Pyrene	129-00-0	10/ 14	0.0058	0.12	0.0296	--	Yes	Detected organic	207	122	3815	122	RC	No	Below risk screening criteria	LL6ss-078	2/22/2010

Table G-1. SRC and COPC Screening for Surface Soil (0-1 ft bgs Discrete Samples) at Load Line 6 (continued)

Analyte (mg/kg)	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=10 ⁻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						
Pesticide/PCBs																	
4,4'-DDE	72-55-9	1/ 8	0.0024	0.0024	0.00094	--	Yes	Detected organic	4.08	2.63	49.1	2.63	RC	No	Below risk screening criteria	LL6sd-010	12/1/2003
PCB-1254	11097-69-1	1/ 8	0.033	0.033	0.00996	--	Yes	Detected organic	0.203	0.12	3.46	0.12	RC	No	Below risk screening criteria	LL6ss-010	12/2/2003
PCB-1260	11096-82-5	1/ 8	0.0096	0.0096	0.00678	--	Yes	Detected organic	0.203	0.349	3.46	0.203	RA	No	Below risk screening criteria	LL6sd-010	12/1/2003
Volatile Organic Compounds																	
Methylene chloride	75-09-2	1/ 8	0.002	0.002	0.00174	--	Yes	Detected organic	--	--	--	35	RSL	No	Below risk screening criteria	LL6ss-073	2/22/2010
Toluene	108-88-3	1/ 8	0.00035	0.00035	0.00091	--	Yes	Detected organic	--	--	--	490	RSL	No	Below risk screening criteria	LL6ss-073	2/22/2010
Non-Production Area																	
Metals																	
Aluminum	7429-90-5	15/ 15	3300	18000	12600	17700	Yes	Exceeds background	52923	7380	3496	3496	NGT	Yes	Exceeds screening level	LL6ss-029	11/25/2003
Antimony	7440-36-0	3/ 14	0.097	0.62	0.284	0.96	No	Below background	13.6	2.82	175	2.82	RC	No	Below background	LL6ss-025	11/14/2003
Arsenic	7440-38-2	15/ 15	2.2	31.1	11.2	15.4	Yes	Exceeds background	0.425	0.524	2.78	0.425	RA	Yes	Exceeds screening level	LL6sd-081	2/18/2010
Barium	7440-39-3	15/ 15	43.3	180	78.4	88.4	Yes	Exceeds background	8966	1413	351	351	NGT	No	Below risk screening criteria	LL6ss-032	11/13/2003
Beryllium	7440-41-7	15/ 15	0.36	2.1	0.716	0.88	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	LL6ss-032	11/13/2003
Cadmium	7440-43-9	3/ 15	0.13	2.4	0.217	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010
Calcium	7440-70-2	15/ 15	140	57000	8810	15800	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-031	11/13/2003
Chromium ^d	7440-47-3	15/ 15	5.7	26.7	15.7	17.4	Yes	Exceeds background	19694	8147	329763	8147	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010
Cobalt	7440-48-4	15/ 15	3.6	12.4	8.29	10.4	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	LL6sb-083	2/25/2010
Copper	7440-50-8	15/ 15	5.9	85.4	17.4	17.7	Yes	Exceeds background	2714	311	25368	311	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010
Iron	7439-89-6	15/ 15	10000	35000	22400	23100	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	LL6ss-029	11/25/2003
Lead	7439-92-1	15/ 15	9.9	117	23.1	26.1	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	LL6sd-081	2/18/2010
Magnesium	7439-95-4	15/ 15	910	8800	2820	3030	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-032	11/13/2003
Manganese	7439-96-5	15/ 15	170	1800	630	1450	Yes	Exceeds background	1482	293	35.1	35.1	NGT	Yes	Exceeds screening level	LL6ss-032	11/13/2003
Mercury	7439-97-6	13/ 15	0.0081	0.14	0.0366	0.036	Yes	Exceeds background	16.5	2.27	172	2.27	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010
Nickel	7440-02-0	15/ 15	8.4	27	15.6	21.1	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria	LL6ss-027	11/20/2003
Potassium	7440-09-7	15/ 15	475	1700	1090	927	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-027	11/20/2003
Selenium	7782-49-2	11/ 15	0.65	2.2	1.01	1.4	Yes	Exceeds background	--	--	--	39	RSL	No	Below risk screening criteria	LL6sd-081	2/18/2010
Silver	7440-22-4	2/ 15	0.019	0.3	0.168	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010
Sodium	7440-23-5	6/ 15	28.4	1400	321	123	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6ss-040	11/5/2003
Thallium	7440-28-0	3/ 15	0.1	0.32	0.33	0	Yes	Exceeds background	4.76	0.612	47.7	0.612	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010
Vanadium	7440-62-2	15/ 15	6.7	30	21.6	31.1	No	Below background	156	44.9	2304	44.9	RC	No	Below background	LL6ss-027	11/20/2003
Zinc	7440-66-6	15/ 15	33	641	93.1	61.8	Yes	Exceeds background	19659	2321	187269	2321	RC	No	Below risk screening criteria	LL6sd-081	2/18/2010

Table G-1. SRC and COPC Screening for Surface Soil (0-1 ft bgs Discrete Samples) at Load Line 6 (continued)

Analyte (mg/kg)	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=10 ⁻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						
Semi-volatile Organic Compounds																	
Anthracene	120-12-7	1/ 2	0.015	0.015	0.00975	--	Yes	Detected organic	--	--	--	1800	RSL	No	Below risk screening criteria	LL6sb-068	3/1/2010
Benz(a)anthracene	56-55-3	1/ 2	0.072	0.072	0.0383	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6sb-068	3/1/2010
Benzo(a)pyrene	50-32-8	1/ 2	0.055	0.055	0.0298	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	LL6sb-068	3/1/2010
Benzo(b)fluoranthene	205-99-2	1/ 2	0.078	0.078	0.0413	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6sb-068	3/1/2010
Benzo(ghi)perylene ^e	191-24-2	1/ 2	0.038	0.038	0.0213	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	LL6sb-068	3/1/2010
Benzo(k)fluoranthene	207-08-9	1/ 2	0.041	0.041	0.0228	--	Yes	Detected organic	2.21	6.5	47.7	2.21	RA	No	Below risk screening criteria	LL6sb-068	3/1/2010
Chrysene	218-01-9	1/ 2	0.074	0.074	0.0393	--	Yes	Detected organic	22.1	65	477	22.1	RA	No	Below risk screening criteria	LL6sb-068	3/1/2010
Fluoranthene	206-44-0	1/ 2	0.14	0.14	0.0723	--	Yes	Detected organic	276	163	5087	163	RC	No	Below risk screening criteria	LL6sb-068	3/1/2010
Indeno(1,2,3-cd)pyrene	193-39-5	1/ 2	0.029	0.029	0.0168	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6sb-068	3/1/2010
Phenanthrene ^e	85-01-8	1/ 2	0.054	0.054	0.0293	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	LL6sb-068	3/1/2010
Pyrene	129-00-0	1/ 2	0.12	0.12	0.0623	--	Yes	Detected organic	207	122	3815	122	RC	No	Below risk screening criteria	LL6sb-068	3/1/2010

^aBackground criteria for soil 0-1 ft bgs 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 (FWCUG) 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 = USEPA Residential Regional Screening Level

^dFWCUGs for trivalent chromium are used based on results of chromium speciation samples.

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

bgs = Below ground surface

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

PAH = Polycyclic Aromatic Hydrocarbon

PCB = Polychlorinated Biphenyl

SRC = Site-related Contaminant

USEPA = United States Environmental Protection Agency

-- = No value available

Bold = Chemical is a COPC

Table G-2. SRC and COPC Screening for Subsurface Soil (1-13 ft bgs Discrete Samples) at Load Line 6

Analyte (mg/kg)	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=10-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max Detect
									RA	RC	NGT						
Former Production Area																	
Metals																	
Aluminum	7429-90-5	38/ 38	5480	19000	12200	19500	No	Below background	52923	7380	3496	3496	NGT	No	Below background	LL6sb-012	11/25/2003
Antimony	7440-36-0	2/ 36	0.094	0.099	0.242	0.96	No	Below background	13.6	2.82	175	2.82	RC	No	Below background	LL6sb-069	2/25/2010
Arsenic	7440-38-2	38/ 38	2.6	26	13.1	19.8	Yes	Exceeds background	0.425	0.524	2.78	0.425	RA	Yes	Exceeds screening level	LL6sb-033	11/18/2003
Barium	7440-39-3	38/ 38	21.6	110	70.8	124	No	Below background	8966	1413	351	351	NGT	No	Below background	LL6sb-020	12/2/2003
Beryllium	7440-41-7	38/ 38	0.21	1.1	0.601	0.88	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	LL6sb-009	11/20/2003
Cadmium	7440-43-9	7/ 38	0.039	0.67	0.0729	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria	LL6sb-007	11/14/2003
Calcium	7440-70-2	38/ 38	410	36600	9570	35500	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-069	2/25/2010
Chromium ^d	7440-47-3	38/ 38	9.1	29	17.2	27.2	Yes	Exceeds background	19694	8147	329763	8147	RC	No	Below risk screening criteria	LL6sb-015	11/25/2003
Cobalt	7440-48-4	38/ 38	2.3	33	10.3	23.2	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	LL6sb-016	11/21/2003
Copper	7440-50-8	38/ 38	5.2	110	20.9	32.3	Yes	Exceeds background	2714	311	25368	311	RC	No	Below risk screening criteria	LL6sb-015	11/25/2003
Iron	7439-89-6	38/ 38	10000	34000	24600	35200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	LL6sb-015	11/25/2003
Lead	7439-92-1	38/ 38	8.5	150	21.7	19.1	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	LL6sb-007	11/14/2003
Magnesium	7439-95-4	38/ 38	1300	8500	4190	8790	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-042	12/3/2003
Manganese	7439-96-5	38/ 38	45	820	395	3030	No	Below background	1482	293	35.1	35.1	NGT	No	Below background	LL6sb-017	11/19/2003
Mercury	7439-97-6	30/ 38	0.011	0.29	0.0342	0.044	Yes	Exceeds background	16.5	2.27	172	2.27	RC	No	Below risk screening criteria	LL6sb-017	11/19/2003
Nickel	7440-02-0	38/ 38	8	36	22.9	60.7	No	Below background	1346	155	12639	155	RC	No	Below background	LL6sb-015	11/25/2003
Potassium	7440-09-7	38/ 38	580	2900	1460	3350	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-038	11/5/2003
Selenium	7782-49-2	16/ 38	0.46	1.8	0.479	1.5	Yes	Exceeds background	--	--	--	39	RSL	No	Below risk screening criteria	LL6sb-070	3/1/2010
Silver	7440-22-4	5/ 38	0.018	0.034	0.146	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	No	Below risk screening criteria	LL6sb-070	3/1/2010
Sodium	7440-23-5	16/ 38	39.2	1800	411	145	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-004	11/25/2003
Thallium	7440-28-0	10/ 38	0.11	0.31	0.183	0.91	No	Below background	4.76	0.612	47.7	0.612	RC	No	Below background	LL6sb-001	12/3/2003
Vanadium	7440-62-2	38/ 38	9.9	32	20.5	37.6	No	Below background	156	44.9	2304	44.9	RC	No	Below background	LL6sb-018	12/2/2003
Zinc	7440-66-6	38/ 38	29	190	62.8	93.3	Yes	Exceeds background	19659	2321	187269	2321	RC	No	Below risk screening criteria	LL6sb-007	11/14/2003
Explosives																	
Nitrocellulose	9004-70-0	5/ 8	0.85	2.1	1.88	--	Yes	Detected organic	--	--	--	19000000	RSL	No	Below risk screening criteria	LL6sb-014	11/25/2003
Semi-volatile Organic Compounds																	
2-Methylnaphthalene	91-57-6	1/ 8	0.022	0.022	0.0757	--	Yes	Detected organic	238	30.6	2384	30.6	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003
Acenaphthene	83-32-9	1/ 12	0.069	0.069	0.0147	--	Yes	Detected organic	--	--	--	360	RSL	No	Below risk screening criteria	LL6sb-024	11/25/2003
Anthracene	120-12-7	1/ 12	0.13	0.13	0.0197	--	Yes	Detected organic	--	--	--	1800	RSL	No	Below risk screening criteria	LL6sb-024	11/25/2003
Benz(a)anthracene	56-55-3	1/ 12	0.29	0.29	0.0331	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	Yes	Exceeds screening level	LL6sb-024	11/25/2003
Benzo(a)pyrene	50-32-8	1/ 12	0.2	0.2	0.0258	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	LL6sb-024	11/25/2003
Benzo(b)fluoranthene	205-99-2	1/ 12	0.23	0.23	0.0282	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	Yes	Exceeds screening level	LL6sb-024	11/25/2003
Benzo(ghi)perylene ^e	191-24-2	1/ 12	0.083	0.083	0.016	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	LL6sb-024	11/25/2003
Benzo(k)fluoranthene	207-08-9	1/ 12	0.16	0.16	0.0226	--	Yes	Detected organic	2.21	6.5	47.7	2.21	RA	No	Below risk screening criteria	LL6sb-024	11/25/2003
Bis(2-ethylhexyl)phthalate	117-81-7	4/ 8	0.016	0.16	0.105	--	Yes	Detected organic	--	--	--	39	RSL	No	Below risk screening criteria	LL6sb-044	12/2/2003
Carbazole	86-74-8	1/ 8	0.14	0.14	0.0388	--	Yes	Detected organic	69.4	44.6	835	44.6	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003
Chrysene	218-01-9	1/ 12	0.3	0.3	0.034	--	Yes	Detected organic	22.1	65	477	22.1	RA	No	Below risk screening criteria	LL6sb-024	11/25/2003
Dibenz(a,h)anthracene	53-70-3	1/ 12	0.052	0.052	0.0134	--	Yes	Detected organic	0.022	0.065	0.477	0.022	RA	Yes	Exceeds screening level	LL6sb-024	11/25/2003
Dibenzofuran	132-64-9	1/ 8	0.045	0.045	0.0789	--	Yes	Detected organic	119	15.3	1192	15.3	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003
Fluoranthene	206-44-0	2/ 12	0.0068	0.76	0.0727	--	Yes	Detected organic	276	163	5087	163	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003
Fluorene	86-73-7	1/ 12	0.057	0.057	0.0137	--	Yes	Detected organic	737	243	11458	243	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003
Indeno(1,2,3-cd)pyrene	193-39-5	1/ 12	0.088	0.088	0.0164	--	Yes	Detected organic	0.221	0.65	4.77	0.221	RA	No	Below risk screening criteria	LL6sb-024	11/25/2003
Naphthalene	91-20-3	1/ 12	0.078	0.078	0.0155	--	Yes	Detected organic	368	122	1541	122	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003
Phenanthrene ^e	85-01-8	1/ 12	0.51	0.51	0.0514	--	Yes	Detected organic	--	--	--	180	RSL	No	Below risk screening criteria	LL6sb-024	11/25/2003
Pyrene	129-00-0	2/ 12	0.005	0.51	0.0519	--	Yes	Detected organic	207	122	3815	122	RC	No	Below risk screening criteria	LL6sb-024	11/25/2003

Table G-2. SRC and COPC Screening for Subsurface Soil (1-13 ft bgs Discrete Samples) at Load Line 6 (continued)

Analyte (mg/kg)	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=10 ⁻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						
Volatile Organic Compounds																	
Acetone	67-64-1	1/ 8	0.011	0.011	0.006	None	Yes	Detected organic	--	--	--	6100	RSL	No	Below risk screening criteria	LL6sb-069	2/25/2010
Toluene	108-88-3	1/ 8	0.0004	0.0004	0.00121	None	Yes	Detected organic	--	--	--	490	RSL	No	Below risk screening criteria	LL6sb-069	2/25/2010
Non-Production Area																	
Metals																	
Aluminum	7429-90-5	14/ 14	5900	19000	14100	19500	No	Below background	52923	7380	3496	3496	NGT	No	Below background	LL6sb-026	11/20/2003
Antimony	7440-36-0	3/ 12	0.077	0.58	0.243	0.96	No	Below background	13.6	2.82	175	2.82	RC	No	Below background	LL6sb-037	11/14/2003
Arsenic	7440-38-2	14/ 14	6.8	18.9	13.1	19.8	No	Below background	0.425	0.524	2.78	0.425	RA	No	Below background	LL6sb-068	3/1/2010
Barium	7440-39-3	14/ 14	20	160	70.7	124	Yes	Exceeds background	8966	1413	351	351	NGT	No	Below risk screening criteria	LL6sb-028	11/18/2003
Beryllium	7440-41-7	14/ 14	0.19	1.3	0.671	0.88	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	LL6sb-068	3/1/2010
Cadmium	7440-43-9	2/ 14	0.056	0.064	0.0448	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria	LL6sb-068	3/1/2010
Calcium	7440-70-2	14/ 14	270	39000	5480	35500	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-031	11/18/2003
Chromium ^d	7440-47-3	14/ 14	8.2	25	18.1	27.2	No	Below background	19694	8147	329763	8147	RC	No	Below background	LL6sb-030	11/18/2003
Cobalt	7440-48-4	14/ 14	3.5	17.5	8.94	23.2	No	Below background	803	131	7.03	7.03	NGT	No	Below background	LL6sb-083	2/25/2010
Copper	7440-50-8	14/ 14	5.9	22.2	16.7	32.3	No	Below background	2714	311	25368	311	RC	No	Below background	LL6sb-083	2/25/2010
Iron	7439-89-6	14/ 14	11000	45000	26600	35200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	LL6sb-030	11/18/2003
Lead	7439-92-1	14/ 14	7.8	18	12.9	19.1	No	Below background	--	--	--	400	RSL	No	Below background	LL6sb-028	11/18/2003
Magnesium	7439-95-4	14/ 14	1500	9200	3910	8790	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-031	11/18/2003
Manganese	7439-96-5	14/ 14	79	595	309	3030	No	Below background	1482	293	35.1	35.1	NGT	No	Below background	LL6sb-083	2/25/2010
Mercury	7439-97-6	10/ 14	0.0064	0.042	0.0232	0.044	No	Below background	16.5	2.27	172	2.27	RC	No	Below background	LL6sb-027	11/20/2003
Nickel	7440-02-0	14/ 14	9.1	36.7	21.7	60.7	No	Below background	1346	155	12639	155	RC	No	Below background	LL6sb-083	2/25/2010
Potassium	7440-09-7	14/ 14	640	3200	1440	3350	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-031	11/18/2003
Selenium	7782-49-2	10/ 14	0.67	2.5	1.13	1.5	Yes	Exceeds background	--	--	--	39	RSL	No	Below risk screening criteria	LL6sb-030	11/18/2003
Silver	7440-22-4	2/ 14	0.02	0.027	0.131	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	No	Below risk screening criteria	LL6sb-068	3/1/2010
Sodium	7440-23-5	6/ 14	67.5	1300	264	145	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sb-025	11/14/2003
Thallium	7440-28-0	4/ 14	0.16	0.2	0.308	0.91	No	Below background	4.76	0.612	47.7	0.612	RC	No	Below background	LL6sb-083	2/25/2010
Vanadium	7440-62-2	14/ 14	11	31	23.3	37.6	No	Below background	156	44.9	2304	44.9	RC	No	Below background	LL6sb-027	11/20/2003
Zinc	7440-66-6	14/ 14	22	68.6	51.1	93.3	No	Below background	19659	2321	187269	2321	RC	No	Below background	LL6sb-083	2/25/2010
Semi-volatile Organic Compounds																	
Di-n-octylphthalate	117-84-0	1/ 4	0.02	0.02	0.00874	None	Yes	Detected organic	--	--	--	63	RSL	No	Below risk screening criteria	LL6sb-049	11/4/2003

^aBackground criteria for soil >1 ft bgs 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 (FWCUG) 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 = USEPA Residential Regional Screening Level

^dFWCUGs for trivalent chromium are used based on results of chromium speciation samples.

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

bgs = Below ground surface

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

PAH = Polycyclic Aromatic Hydrocarbon

SRC = Site-related Contaminant

USEPA = United States Environmental Protection Agency

-- = No value available

Bold = Chemical is a COPC

Table G-3. SRC and COPC Screening for Sediment at Load Line 6

Analyte (mg/kg)	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=10-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max Detect
									RA	RC	NGT						
Drainage Ditches																	
Metals																	
Aluminum	7429-90-5	2/ 2	7610	9600	8610	13900	No	Below background	52923	7380	3496	3496	NGT	No	Below background	LL6sd-002	12/01/03
Antimony	7440-36-0	1/ 2	0.091	0.091	0.203	0	Yes	Exceeds background	13.6	2.82	175	2.82	RC	No	Below risk screening criteria	LL6sd-082	02/17/10
Arsenic	7440-38-2	2/ 2	8.7	9.6	9.15	19.5	No	Below background	0.425	0.524	2.78	0.425	RA	No	Below background	LL6sd-082	02/17/10
Barium	7440-39-3	2/ 2	57.4	73	65.2	123	No	Below background	8966	1413	351	351	NGT	No	Below background	LL6sd-002	12/01/03
Beryllium	7440-41-7	2/ 2	0.41	0.55	0.48	0.38	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	LL6sd-082	02/17/10
Calcium	7440-70-2	2/ 2	852	4700	2780	5510	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-002	12/01/03
Chromium ^d	7440-47-3	2/ 2	12.4	14	13.2	18.1	No	Below background	90.4	19.9	1.64	1.64	NGT	No	Below background	LL6sd-002	12/01/03
Cobalt^e	7440-48-4	2/ 2	6.3	12.8	9.55	9.1	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	LL6sd-082	02/17/10
Copper	7440-50-8	2/ 2	15	21	18	27.6	No	Below background	2714	311	25368	311	RC	No	Below background	LL6sd-002	12/01/03
Iron	7439-89-6	2/ 2	20000	28100	24100	28200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	LL6sd-082	02/17/10
Lead	7439-92-1	2/ 2	14.8	36	25.4	27.4	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	LL6sd-002	12/01/03
Magnesium	7439-95-4	2/ 2	2000	2140	2070	2760	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-082	02/17/10
Manganese	7439-96-5	2/ 2	380	776	578	1950	No	Below background	1482	293	35.1	35.1	NGT	No	Below background	LL6sd-082	02/17/10
Mercury	7439-97-6	2/ 2	0.039	0.052	0.0455	0.059	No	Below background	16.5	2.27	172	2.27	RC	No	Below background	LL6sd-002	12/01/03
Nickel	7440-02-0	2/ 2	14	19	16.5	17.7	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria	LL6sd-082	02/17/10
Potassium	7440-09-7	2/ 2	881	1000	941	1950	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-002	12/01/03
Selenium	7782-49-2	1/ 2	0.97	0.97	0.655	1.7	No	Below background	--	--	--	39	RSL	No	Below background	LL6sd-082	02/17/10
Sodium	7440-23-5	1/ 2	32.1	32.1	53.6	112	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-082	02/17/10
Thallium	7440-28-0	1/ 2	0.095	0.095	0.115	0.89	No	Below background	4.76	0.612	47.7	0.612	RC	No	Below background	LL6sd-082	02/17/10
Vanadium	7440-62-2	2/ 2	13.9	17	15.5	26.1	No	Below background	156	44.9	2304	44.9	RC	No	Below background	LL6sd-002	12/01/03
Zinc	7440-66-6	2/ 2	68	72.9	70.5	532	No	Below background	19659	2321	187269	2321	RC	No	Below background	LL6sd-082	02/17/10
Former Test Pond																	
Metals																	
Aluminum	7429-90-5	1/ 1	13300	13300	13300	13900	No	Below background	52923	7380	3496	3496	NGT	No	Below background	LL6sd-084	04/01/10
Antimony	7440-36-0	1/ 1	1.7	1.7	1.7	0	Yes	Exceeds background	13.6	2.82	175	2.82	RC	No	Below risk screening criteria	LL6sd-084	04/01/10
Arsenic	7440-38-2	1/ 1	8.9	8.9	8.9	19.5	No	Below background	0.425	0.524	2.78	0.425	RA	No	Below background	LL6sd-084	04/01/10
Barium	7440-39-3	1/ 1	70.8	70.8	70.8	123	No	Below background	8966	1413	351	351	NGT	No	Below background	LL6sd-084	04/01/10
Beryllium	7440-41-7	1/ 1	0.65	0.65	0.65	0.38	Yes	Exceeds background	--	--	--	16	RSL	No	Below risk screening criteria	LL6sd-084	04/01/10
Cadmium	7440-43-9	1/ 1	0.88	0.88	0.88	0	Yes	Exceeds background	22.3	6.41	10.9	6.41	RC	No	Below risk screening criteria	LL6sd-084	04/01/10
Calcium	7440-70-2	1/ 1	3710	3710	3710	5510	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-084	04/01/10
Chromium ^d	7440-47-3	1/ 1	18	18	18	18.1	No	Below background	19694	8147	329763	8147	RC	No	Below background	LL6sd-084	04/01/10
Cobalt^e	7440-48-4	1/ 1	11.7	11.7	11.7	9.1	Yes	Exceeds background	803	131	7.03	7.03	NGT	Yes	Exceeds screening level	LL6sd-084	04/01/10
Copper	7440-50-8	1/ 1	91.7	91.7	91.7	27.6	Yes	Exceeds background	2714	311	25368	311	RC	No	Below risk screening criteria	LL6sd-084	04/01/10
Iron	7439-89-6	1/ 1	23300	23300	23300	28200	No	Essential Nutrient	19010	2313	184370	180000	RDA	No	Essential Nutrient	LL6sd-084	04/01/10
Lead	7439-92-1	1/ 1	55.2	55.2	55.2	27.4	Yes	Exceeds background	--	--	--	400	RSL	No	Below risk screening criteria	LL6sd-084	04/01/10
Magnesium	7439-95-4	1/ 1	2970	2970	2970	2760	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-084	04/01/10

Table G-3. SRC and COPC Screening for Sediment at Load Line 6 (continued)

Analyte (mg/kg)	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 Detect
									RA	RC	NGT						
Manganese	7439-96-5	1/ 1	327	327	327	1950	No	Below background	1482	293	35.1	35.1	NGT	No	Below background	LL6sd-084	04/01/10
Nickel	7440-02-0	1/ 1	22.8	22.8	22.8	17.7	Yes	Exceeds background	1346	155	12639	155	RC	No	Below risk screening criteria	LL6sd-084	04/01/10
Potassium	7440-09-7	1/ 1	1670	1670	1670	1950	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-084	04/01/10
Selenium	7782-49-2	1/ 1	1.4	1.4	1.4	1.7	No	Below background	--	--	--	39	RSL	No	Below background	LL6sd-084	04/01/10
Silver	7440-22-4	1/ 1	0.21	0.21	0.21	0	Yes	Exceeds background	324	38.6	3105	38.6	RC	No	Below risk screening criteria	LL6sd-084	04/01/10
Sodium	7440-23-5	1/ 1	148	148	148	112	No	Essential Nutrient	--	--	--	1000000	RDA	No	Essential Nutrient	LL6sd-084	04/01/10
Vanadium	7440-62-2	1/ 1	22.9	22.9	22.9	26.1	No	Below background	156	44.9	2304	44.9	RC	No	Below background	LL6sd-084	04/01/10
Zinc	7440-66-6	1/ 1	93.1	93.1	93.1	532	No	Below background	19659	2321	187269	2321	RC	No	Below background	LL6sd-084	04/01/10
Explosives																	
Tetryl	479-45-8	1/ 1	0.031	0.031	0.031	--	Yes	Detected organic	--	--	--	16	RSL	No	Below risk screening criteria	LL6sd-084	04/01/10

^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 (FWCUG) 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 = USEPA Residential Regional Screening Level

^dFWCUGs for trivalent chromium are used based on results of chromium speciation samples.

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

bgs = Below ground surface

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

SRC = Site-related Contaminant

USEPA = United States Environmental Protection Agency

-- = No value available

Bold = Chemical is a COPC

Table G-4. SRC and COPC Screening for Surface Water at Load Line 6

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=10-6)			Risk Screening Level	Screening Level Source ^c	COPC? (yes/no)	COPC Justification	Station at Max Detect	Date Collected at Max Detect
									RA	RC	NGT						
Drainage Ditches																	
Metals																	
Aluminum	7429-90-5	3/ 3	0.71	6.04	2.64	3.37	Yes	Exceeds background	63.895	14.827	73.445	14.827	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Antimony	7440-36-0	1/ 3	0.00026	0.00026	0.00129	0	Yes	Exceeds background	0.0171	0.0049	0.00645	0.00491	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Arsenic	7440-38-2	3/ 3	0.00093	0.0032	0.00191	0.0032	No	Below background	0.0011	0.0012	0.00417	0.0011	RA	No	Below background	LL6sw-082	02/17/10
Barium	7440-39-3	3/ 3	0.0221	0.0667	0.0459	0.0475	Yes	Exceeds background	12.131	2.901	10.64	2.901	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Beryllium	7440-41-7	1/ 3	0.00042	0.00042	0.000335	0	Yes	Exceeds background	--	--	--	0.0025	RSL	No	Below risk screening criteria	LL6sw-082	02/17/10
Cadmium	7440-43-9	2/ 3	0.00014	0.0004	0.000253	0	Yes	Exceeds background	0.0151	0.0051	0.00408	0.00408	NGT	No	Below risk screening criteria	LL6sw-082	02/17/10
Calcium	7440-70-2	3/ 3	13.2	72	44.8	41.4	No	Essential Nutrient	--	--	--	500	RDA	No	Essential Nutrient	LL6sw-002	12/01/03
Chromium ^d	7440-47-3	3/ 3	0.0023	0.007	0.00403	0	Yes	Exceeds background	0.0903	0.0303	0.0245	0.0245	NGT	No	Below risk screening criteria	LL6sw-082	02/17/10
Cobalt	7440-48-4	3/ 3	0.00026	0.0072	0.00285	0	Yes	Exceeds background	--	--	--	0.0006	RSL	Yes	Exceeds screening level	LL6sw-082	02/17/10
Copper	7440-50-8	3/ 3	0.0032	0.0123	0.00657	0.0079	Yes	Exceeds background	2.788	0.614	7.199	0.614	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Iron	7439-89-6	3/ 3	1.14	8.42	3.72	2.56	No	Essential Nutrient	20	4.527	31.296	18	RDA	No	Essential Nutrient	LL6sw-082	02/17/10
Lead	7439-92-1	3/ 3	0.00094	0.0107	0.00665	0	Yes	Exceeds background	--	--	--	0.015	RSL	No	Below risk screening criteria	LL6sw-082	02/17/10
Magnesium	7439-95-4	3/ 3	3.33	8.1	5.71	10.8	No	Essential Nutrient	--	--	--	200	RDA	No	Essential Nutrient	LL6sw-002	12/01/03
Manganese	7439-96-5	3/ 3	0.0287	2.2	0.932	0.391	Yes	Exceeds background	2.476	0.633	1.449	0.633	RC	Yes	Exceeds screening level	LL6sw-002	12/01/03
Nickel	7440-02-0	2/ 3	0.0014	0.0111	0.00448	0	Yes	Exceeds background	1.445	0.312	8.258	0.312	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Potassium	7440-09-7	3/ 3	1.39	2.8	2.28	3.17	No	Essential Nutrient	--	--	--	1750	RDA	No	Essential Nutrient	LL6sw-002	12/01/03
Selenium	7782-49-2	2/ 3	0.00036	0.00061	0.00116	0	Yes	Exceeds background	--	--	--	0.01	RSL	No	Below risk screening criteria	LL6sw-082	02/17/10
Sodium	7440-23-5	3/ 3	0.53	1.43	1.06	21.3	No	Essential Nutrient	--	--	--	1200	RDA	No	Essential Nutrient	LL6sw-081	03/02/10
Vanadium	7440-62-2	2/ 3	0.002	0.0107	0.00458	0	Yes	Exceeds background	0.211	0.0706	0.0572	0.0572	NGT	No	Below risk screening criteria	LL6sw-082	02/17/10
Zinc	7440-66-6	3/ 3	0.015	0.0954	0.0629	0.042	Yes	Exceeds background	21.002	4.617	58.216	4.617	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Explosives																	
HMX	2691-41-0	1/ 3	0.00008	0.00008	0.0000917	--	Yes	Exceeds background	3.65	0.782	32.756	0.782	RC	No	Below risk screening criteria	LL6sw-082	02/17/10
Nitrocellulose	9004-70-0	1/ 3	0.24	0.24	0.247	--	Yes	Exceeds background	--	--	--	6000	RSL	No	Below risk screening criteria	LL6sw-082	02/17/10
Semi-volatile Organic Compounds																	
4-Methylphenol	106-44-5	1/ 1	0.00026	0.00026	0.00026	--	Yes	Exceeds background	0.261	0.0678	0.448	0.0678	RC	No	Below risk screening criteria	LL6sw-002	12/01/03
Volatile Organic Compounds																	
Acetone	67-64-1	1/ 3	0.0022	0.0022	0.00407	--	Yes	Exceeds background	--	--	--	1.4	RSL	No	Below risk screening criteria	LL6sw-002	12/01/03

Table G-4. SRC and COPC Screening for Surface Water at Load Line 6 (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 Detect
									RA	RC	NGT						
Former Test Pond																	
Metals																	
Aluminum	7429-90-5	1/ 1	0.201	0.201	0.201	3.37	No	Below background	63.895	14.827	73.445	14.827	RC	No	Below background	LL6sw-084	04/01/10
Antimony	7440-36-0	1/ 1	0.00029	0.00029	0.00029	0	Yes	Exceeds background	0.0171	0.0049	0.00645	0.00491	RC	No	Below risk screening criteria	LL6sw-084	04/01/10
Arsenic	7440-38-2	1/ 1	0.00081	0.00081	0.00081	0.0032	No	Below background	0.0011	0.0012	0.00417	0.0011	RA	No	Below background	LL6sw-084	04/01/10
Barium	7440-39-3	1/ 1	0.0099	0.0099	0.0099	0.0475	No	Below background	12.131	2.901	10.64	2.901	RC	No	Below background	LL6sw-084	04/01/10
Calcium	7440-70-2	1/ 1	20.4	20.4	20.4	41.4	No	Essential Nutrient	--	--	--	500	RDA	No	Essential Nutrient	LL6sw-084	04/01/10
Cobalt	7440-48-4	1/ 1	0.00009	0.00009	0.00009	0	Yes	Exceeds background	--	--	--	0.0006	RSL	No	Below risk screening criteria	LL6sw-084	04/01/10
Copper	7440-50-8	1/ 1	0.0024	0.0024	0.0024	0.0079	No	Below background	2.788	0.614	7.199	0.614	RC	No	Below background	LL6sw-084	04/01/10
Iron	7439-89-6	1/ 1	1.04	1.04	1.04	2.56	No	Essential Nutrient	20	4.527	31.296	18	RDA	No	Essential Nutrient	LL6sw-084	04/01/10
Lead	7439-92-1	1/ 1	0.00028	0.00028	0.00028	0	Yes	Exceeds background	--	--	--	0.015	RSL	No	Below risk screening criteria	LL6sw-084	04/01/10
Magnesium	7439-95-4	1/ 1	3.8	3.8	3.8	10.8	No	Essential Nutrient	--	--	--	200	RDA	No	Essential Nutrient	LL6sw-084	04/01/10
Manganese	7439-96-5	1/ 1	0.133	0.133	0.133	0.391	No	Below background	2.476	0.633	1.449	0.633	RC	No	Below background	LL6sw-084	04/01/10
Potassium	7440-09-7	1/ 1	2.76	2.76	2.76	3.17	No	Essential Nutrient	--	--	--	1750	RDA	No	Essential Nutrient	LL6sw-084	04/01/10
Sodium	7440-23-5	1/ 1	0.582	0.582	0.582	21.3	No	Essential Nutrient	--	--	--	1200	RDA	No	Essential Nutrient	LL6sw-084	04/01/10
Explosives																	
HMX	2691-41-0	1/ 1	0.000062	0.000062	0.000062	--	Yes	Exceeds background	3.65	0.782	32.756	0.782	RC	No	Below risk screening criteria	LL6sw-084	04/01/10
Pesticides/PCBs																	
beta-BHC	319-85-7	1/ 1	0.000044	0.000044	0.000044	--	Yes	Exceeds background	0.0009	0.001	0.0102	0.000946	RA	No	Below risk screening criteria	LL6sw-084	04/01/10

^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 (FWCUG) 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 = USEPA Residential Regional Screening Level

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

bgs = Below ground surface

CAS = Chemical Abstract Service

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

PCB = Polychlorinated Biphenyl

SRC = Site-related Contaminant

USEPA = United States Environmental Protection Agency

-- = No value available

Bold = Chemical is a COPC

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**Table G-5. COC Screening for Surface Soil (0-1 ft bgs Discrete Samples) at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

COPC	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	UCL 95	Dist.	EPC	Resident FWCUG ^a		Background Criteria ^b	EPC Exceeds FWCUG?
									HQ=1	Risk=10 ⁻⁵		
Former Production Area												
Metals												
Arsenic	7440-38-2	44/ 44	3.2	41	11.7	13.1	X	13.1	20.2	4.25	15.4	No
Cadmium	7440-43-9	14/ 44	0.053	6.8	0.336	0.6	D	0.6	64.1	12491	0	No
Cobalt	7440-48-4	44/ 44	3.6	23.9	9.27	10.2	L	10.2	1313	8030	10.4	No
Copper	7440-50-8	44/ 44	6.8	627	34.9	58.3	X	58.3	3106	--	17.7	No
Manganese	7439-96-5	44/ 44	120	1820	453	520	X	520	2927	--	1450	No
Semi-volatile Organic Compounds												
Benzo(a)pyrene	50-32-8	9/ 14	0.0037	0.054	0.0176	0.0641	L	0.054	--	0.221	--	No
Dibenz(a,h)anthracene	53-70-3	2/ 14	0.013	0.028	0.00951	0.0149	D	0.0149	--	0.221	--	No
Non-Production Area												
Metals												
Aluminum	7429-90-5	15/ 15	3300	18000	12600	14500	N	14500	73798	--	17700	No
Arsenic ^c	7440-38-2	15/ 15	2.2	31.1	11.2	14	X	14	20.2	4.25	15.4	No
Cobalt	7440-48-4	15/ 15	3.6	12.4	8.29	9.49	N	9.49	1313	8030	10.4	No
Manganese	7439-96-5	15/ 15	170	1800	630	873	L	873	2927	--	1450	No
Semi-volatile Organic Compounds												
Benzo(a)pyrene	50-32-8	1/ 2	0.055	0.055	0.0298	0.189	D	0.055	--	0.221	--	No

All units are milligrams per kilogram (mg/kg)

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

^bBackground criteria for soil 0-1 ft bgs 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).

^cSince Resident FWCUG for arsenic is less than the background level, background is used as the cleanup goal for comparison.

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

bgs = Below Ground Surface

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

HQ = Hazard Quotient

UCL 95 = 95% Upper Confidence Limit of the mean

Bold = EPC exceeds FWCUG

-- = No value available

**Table G-6. Sum-of-Ratios for Non-Carcinogens:
COC Screening for Surface Soil (0-1 ft bgs Discrete Samples) at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

COPC	CAS Number	EPC	Resident FWCUG ^a HQ=1	Critical Effect or Target Organ	Background Criteria ^b	Ratio
Former Production Area						
<i>Metals</i>						
Arsenic	7440-38-2	13.1	20.2	Skin	15.4	NA
Cadmium	7440-43-9	0.6	64.1	Proteinuria	0	0.009
Cobalt	7440-48-4	10.2	1313	Not Specified	10.4	NA
Copper	7440-50-8	58.3	3106	GI, Kidney, Liver	17.7	0.02
Manganese	7439-96-5	520	2927	CNS	1450	NA
Sum-of-Ratios						0.03
Non-Production Area						
<i>Metals</i>						
Aluminum	7429-90-5	14500	73798	Neurotoxicity in offspring	17700	NA
Arsenic	7440-38-2	14	20.2	Skin	15.4	NA
Cobalt	7440-48-4	9.49	1313	Not Specified	10.4	NA
Manganese	7439-96-5	873	2927	CNS	1450	NA
Sum-of-Ratios						--

All units are milligrams per kilogram (mg/kg)

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

^bBackground criteria for surface (0-1 ft bgs) soil 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).

bgs = Below Ground Surface

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

HQ = Hazard Quotient

NA = Not Applicable because EPC is less than background or SOR less than or equal to 1

SOR = Sum-of-Ratios

Bold = SOR exceeds one

-- = No value available

**Table G-7 Sum-of-Ratios for Carcinogens: COC Screening for Surface Soil (0-1 ft bgs Discrete Samples) at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

COPC	CAS Number	EPC	Resident FWCUG ^a (Risk=1E-5)	Background Criteria ^b	Ratio
Former Production Area					
Arsenic	7440-38-2	13.1	4.25	15.4	NA
Cadmium	7440-43-9	0.6	12491	0	<0.01
Cobalt	7440-48-4	10.2	8030	10.4	<0.01
Benzo(a)pyrene	50-32-8	0.054	0.221	--	0.2
Dibenz(a,h)anthracene	53-70-3	0.0149	0.221	--	0.07
Sum-of-Ratios					0.3
Non-Production Area					
Arsenic	7440-38-2	14	4.25	15.4	NA
Cobalt	7440-48-4	9.49	8030	10.4	<0.01
Benzo(a)pyrene	50-32-8	0.055	0.221	--	0.2
Sum-of-Ratios					0.2

All units are milligrams per kilogram (mg/kg)

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

^bBackground criteria for surface (0-1 ft bgs) soil 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).

bgs = Below Ground Surface

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

SOR = Sum-of-Ratios

-- = No value available

Bold = SOR greater than 1

**Table G-8. COC Screening for Subsurface Soil (1-13 ft bgs Discrete Samples) at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

COPC	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	UCL 95	Dist.	EPC	Resident FWCUG ^a		Background Criteria ^b	EPC Exceeds FWCUG?
									HQ=1	Risk=1E-5		
Former Production Area												
Metals												
Arsenic ^c	7440-38-2	38/ 38	2.6	26	13.1	14.2	X	14.2	20.2	4.25	19.8	No
Cobalt	7440-48-4	38/ 38	2.3	33	10.3	11.6	X	11.6	1313	8030	23.2	No
Semi-volatile Organic Compounds												
Benz(a)anthracene	56-55-3	1/ 12	0.29	0.29	0.0331	0.0755	D	0.0755	--	2.21	--	No
Benzo(a)pyrene	50-32-8	1/ 12	0.2	0.2	0.0258	0.0549	D	0.0549	--	0.221	--	No
Benzo(b)fluoranthene	205-99-2	1/ 12	0.23	0.23	0.0282	0.0618	D	0.0618	--	2.21	--	No
Dibenz(a,h)anthracene	53-70-3	1/ 12	0.052	0.052	0.0134	0.0223	D	0.0223	--	0.221	--	No
Non-Production Area												
No COPCs identified in subsurface soil in the Non-Production Area												

All units are milligrams per kilogram (mg/kg)

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

^bBackground criteria for 0-1 ft bgs and subsurface (>1 ft bgs) soil 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).

^cSince Resident FWCUG for arsenic is less than the background level, background is used as the cleanup goal for comparison.

Dist.: 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

bgs = Below Ground Surface

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

HQ = Hazard Quotient

UCL 95 = 95% Upper Confidence Limit of the mean

Bold = EPC exceeds FWCUG

-- = No value available

**Table G-9. Sum-of-Ratios for Carcinogens: COC Screening for Subsurface Soil (1-13 ft bgs Discrete Samples) at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

Analyte (mg/kg)	CAS Number	EPC	Resident FWCUG^a Risk=10⁻⁵	Background Criteria^b	Ratio
Former Production Area					
Arsenic	7440-38-2	14.2	4.25	19.8	NA
Cobalt	7440-48-4	11.6	8030	23.2	<0.01
Benz(a)anthracene	56-55-3	0.0755	2.21	--	0.03
Benzo(a)pyrene	50-32-8	0.0549	0.221	--	0.2
Benzo(b)fluoranthene	205-99-2	0.0618	2.21	--	0.03
Dibenz(a,h)anthracene	53-70-3	0.0223	0.221	--	0.1
Sum-of-Ratios					0.4

All units are milligrams per kilogram (mg/kg)

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

^bBackground criteria for subsurface (>1 ft bgs) soil 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).

bgs = Below Ground Surface

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

EPC = Exposure Point Concentration

NA = Not Applicable because EPC is less than background

SOR = Sum-of-Ratios

-- = No value available

Bold = Sum-of-ratios greater than 1

**Table G-10. COC Screening for Sediment at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

Sample ID	Date	Depth (ft)	COPC	Cobalt ^c
			CAS Number	7440-48-4
			Resident FWCUG ^a	
			HQ=1	1313
			Risk=1E-5	8030
			Background Criteria ^b	9.1
			Station	Result Exceeds FWCUG?
Drainage Ditches				
LL6sd-002-0001-SD	12/1/2003	0.0 - 0.5	LL6sd-002	6.3 No
LL6sd-082-5245-SD	2/17/2010	0.0 - 0.5	LL6sd-082	12.8 No
Former Test Pond				
LL6sd-084-5795-SD	4/1/2010	0.0 - 0.5	LL6sd-084	11.7 No

All units are milligrams per kilogram (mg/kg)

^aFacility-Wide Cleanup Goals (FWCUGs) 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. Values are FWCUGs for cobalt in soil.

CAS = Chemical Abstract Service

COC = Chemical of Concern

HQ = Hazard Quotient

Bold = Concentration exceeds FWCUG for this sample

**Table G-11. COC Screening for Surface Water at Load Line 6
Unrestricted Land Use Receptor: Resident (Adult and Child)**

Sample ID	Date	COPC	Cobalt		Manganese		Sum of Ratios
		CAS Number	7440-48-4		7439-96-5		
		Resident FWCUG ^a					
		HQ=1	0.006		6.326		
		Risk=1E-5	--		--		
		Background Criteria ^b	0		0.391		
		Station	Result Exceeds FWCUG?	Ratio	Result Exceeds FWCUG?	Ratio	
Drainage Ditches							
LL6sw-002-0001-SW	12/01/2003	LL6sw-002	0.0011J No	0.2	2.2 No	0.3	0.5
LL6sw-081-5242-SW	03/02/2010	LL6sw-081	0.00026J No	0.04	0.0287 No	0.005	0.05
LL6sw-082-5244-SW	02/17/2010	LL6sw-082	0.0072 Yes	1	0.566 No	0.09	1
Former Test Pond							
No COPCs identified in surface water at the Former Test Pond							

All units are milligrams per liter (mg/L)

^aFacility-Wide Cleanup Goals (FWCUGs) 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).

Data Qualifiers: J= indicates that the analyte was positively identified, but the associated numerical value is an approximate concentration of the analyte in the sample.

CAS = Chemical Abstract Service

COC = Chemical of Concern

COPC = Chemical of Potential Concern

HQ = Hazard Quotient

-- = No value

Bold = Concentration exceeds FWCUG for this sample

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