

APPENDIX H

Ecological Risk Assessment Information and Data

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Photograph H-1. Habitat Area at Buildings F-15 and F-16 Showing Paved Area and Slabs before their Removal, with Forest in Background (photograph taken August 12, 2008)



Photograph H-2. Winter Scene in Habitat Area at Buildings F-15 and F-16 with Forest in Background (photograph taken November 20, 2008)

2	2
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Metric 1. Wetland Area (size).

max 6 pts.

subtotal

Select one size class and assign score.

- >50 acres (>20.2ha) (6 pts)
- 25 to <50 acres (10.1 to <20.2ha) (5 pts)
- 10 to <25 acres (4 to <10.1ha) (4 pts)
- 3 to <10 acres (1.2 to <4ha) (3 pts)
- 0.3 to <3 acres (0.12 to <1.2ha) (2pts)
- 0.1 to <0.3 acres (0.04 to <0.12ha) (1 pt)
- <0.1 acres (0.04ha) (0 pts)

2

0.69 acre total
0.06 acre in Bldg. F-15 AOC
Habitat Boundary

2	4
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Metric 2. Upland buffers and surrounding land use.

max 14 pts.

subtotal

2a. Calculate average buffer width. Select only one and assign score. Do not double check.

- WIDE. Buffers average 50m (164ft) or more around wetland perimeter (7)
- MEDIUM. Buffers average 25m to <50m (82 to <164ft) around wetland perimeter (4)
- NARROW. Buffers average 10m to <25m (32ft to <82ft) around wetland perimeter (1)
- VERY NARROW. Buffers average <10m (<32ft) around wetland perimeter (0)

0

2b. Intensity of surrounding land use. Select one or double check and average.

- VERY LOW. 2nd growth or older forest, prairie, savannah, wildlife area, etc. (7)
- LOW. Old field (> 10 years), shrub land, young second growth forest. (5)
- MODERATELY HIGH. Residential, fenced pasture, park, conservation tillage, new fallow field. (3)
- HIGH. Urban, industrial, open pasture, row cropping, mining, construction. (1)

2

9	13
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Metric 3. Hydrology.

max 30 pts.

subtotal

3a. Sources of Water. Score all that apply.

- High pH groundwater (5)
- Other groundwater (3)
- Precipitation (1)
- Seasonal/Intermittent surface water (3)
- Perennial surface water (lake or stream) (5)

4

1

3

3c. Maximum water depth. Select only one and assign score.

- >0.7 (27.6in) (3)
- 0.4 to 0.7m (15.7 to 27.6in) (2)
- <0.4m (<15.7in) (1)

1

3e. Modifications to natural hydrologic regime. Score one or double check and average.

- None or none apparent (12)
- Recovered (7)
- Recovering (3)
- Recent or no recovery (1)

2

Check all disturbances observed

- ditch
- tile
- dike
- weir
- stormwater input
- point source (nonstormwater)
- filling/grading
- road bed/RR track
- dredging
- other

5	18
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Metric 4. Habitat Alteration and Development.

max 20 pts.

subtotal

4a. Substrate disturbance. Score one or double check and average.

- None or none apparent (4)
- Recovered (3)
- Recovering (2)
- Recent or no recovery (1)

2

4b. Habitat development. Select only one and assign score.

- Excellent (7)
- Very good (6)
- Good (5)
- Moderately good (4)
- Fair (3)
- Poor to fair (2)
- Poor (1)

1

4c. Habitat alteration. Score one or double check and average.

- None or none apparent (9)
- Recovered (6)
- Recovering (3)
- Recent or no recovery (1)

2

18
Subtotal this page

Check all disturbances observed

- shrub/sapling removal
- mowing
- grazing
- clearcutting
- selective cutting
- woody debris removal
- toxic pollutants
- herbaceous/aquatic bed removal
- sedimentation
- dredging
- farming
- nutrient enrichment

last revised 1 February 2001 jjm

Figure H-1. Ohio Rapid Assessment Method Worksheet

Site: F-15 Wetland

Rater(s): J. Graton (SAIC)

Date: 10/31/2011

18
subtotal first page0 18
max 10 pts. subtotal**Metric 5. Special Wetlands.**

Check all that apply and score as indicated.

- Bog (10)
- Fen (10)
- Old growth forest (10)
- Mature forested wetland (5)
- Lake Erie coastal/tributary wetland-unrestricted hydrology (10)
- Lake Erie coastal/tributary wetland-restricted hydrology (5)
- Lake Plain Sand Prairies (Oak Openings) (10)
- Relict Wet Prairies (10)
- Known occurrence state/federal threatened or endangered species (10)
- Significant migratory songbird/water fowl habitat or usage (10)
- Category 1 Wetland. See Question 1 Qualitative Rating (-10)

3 21
max 20 pts. subtotal**Metric 6. Plant communities, interspersions, microtopography.**

6a. Wetland Vegetation Communities.

Score all present using 0 to 3 scale.

- Aquatic bed
- Emergent
- Shrub
- Forest
- Mudflats
- Open water
- Other _____

6b. horizontal (plan view) Interspersion.

Select only one.

- High (5)
- Moderately high (4)
- Moderate (3)
- Moderately low (2)
- Low (1)
- None (0)

6c. Coverage of invasive plants. Refer to Table 1 ORAM long form for list. Add or deduct points for coverage

- Extensive >75% cover (-5)
- Moderate 25-75% cover (-3)
- Sparse 5-25% cover (-1)
- Nearly absent <5% cover (0)
- Absent (1)

6d. Microtopography.

Score all present using 0 to 3 scale.

- Vegetated hummocks/tussocks
- Coarse woody debris >15cm (6in)
- Standing dead >25cm (10in) dbh
- Amphibian breeding pools

Vegetation Community Cover Scale

0	Absent or comprises <0.1ha (0.2471 acres) contiguous area
1	Present and either comprises small part of wetland's vegetation and is of moderate quality, or comprises a significant part but is of low quality
2	Present and either comprises significant part of wetland's vegetation and is of moderate quality or comprises a small part and is of high quality
3	Present and comprises significant part, or more, of wetland's vegetation and is of high quality

Narrative Description of Vegetation Quality

low	Low spp diversity and/or predominance of nonnative or disturbance tolerant native species
mod	Native spp are dominant component of the vegetation, although nonnative and/or disturbance tolerant native spp can also be present, and species diversity moderate to moderately high, but generally w/o presence of rare threatened or endangered spp
high	A predominance of native species, with nonnative spp and/or disturbance tolerant native spp absent or virtually absent, and high spp diversity and often, but not always, the presence of rare, threatened, or endangered spp

Mudflat and Open Water Class Quality

0	Absent <0.1ha (0.247 acres)
1	Low 0.1 to <1ha (0.247 to 2.47 acres)
2	Moderate 1 to <4ha (2.47 to 9.88 acres)
3	High 4ha (9.88 acres) or more

Microtopography Cover Scale

0	Absent
1	Present very small amounts or if more common of marginal quality
2	Present in moderate amounts, but not of highest quality or in small amounts of highest quality
3	Present in moderate or greater amounts and of highest quality

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Category 1

End of Quantitative Rating. Complete Categorization Worksheets.

Figure H-1. Ohio Rapid Assessment Method Worksheet (continued)

Table H-1. Historical ERA COPEC Screening for Soil at Buildings F-15 and F-16

Table F-15/F-16-11

Building F-15/F-16 Ecological Risk Screening Tables for Surface Soil (0-1 ft)

RVAAP 14 AOC Characterization

Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Frequency of Detection	Average Concentration	Maximum Detected Concentration	Units	Surface Soil Background Concentration	Maximum Concentration > Background	Screening Value	Maximum Concentration > Screening value	PBT	COPC	COPC Rationale
Metals	Aluminum	19 / 19	12542	16000	mg/kg	17700	No	600 ss2	Yes	No	No	BLBKG
	Arsenic	19 / 19	12	20	mg/kg	15.4	Yes	9.9 ss1	Yes	No	Yes	ASL
	Barium	19 / 19	93	200	mg/kg	88.4	Yes	283 ss1	No	No	No	BSL
	Beryllium	19 / 19	1.1	2.9	mg/kg	0.88	Yes	10 ss1	No	No	No	BSL
	Cadmium	5 / 19	0.31	2.5	mg/kg	0.00	Yes	4 ss1	No	No	No	BSL
	Calcium	19 / 19	9058	29000	mg/kg	15800	Yes	NUT	No	No	No	BSL
	Chromium	19 / 19	25	55	mg/kg	17.4	Yes	0.4 ss1	Yes	No	Yes	ASL
	Cobalt	19 / 19	9.4	12	mg/kg	10.4	Yes	20 ss1	No	No	No	BSL
	Copper	19 / 19	32	200	mg/kg	17.7	Yes	60 ss1	Yes	No	Yes	ASL
	Iron	19 / 19	24421	28000	mg/kg	23100	Yes	200 ss2	Yes	No	Yes	ASL
	Lead	19 / 19	32	120	mg/kg	26.1	Yes	40.5 ss1	Yes	No	Yes	ASL
	Magnesium	19 / 19	3484	6600	mg/kg	3030	Yes	NUT	No	No	No	BSL
	Manganese	19 / 19	496	1200	mg/kg	1450	No	100 ss2	Yes	No	No	BLBKG
	Nickel	19 / 19	24	28	mg/kg	21.1	Yes	30 ss1	No	No	No	BSL
	Potassium	19 / 19	1439	2100	mg/kg	927	Yes	NUT	No	No	No	BSL
	Selenium	5 / 19	0.75	1.7	mg/kg	1.4	Yes	0.21 ss1	Yes	No	Yes	ASL
	Sodium	19 / 19	350	710	mg/kg	123	Yes	NUT	No	No	No	BSL
	Vanadium	19 / 19	23	29	mg/kg	31.1	No	2 ss1	Yes	No	No	BLBKG
	Zinc	19 / 19	79	130	mg/kg	61.8	Yes	8.5 ss1	Yes	No	Yes	ASL
	Antimony	3 / 18	0.70	1	mg/kg	0.96	Yes	5 ss1	No	No	No	BSL
	Mercury	18 / 19	0.042	0.065	mg/kg	0.04	Yes	0.00051 ss1	Yes	Yes	Yes	ASL
	Thallium	5 / 19	0.30	0.59	mg/kg	0.00	Yes	1 ss1	No	No	No	BSL
Pesticides	4,4'-DDE	1 / 2	0.0070	0.012	mg/kg	--	NA	0.596 ss4	No	No	No	BSL
	4,4'-DDT	1 / 2	0.010	0.019	mg/kg	--	NA	0.0335 ss4	Yes	No	Yes	ASL
	Aroclor 1260	1 / 2	0.068	0.12	mg/kg	--	NA	0.000332 ss4	Yes	No	Yes	ASL
SVOCs	Anthracene	1 / 2	0.035	0.053	mg/kg	--	NA	148 ss4	No	No	No	BSL
	Benz(a)anthracene	2 / 2	0.088	0.14	mg/kg	--	NA	5.21 ss4	No	No	No	BSL
	Benz(a)pyrene	2 / 2	0.070	0.11	mg/kg	--	NA	1.52 ss4	No	No	No	BSL
	Benz(b)fluoranthene	2 / 2	0.086	0.13	mg/kg	--	NA	59.8 ss4	No	No	No	BSL
	Benz(g,h,i)perylene	2 / 2	0.059	0.095	mg/kg	--	NA	119 ss4	No	No	No	BSL
	Benz(k)fluoranthene	2 / 2	0.063	0.1	mg/kg	--	NA	148 ss4	No	No	No	BSL
	Bis(2-ethylhexyl) phthalate	1 / 2	0.11	0.13	mg/kg	--	NA	0.925 ss4	No	No	No	BSL
	Carbazole	1 / 2	0.062	0.038	mg/kg	--	NA	--	NSL	No	Yes	NSL
	Chrysene	2 / 2	0.13	0.2	mg/kg	--	NA	4.73 ss4	No	No	No	BSL
	Dibenzofuran	2 / 2	0.14	0.26	mg/kg	--	NA	--	NSL	No	Yes	NSL
	Fluoranthene	2 / 2	0.16	0.26	mg/kg	--	NA	122 ss4	No	No	No	BSL
	Indeno(1,2,3-cd)pyrene	2 / 2	0.046	0.073	mg/kg	--	NA	109 ss4	No	No	No	BSL
	Naphthalene	2 / 2	0.38	0.73	mg/kg	--	NA	0.0994 ss4	Yes	No	Yes	ASL
	Phenanthrene	2 / 2	0.29	0.52	mg/kg	--	NA	45.7 ss4	No	No	No	BSL
	Pyrene	2 / 2	0.18	0.3	mg/kg	--	NA	78.5 ss4	No	No	No	BSL
	Nitrocellulose	1 / 1	2.1	2.1	mg/kg	--	NA	--	NSL	No	Yes	NSL
	Nitroglycerine	1 / 2	0.38	0.52	mg/kg	--	NA	--	NSL	No	Yes	NSL

Notes:

-- no value available

mg/kg - means milligrams per Kilogram (parts per million - ppm)

ss1 - Preliminary Remediation Goals (Efrymon et al., 1997a)

ss2 - Toxicological Benchmarks for Soil and Litter Invertebrates (Efrymonson et al. 1997b)

ss3 - Toxicological Benchmarks for Terrestrial Plants (Efrymonson et al. 1997c)

ss4 - Ecological Data Quality Level (USEPA Region 5, 1999)

NA - not applicable

NUT - nutrient

BLBKG - below background concentration

PBT - persistent, bioaccumulative and toxic

NSL - no screening level

ASL - above screening level

BSL - below screening level

AOC = Area of Concern

COPEC = Chemical of Potential Ecological Concern

PCB = Polychlorinated Biphenyl

COPC = Chemical of Potential Concern

ERA = Ecological Risk Assessment

SVOC = Semi-volatile Organic Compound

Table H-2. Historical ERA COPEC Screening for Sediment at Buildings F-15 and F-16

Table F-15/F-16-12

Building F-15/F-16 Ecological Risk Screening Tables for Sediment

RVAAP 14 AOC Characterization

Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Frequency of Detection	Average Concentration	Maximum Detected Concentration	Units	Sediment Background Concentration	Maximum Concentration > Background	SRV	Maximum Concentration > SRV	Screening Value	Maximum Concentration > Screening value	PBT	COPC	COPC Rationale
Metals	Aluminum	3 / 3	12667	13000	mg/kg	13900	No	29000	No	--	NSL	No	No	BLBKG
	Arsenic	3 / 3	10	12	mg/kg	19.5	No	25	No	9.79 sd1	Yes	No	No	BLBKG
	Barium	3 / 3	76	93	mg/kg	123	No	190	No	--	NSL	No	No	BLBKG
	Beryllium	3 / 3	0.78	0.91	mg/kg	0.38	Yes	0.8	Yes	--	NSL	No	Yes	NSL
	Cadmium	2 / 3	0.19	0.24	mg/kg	0.00	Yes	0.79	No	0.99 sd1	No	No	No	BLSRV
	Calcium	3 / 3	7333	17000	mg/kg	5510	Yes	21000	No	NUT	No	No	No	BLSRV
	Chromium	3 / 3	18	20	mg/kg	18.1	Yes	29	No	43.4 sd1	No	No	No	BLSRV
	Cobalt	3 / 3	9.3	11	mg/kg	9.1	Yes	12	No	50 sd2	No	No	No	BLSRV
	Copper	3 / 3	19	19	mg/kg	27.6	No	32	No	31.6 sd1	No	No	No	BLBKG
	Iron	3 / 3	23667	25000	mg/kg	28200	No	41000	No	--	NSL	No	No	BLBKG
	Lead	3 / 3	25	29	mg/kg	27.4	Yes	47	No	35.8 sd1	No	No	No	BLSRV
	Magnesium	3 / 3	3333	4700	mg/kg	2760	Yes	7100	No	NUT	No	No	No	BLSRV
	Manganese	3 / 3	427	460	mg/kg	1950	No	1500	No	--	NSL	No	No	BLBKG
	Nickel	3 / 3	22	25	mg/kg	17.7	Yes	33	No	22.7 sd1	Yes	No	No	BLSRV
	Potassium	3 / 3	1600	2000	mg/kg	1950	Yes	6800	No	NUT	No	No	No	BLSRV
	Sodium	3 / 3	357	420	mg/kg	112	Yes	--	NA	NUT	No	No	No	BSL
	Vanadium	3 / 3	22	23	mg/kg	26.1	No	40	No	--	NSL	No	No	BLBKG
	Zinc	3 / 3	102	120	mg/kg	532	No	160	No	121 sd1	No	No	No	BLBKG
	Mercury	3 / 3	0.034	0.036	mg/kg	0.06	No	0.12	No	0.18 sd1	No	Yes	No	BLBKG

Notes:

-- no value available

mg/kg - means milligrams per Kilogram (parts per million - ppm)

sd1 - Threshold Effects Concentration from McDonald et al., (2000)

sd2 - Ecological Data Quality Level (USEPA Region 5, 1999)

NUT - nutrient

NA - not applicable

BLBKG - below background concentration

PBT - persistent, bioaccumulative and toxic

NSL - no screening level

ASL - above screening level

BSL - below screening level

SRV - Sediment Reference Value (OEPA, 2003)

BLSRV-Below Sediment Reference Value

AOC = Area of Concern

COPC = Chemical of Potential Concern

COPEC = Chemical of Potential Ecological Concern

ERA = Ecological Risk Assessment

Table H-3. Historical ERA COPEC Screening for Surface Water at Buildings F-15 and F-16

Table F-15/F-16-13

Building F-15/F-16 Ecological Risk Screening Tables for Surface water

RVAAP 14 AOC Characterization

Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Frequency of Detection	Average Concentration	Maximum Detected Concentration	Units	Surface Water Background Concentration	Maximum Concentration > Background	Screening Value	Maximum Concentration > Screening value	PBI	COPC	COPC Rationale
Metals	Aluminum	3 / 3	450	530	ug/l	3370	No	--	NSL	No	No	BLBKG
	Barium	3 / 3	29	39	ug/l	47.5	No	2000 swl	No	No	No	BLBKG
	Calcium	3 / 3	53000	97000	ug/l	41400	Yes	NUT	No	No	No	BSL
	Chromium	1 / 3	3.9	1.6	ug/l	0.00	Yes	2811 swl[H]	No	No	No	BSL
	Cobalt	1 / 3	2.3	2	ug/l	0.00	Yes	220 swl	No	No	No	BSL
	Copper	1 / 3	3.9	1.6	ug/l	7.9	No	23 swl[H]	No	No	No	BLBKG
	Iron	3 / 3	1700	3600	ug/l	2560	Yes	--	NSL	No	Yes	NSL
	Magnesium	3 / 3	9667	13000	ug/l	10800	Yes	NUT	No	No	No	BSL
	Manganese	3 / 3	1582	4600	ug/l	391	Yes	--	NSL	No	Yes	NSL
	Nickel	1 / 3	4.0	1.9	ug/l	0.00	Yes	743 swl[H]	No	No	No	BSL
	Potassium	3 / 3	3833	7100	ug/l	3170	Yes	NUT	No	No	No	BSL
	Sodium	3 / 3	3000	3100	ug/l	21300	No	NUT	No	No	No	BLBKG
	Arsenic	1 / 3	2.9	6.8	ug/l	3.2	Yes	340 swl	No	No	No	BSL
	Lead	1 / 3	1.5	1.5	ug/l	0.00	Yes	244 swl[H]	No	No	No	BSL
VOCs	Acetone	1 / 3	8.7	16	ug/l	--	NA	--	NSL	No	Yes	NSL
SVOCs	4-Methylphenol	1 / 3	0.85	0.65	ug/l	--	NA	480 swl	No	No	No	BSL
	Phenol	1 / 3	1.8	0.62	ug/l	--	NA	4700 swl	No	No	No	BSL
Explosives	1,3,5-Trinitrobenzene	1 / 3	0.15	0.14	ug/l	--	NA	27 swl	No	No	No	BSL
	4-Amino-2,6-Dinitrotoluene	1 / 3	0.34	0.53	ug/l	--	NA	98 swl	No	No	No	BSL
	RDX	1 / 3	0.15	0.14	ug/l	--	NA	520 swl	No	No	No	BSL
Propellants	Nitroglycerine	1 / 3	1.2	2.1	ug/l	--	NA	160 swl	No	No	No	BSL

Notes:

-- no value available

ug/l - means micrograms per Liter (parts per billion - ppb)

swl - Ohio Water Quality Criteria (Reg 3745-1-07)

swl[H] - Ohio Water Quality Criteria (Reg 3745-1-07) based on a site specific hardness of 172 (mg/l)

NA - not applicable

ID - insufficient data to calculate screening value

NUT - nutrient

BLBKG - below background concentration

PBT- persistent, bioaccumulative and toxic

NSL - no screening level

ASL- above screening level!

AOC = Area of Concern

COPC = Chemical of Potential Concern

COPEC = Chemical of Potential Ecological Concern

ERA = Ecological Risk Assessment

SVOC = Semi-volatile Organic Compound

VOC = Volatile Organic Compound

Table H-4. Checklist of Important Ecological Places and Resources at Buildings F-15 and F-16

Resource	Army (2005)	Ohio EPA (2008)	F-15 and F-16	
			Absent	Present
National Park	X	X	X	
Designated Federal Wilderness Area	X	X	X	
National Lakeshore Recreational Area	X	X	X	
Habitat known to be used by federally designated or proposed threatened or endangered species	X	X	X	
National or state wildlife refuge	X	X	X	
Federal land designated for protection of natural ecosystems	X	X	X	
Habitat known to be used by state -designated threatened or endangered species	X	X	X	
Federally-designated scenic or wild river	X	X	X	
State land designated for wildlife or game management	X	X	X	
State-designated scenic or wild river	X	X	X	
Wetlands and waters of the state^a	X	X		X ^b
National preserve	X	X ^c	X	
State-designated natural areas	X	X ^c	X	
Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters	X	X ^d	X	
Migratory pathways and feeding areas critical for maintenance of anadromous fish species ^e	X	X ^d	X	
Terrestrial areas used for breeding by large or dense aggregations of animals	X	X ^d	X	
Particular areas, relatively small in size, important to maintenance of unique biotic communities^f	X	X ^d	X	
Locally important ecological place^g	X		X	
Critical habitat for federally designated threatened or endangered species	X		X	
Marine sanctuary	X		X	
Areas identified under the Coastal Zone Management Act	X		X	
Sensitive areas identified under the National Estuary Program or Near Coastal Waters Program	X		X	
Critical areas identified under the Clean Lakes Program	X		X	
National monument	X		X	
National seashore recreational area	X		X	
Unit of coastal barrier resources system	X		X	
Coastal barrier (undeveloped)	X		X	
Coastal barrier (partially developed)	X		X	
Administratively proposed federal wilderness area	X		X	
National river reach designated as recreational	X		X	
Habitat known to be used by species under review as to its federal threatened or endangered status	X		X	
State-designated areas for protection or maintenance of aquatic life	X		X	
Fragile landscapes, land sensitive to degradation if vegetative habitat or cover diminishes	X		X	
State, local or private land designated for protection of natural ecosystems			X	X

Table H-4. Checklist of Important Ecological Places and Resources at Buildings F-15 and F-16
(continued)

Resource	Army (2005)	Ohio EPA (2008)	F-15 and F-16	
			Absent	Present
Federal land designated for wildlife or game management		X	X	
Surface water, as that term is used in Chapter 3745-1 of the OAC		X	X	
Federally listed or state-listed threatened or endangered species		X	X	
State of Ohio special interest or declining species and its associated habitat		X	X	
State park		X	X	

U.S. Army Biological Technical Assistance Group, *Technical Document for Ecological Risk Assessment: Process for Developing Management Goals*. August 2005.

Ohio EPA. *Guidance for Conducting Ecological Risk Assessments (Ohio EPA)*. Division of Emergency and Remedial Response. April 2008.

^aFor Ohio EPA 2008, as qualified by “regulated under federal law and state of Ohio's water quality laws.”

^bThe wetland is located along the eastern side of the Building F-15 area of concern (AOC). It is 0.69 acre but only 0.06 acre actually lies within the AOC boundary (see Figure 7-2).

^cOhio EPA does not restrict preserves and natural areas to national or state.

^dOhio EPA lists “wildlife populations and their associated important nesting areas and food resources, taking into consideration land use and the quality and extent of habitat on and in the vicinity of the site.”

^eWithin river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time.

^fIdentified by the Integrated Natural Resource Management Plan (INRMP), Base Realignment and Closure Cleanup Plan or Redevelopment Plan, or other official land management plans.

^gThe Ohio Army National Guard INRMP (OHARNG 2014) has five special interest areas (important resources) at Ravenna Army Ammunition Plant: Unit 1 - mixed mature woods, Unit 2 - Hemlock Ravine-Wadsworth Glen, Unit 3 - mixed swamp forest, Unit 4 - mixed valuable communities, and Unit 5 - oak/maple swamp forest. Also, the Ohio Army National Guard recognizes the importance of federal- and state-listed threatened and endangered plant and animal species.

x = Designated as important and **when bolded there are possible qualifiers**.

OAC = Ohio Administrative Code.

Ohio EPA = Ohio Environmental Protection Agency.

Table H-5. Natural Resources Management Goals (OHARNG 2014)

Goals and Objectives of Ohio Army National Guard	Comments on Goals Relative to HTRW Work at RVAAP
<p>Goal 1. Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and Army regulations and policies.</p> <p>Objective 1.1: Initiate programs and projects that enhance the training land and training opportunities and/or do not unnecessarily limit training land availability.</p> <p>Objective 1.2: Continue to educate Camp Ravenna users regarding the natural resources at Camp Ravenna and their part in ensuring sustainable use of the site in perpetuity.</p>	<p>The Army is committed to natural resources management in a manner that is compatible with and supports the military mission and complies with federal and state laws and Army regulations and policies.</p>
<p>Goal 2. Maintain and foster positive working relationships with the U.S. Fish and Wildlife Service; the ODNR DOW; and other federal, state, and local natural resources management agencies and organizations for the benefit of the military mission, the natural resources being managed, and the citizens of Ohio and the nation.</p> <p>Objective 2.1: Effectively communicate mission needs to cooperating agencies and solicit input/review on projects with the potential to impact natural resources, especially in areas of regulatory primacy.</p> <p>Objective 2.2: Provide copies of biological surveys to interested cooperating agencies.</p> <p>Objective 2.3: Facilitate cooperative management programs and projects that are compatible with the military mission and within the capabilities of the Camp Ravenna staff.</p>	<p>The Army works and coordinates with other federal and state agencies as necessary if mission or projects have the potential to impact natural resources.</p>
<p>Goal 3. Monitor the condition of the natural resources and the implied impacts from training and the natural resources management program on the natural resources at the Camp Ravenna.</p> <p>Objective 3.1: Maintain current species inventories and other PLSs through periodic reoccurring surveys and inventories.</p>	<p>The Army conducts natural resource management activities at the facility to monitor potential impacts from training or other disturbance activities.</p>
<p>Goal 4. Protect and maintain populations of rare plant and animal species on the Camp Ravenna in compliance with federal and state laws and regulations.</p> <p>Objective 4.1: Avoid negative impacts to federally listed species and avoid/minimize impacts to state-listed and otherwise rare species.</p>	<p>The Army protects and maintains populations of rare plant and animal species by implementing a natural resource management plan at the facility and by avoiding and/or not disturbing areas with rare species.</p>

Table H-5. Natural Resources Management Goals (OHARNG 2014) (continued)

Goals and Objectives of Ohio Army National Guard	Comments on Goals Relative to HTRW Work at RVAAP
<p>Goal 5. Sustain usable training lands and native natural resources by managing non-native and invasive species, vegetation and plant communities, and nuisance wildlife species.</p> <p>Objective 5.1: Manage populations of invasive plant species where they hinder training and/or habitat management objectives.</p> <p>Objective 5.2: Manage non-native and invasive insect species that pose a threat to forest resources.</p> <p>Objective 5.3: Manage terrestrial vegetation to support training, encourage native plant communities, and prevent damage to training site facilities and infrastructure.</p> <p>Objective 5.4: Manage the beaver population to prevent damage to training site facilities and infrastructure and to maintain the quality warm water habitats of Hinkley Creek, Sand Creek, and South Fork Eagle Creek.</p> <p>Objective 5.5: Manage other nuisance animals that negatively impact the ecosystem.</p>	The Army sustains usable training lands and native natural resources by implementing a natural resource management plan which incorporates invasive species and nuisance species management and by utilizing native species mixes for re-vegetation after ground disturbance activities.
<p>Goal 6. Manage wildlife resources in a manner compatible with the military mission and within the limits of the natural habitat.</p> <p>Objective 6.1: Cooperatively manage wildlife resources with the Ohio DOW.</p> <p>Objective 6.2: Provide opportunity for wildlife recreation to the public that is compatible with the military mission.</p> <p>Objective 6.3: Maintain wildlife population without augmenting the habitat with artificial food plots.</p>	The Army minimizes habitat disturbance during HTRW activities and utilizes sustainability practices when disturbance is required in order to properly manage and maintain wildlife populations and resources.

Table H-5. Natural Resources Management Goals (OHARNG 2014) (continued)

Goals and Objectives of Ohio Army National Guard	Comments on Goals Relative to HTRW Work at RVAAP
<p>Goal 7. Manage the Camp Ravenna white-tailed deer population in a manner that minimizes impacts on the military mission, is ecologically sustainable, provides for public hunting, and is in accordance with Army regulations and state law.</p> <p>Objective 7.1: Census the deer herd.</p> <p>Objective 7.2: Determine winter carrying capacity for white-tailed deer at Camp Ravenna.</p> <p>Objective 7.3: Maintain the white-tailed deer population at or near carrying capacity and at a buck-to-doe ratio close to 1:2 (acceptable ratio is dependent on population size) with a maximum of six hunter's dates per year.</p>	The Army manages populations of white-tailed deer by implementing a natural resource management plan at the facility in a manner that is compatible with and supports the military mission and complies with state laws and Army regulations and policies.
<p>Goal 8. Manage forest resources to benefit of the military mission, perpetuate the ecosystem functions, support regional ecosystem needs, and produce forest products.</p> <p>Objective 8.1: Maintain current forest resource data.</p> <p>Objective 8.2: Implement forest management strategies identified in the Camp Ravenna INRMP.</p>	The Army sustains and manages forest resources by implementing a natural resource management plan. During HTRW activities, efforts are made by the Army to minimize impacts to forest communities.
<p>Goal 9. Manage wetlands and other surface waters in accordance with applicable federal, state, and local regulations and to protect water quality and ecological functions while facilitating the military mission.</p> <p>Objective 9.1: Avoid wetland fills.</p> <p>Objective 9.2: Minimize and mitigate unavoidable wetland fills.</p> <p>Objective 9.3: Maintain healthy aquatic ecosystems in ponds.</p> <p>Objective 9.4: Restore, enhance, and create wetlands when possible and compatible with the military mission.</p>	Wetlands and other surface waters are to be protected during disturbance activities in accordance with federal, state, and local regulations. Avoidance measures will be implemented as practical. Some AOCs have wetlands.
<p>Goal 10. Manage soil to maintain productivity and prevent and repair erosion in accordance with state and federal laws and regulations so that Camp Ravenna can support doctrinally required military training in perpetuity.</p> <p>Objective 10.1: Conduct training and other activities in locations with soil most suitable for supporting the activity.</p> <p>Objective 10.2: Rehabilitate, repair, and maintain areas damaged by training and other activities.</p>	Manage soil relevant to remedial activities under CERCLA. Appropriate storm water and erosion controls are to be utilized during activities that require ground disturbance.

Table H-5. Natural Resources Management Goals (OHARNG 2014) (continued)

Goals and Objectives of Ohio Army National Guard	Comments on Goals Relative to HTRW Work at RVAAP
<p>Goal 11. Manage cultural resources on Camp Ravenna in accordance with state and federal laws and regulations while implementing the natural resources management program.</p> <p>Objective 11.1: Comply with federal, state, and local laws and regulations pertaining to cultural resources found on the training site.</p>	<p>The Army utilizes a cultural resource management plan to manage and protect cultural resources at the facility. Coordination with state and federal agencies regarding cultural resources is conducted as necessary. Restoration contractors are also advised to utilize the Camp Ravenna Policy for Inadvertent Discoveries for reporting purposes should they come upon a cultural item.</p>
<p>Goal 12. Develop, maintain, and manage data regarding natural resources at Camp Ravenna through the use of GIS for efficient data storage, retrieval, analysis, and presentation.</p> <p>Objective 12.1: Develop accurate and usable natural resources GIS data.</p>	<p>Natural resource data is collected and managed by the OHARNG. This data may be utilized during restoration activities in order to provide an accurate portrait of natural resources at an AOC.</p>

OHARNG. *Integrated Natural Resources Management Plan and Environmental Assessment for the Ravenna Training and Logistics Site, Portage and Trumbull Counties, Ohio.* December 2014.

AOC = Area of concern.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act.

DOW = Department of Wildlife.

GIS = Geographic Information System.

HTRW = Hazardous, toxic and radioactive waste.

INRMP = Integrated Natural Resources Management Plan.

ODNR = Ohio Department of Natural Resources.

OHARNG = Ohio Army National Guard.

PLS = Planning level survey (wetland).

RVAAP = Ravenna Army Ammunition Plant.

Table H-6. Ecological Screening Values for Chemical Analytes in Soil

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
<i>Inorganic Chemicals</i>									
Aluminum (Al)	7429-90-5	--*	Al EcoSSL	50	PRGs ^b	--	--	50	PRGs
Antimony (Sb)	7440-36-0	0.27	mammalian EcoSSL for Sb	5	PRGs	0.142	USEPA Reg 5	2.70E-01	mammalian EcoSSL for Sb
Arsenic (As)	7440-38-2	18	plant EcoSSL for As	9.9	PRGs	5.7	USEPA Reg 5	1.80E+01	plant EcoSSL for As
Barium (Ba)	7440-39-3	330	soil invert EcoSSL for Ba	283	PRGs	1.04	USEPA Reg 5	3.30E+02	soil invert EcoSSL for Ba
Beryllium (Be)	7440-41-7	21	mammalian EcoSSL for Be	10	PRGs	1.06	USEPA Reg 5	2.10E+01	mammalian EcoSSL for Be
Bismuth	7440-69-9	--	--	--	--	--	--	No ESV	No Source
Boron	7440-42-8	--	--	0.5	PRGs	--	--	5.00E-01	PRGs
Bromine	7726-95-6	--	--	10	PRGs	--	--	1.00E+01	PRGs
Cadmium (Cd)	7440-43-9	0.36	mammalian EcoSSL for Cd	4	PRGs	0.00222	USEPA Reg 5	3.60E-01	mammalian EcoSSL for Cd
Calcium	7440-70-2	--	--	--	--	--	--	No ESV	No Source

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Chromium, trivalent (Cr III)	16065-83-1	26	avian EcoSSL for Cr III	0.4	PRGs	0.4	ESL for Cr+3	2.60E+01	avian EcoSSL for Cr III
Chromium, hexavalent (Cr VI)	18540-29-9	130	mammalian EcoSSL for Cr VI	--	--	--	--	1.30E+02	mammalian EcoSSL for Cr VI
Cobalt (Co)	7440-48-4	13	plant EcoSSL for Co	20	PRGs	0.14	USEPA Reg 5	1.30E+01	plant EcoSSL for Co
Copper (Cu)	7440-50-8	28	avian EcoSSL for Cu	60	PRGs	5.4	USEPA Reg 5	2.80E+01	avian EcoSSL for Cu
Cyanide	57-12-5	--	--	--	--	1.33	USEPA Reg 5	1.33E+00	USEPA Reg 5
Fluorine	7782-41-4	--	--	200	PRGs	--	--	2.00E+02	PRGs
Iodine	7553-56-2	--	--	4	PRGs	--	--	4.00E+00	PRGs
Iron (Fe)	7439-89-6	--**	Fe EcoSSL	--	--	--	--	No ESV	No Source
Lanthanum	7439-91-0	--	--	--	--	--	--	No ESV	No Source
Lead (Pb)	7439-92-1	11	avian EcoSSL for Pb	40.5	PRGs	0.0537	USEPA Reg 5	1.10E+01	avian EcoSSL for Pb
Lithium	7439-93-2	--	--	2	PRGs	--	--	2.00E+00	PRGs
Magnesium	7439-95-4	--	--	--	--	--	--	No ESV	No Source
Manganese (Mn)	7439-96-5	220	plant EcoSSL for Mn	500	PRGs ^b	--	--	2.20E+02	plant EcoSSL for Mn
Mercury	7439-97-6	--	--	0.00051	PRGs	0.1	USEPA Reg 5	5.10E-04	PRGs
Mercury, methyl	22967-92-6	--	--	--	--	0.00158	USEPA Reg 5	1.58E-03	USEPA Reg 5
Molybdenum	7439-98-7	--	--	2	PRGs	--	--	2.00E+00	PRGs
Nickel (Ni)	7440-02-0	38	plant EcoSSL for Ni	30	PRGs	13.6	USEPA Reg 5	3.80E+01	plant EcoSSL for Ni
Potassium	7440-09-7	--	--	--	--	--	--	No ESV	No Source

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Selenium (Se)	7782-49-2	0.52	plant EcoSSL for Se	0.21	PRGs	0.0276	USEPA Reg 5	5.20E-01	plant EcoSSL for Se
Silver (Ag)	7440-22-4	4.2	avian EcoSSL for Ag	2	PRGs	4.04	USEPA Reg 5	4.20E+00	avian EcoSSL for Ag
Sodium	7440-23-5	--	--	--	--	--	--	No ESV	No Source
Technetium	7440-26-8	--	--	0.2	PRGs	--	--	2.00E-01	PRGs
Tellurium	13494-80-9	--	--	--	--	--	--	No ESV	No Source
Thallium	7440-28-0	--	--	1	PRGs	0.0569	USEPA Reg 5	1.00E+00	PRGs
Tin	7440-31-5	--	--	50	PRGs	7.62	USEPA Reg 5	5.00E+01	PRGs
Titanium	7440-32-6	--	--	--	--	--	--	No ESV	No Source
Tungsten	7440-33-7	--	--	--	--	--	--	No ESV	No Source
Uranium	7440-61-1	--	--	5	PRGs	--	--	5.00E+00	PRGs
Vanadium (v)	7440-62-2	7.8	avian EcoSSL for V	2	PRGs	1.59	USEPA Reg 5	7.80E+00	avian EcoSSL for V
Zinc (Zn)	7440-66-6	46	avian EcoSSL for Zn	8.5	PRGs	6.62	USEPA Reg 5	4.60E+01	avian EcoSSL for Zn
<i>Anions</i>									
Nitrate	14797-55-8	--	--	--	--	--	--	No ESV	No Source
Sulfide	18496-25-8	--	--	--	--	0.00358	USEPA Reg 5	3.58E-03	USEPA Reg 5
<i>Organic Chemicals</i>									
Acenaphthene	83-32-9	--	--	20	PRGs	682	USEPA Reg 5	2.00E+01	PRGs
Acenaphthylene	208-96-8	--	--	--	--	682	USEPA Reg 5	6.82E+02	USEPA Reg 5
Acetone	67-64-1	--	--	--	--	2.5	USEPA Reg 5	2.50E+00	USEPA Reg 5
Acetonitrile	75-05-8	--	--	--	--	1.37	USEPA Reg 5	1.37E+00	USEPA Reg 5
Acetophenone	98-86-2	--	--	--	--	300	USEPA Reg 5	3.00E+02	USEPA Reg 5
Acetylaminofluorene[2-]	53-96-3	--	--	--	--	0.596	USEPA Reg 5	5.96E-01	USEPA Reg 5
Acrolein	107-02-8	--	--	--	--	5.27	USEPA Reg 5	5.27E+00	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Acrylonitrile	107-13-1	--	--	--	--	0.0239	USEPA Reg 5	2.39E-02	USEPA Reg 5
Aldrin	309-00-2	--	--	--	--	0.00332	USEPA Reg 5	3.32E-03	USEPA Reg 5
2-Amino-4,6-dinitrotoluene	35572-78-2	--	--	--	--	--	--	No ESV	No Source
4-Amino-2,6-dinitrotoluene	19406-51-0	--	--	--	--	--	--	No ESV	No Source
4-Aminobiphenyl	92-67-1	--	--	--	--	0.00305	USEPA Reg 5	3.05E-03	USEPA Reg 5
Aniline	62-53-3	--	--	--	--	0.0568	USEPA Reg 5	5.68E-02	USEPA Reg 5
Anthracene	120-12-7	--	--	--	--	1480	USEPA Reg 5	1.48E+03	USEPA Reg 5
Aramite	140-57-8	--	--	--	--	166	USEPA Reg 5	1.66E+02	USEPA Reg 5
Azobenzene[p-(dimethylamino)]	60-11-7	--	--	--	--	0.04	USEPA Reg 5	4.00E-02	USEPA Reg 5
PCB-1016	12674-11-2	--	--	--	--	--	--	No ESV	No Source
Arochlor-1221	11104-28-2	--	--	--	--	--	--	No ESV	No Source
Arochlor-1232	11141-16-5	--	--	--	--	--	--	No ESV	No Source
Arochlor-1242	53469-21-9	--	--	--	--	--	--	No ESV	No Source
Arochlor-1248	12672-29-6	--	--	--	--	--	--	No ESV	No Source
PCB-1254	11097-69-1	--	--	--	--	--	--	No ESV	No Source
PCB-1260	11096-82-5	--	--	--	--	--	--	No ESV	No Source
Benzene	71-43-2	--	--	--	--	0.255	USEPA Reg 5	2.55E-01	USEPA Reg 5
Benzenemethanol	100-51-6	--	--	--	--	65.8	USEPA Reg 5	6.58E+01	USEPA Reg 5
Benz(a)anthracene	56-55-3	--	--	--	--	5.21	USEPA Reg 5	5.21E+00	USEPA Reg 5
Benzo(a)pyrene	50-32-8	--	--	--	--	1.52	USEPA Reg 5	1.52E+00	USEPA Reg 5
Benzo(b)fluoranthene	205-99-2	--	--	--	--	59.8	USEPA Reg 5	5.98E+01	USEPA Reg 5
Benzo(ghi)perylene	191-24-2	--	--	--	--	119	USEPA Reg 5	1.19E+02	USEPA Reg 5
Benzo(k)fluoranthene	207-08-9	--	--	--	--	148	USEPA Reg 5	1.48E+02	USEPA Reg 5
BHC	608-73-1	--	--	--	--	--	--	No ESV	No Source
BHC, alpha	319-84-6	--	--	--	--	0.0994	USEPA Reg 5	9.94E-02	USEPA Reg 5
BHC, beta	319-85-7	--	--	--	--	0.00398	USEPA Reg 5	3.98E-03	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
BHC, delta	319-86-8	--	--	--	--	9.94	USEPA Reg 5	9.94E+00	USEPA Reg 5
BHC, gamma (Lindane)	58-89-9	--	--	--	--	0.005	USEPA Reg 5	5.00E-03	USEPA Reg 5
Biphenyl	92-52-4	--	--	60	PRGs	--	--	6.00E+01	PRGs
bis(2-chloroethoxy) methane	111-91-1	--	--	--	--	0.302	USEPA Reg 5	3.02E-01	USEPA Reg 5
bis(2-Chloroethyl) ether	111-44-4	--	--	--	--	23.7	USEPA Reg 5	2.37E+01	USEPA Reg 5
bis(2-Ethylhexyl)phthalate	117-81-7	--	--	--	--	0.925	USEPA Reg 5	9.25E-01	USEPA Reg 5
4-Bromoaniline	106-40-1	--	--	--	--	--	--	No ESV	No Source
Bromodichloromethane	75-27-4	--	--	--	--	0.54	USEPA Reg 5	5.40E-01	USEPA Reg 5
Bromoform	75-25-2	--	--	--	--	15.9	USEPA Reg 5	1.59E+01	USEPA Reg 5
Bromomethane	74-83-9	--	--	--	--	0.235	USEPA Reg 5	2.35E-01	USEPA Reg 5
4-bromophenyl-phenylether	101-55-3	--	--	--	--	--	--	No ESV	No Source
2-Butanone	78-93-3	--	--	--	--	89.6	USEPA Reg 5	8.96E+01	USEPA Reg 5
Butylbenzyl phthalate	85-68-7	--	--	--	--	0.239	USEPA Reg 5	2.39E-01	USEPA Reg 5
N-Nitrosodi-n-Butylamine	924-16-3	--	--	--	--	0.267	USEPA Reg 5	2.67E-01	USEPA Reg 5
Carbazole	86-74-8	--	--	--	--	--	--	No ESV	No Source
Carbon disulfide	75-15-0	--	--	--	--	0.0941	USEPA Reg 5	9.41E-02	USEPA Reg 5
Carbon tetrachloride	56-23-5	--	--	--	--	2.98	USEPA Reg 5	2.98E+00	USEPA Reg 5
Chlordane	12789-03-6	--	--	--	--	0.224	USEPA Reg 5	2.24E-01	USEPA Reg 5
alpha-Chlordane	12789-03-6	--	--	--	--	0.224	USEPA Reg 5	2.24E-01	USEPA Reg 5
gamma-Chlordane	12789-03-6	--	--	--	--	0.224	USEPA Reg 5	2.24E-01	USEPA Reg 5
Chloroacetamide	79-07-2	--	--	2	PRGs ^c	--	--	2.00E+00	PRGs
3-Chloroaniline	108-42-9	--	--	20	PRGs	--	--	2.00E+01	PRGs
4-Chloroaniline	106-47-8	--	--	--	--	1.1	USEPA Reg 5	1.10E+00	USEPA Reg 5
Chlorobenzene	108-90-7	--	--	40	PRGs	13.1	USEPA Reg 5	4.00E+01	PRGs
Chlorobenzilate	510-15-6	--	--	--	--	5.05	USEPA Reg 5	5.05E+00	USEPA Reg 5
Chloroethane	75-00-3	--	--	--	--	--	--	No ESV	No Source
Chloroform	67-66-3	--	--	--	--	1.19	USEPA Reg 5	1.19E+00	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Chloromethane	74-87-3	--	--	--	--	10.4	USEPA Reg 5	1.04E+01	USEPA Reg 5
2-Chloronaphthalene	91-58-7	--	--	--	--	0.0122	USEPA Reg 5	1.22E-02	USEPA Reg 5
2-Chlorophenol	95-57-8	--	--	--	--	0.243	USEPA Reg 5	2.43E-01	USEPA Reg 5
3-Chlorophenol	108-43-0	--	--	7	PRGs	--	--	7.00E+00	PRGs
4-Chlorophenol	106-48-9	--	--	--	--	--	--	No ESV	No Source
4-Chlorophenyl-phenyl ether	7005-72-3	--	--	--	--	--	--	No ESV	No Source
4-chloro-3-methylphenol	59-50-7	--	--	--	--	7.95	USEPA Reg 5	7.95E+00	USEPA Reg 5
Chloropropene	107-05-1	--	--	--	--	0.0134	USEPA Reg 5	1.34E-02	USEPA Reg 5
Chloroprene	126-99-8	--	--	--	--	0.0029	USEPA Reg 5	2.90E-03	USEPA Reg 5
Chrysene	218-01-9	--	--	--	--	4.73	USEPA Reg 5	4.73E+00	USEPA Reg 5
m-Cresol	108-39-4	--	--	--	--	3.49	USEPA Reg 5	3.49E+00	USEPA Reg 5
2,4-D	94-75-7	--	--	--	--	0.0272	USEPA Reg 5	2.72E-02	USEPA Reg 5
4,4'-DDD	72-54-8	0.021	mammalian EcoSSL for DDT and metabolites	--	--	0.758	USEPA Reg 5	2.10E-02	mammalian EcoSSL for DDT and metabolites
4,4'-DDE	72-55-9	0.021	mammalian EcoSSL for DDT and metabolites	--	--	0.596	USEPA Reg 5	2.10E-02	mammalian EcoSSL for DDT and metabolites
4,4'-DDT	50-29-3	0.021	mammalian EcoSSL for DDT and metabolites	--	--	0.0035	USEPA Reg 5	2.10E-02	mammalian EcoSSL for DDT and metabolites
Diallate	2303-16-4	--	--	--	--	0.452	USEPA Reg 5	4.52E-01	USEPA Reg 5
Diazinon	333-41-5	--	--	--	--	--	--	No ESV	No Source
Dibenz(a,h)anthracene	53-70-3	--	--	--	--	18.4	USEPA Reg 5	1.84E+01	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Dibenzofuran	132-64-9	--	--	--	--	--	--	No ESV	No Source
1,2-Dibromo-3-Chloropropane	96-12-8	--	--	--	--	0.0352	USEPA Reg 5	3.52E-02	USEPA Reg 5
Dibromochloromethane	124-48-1	--	--	--	--	2.05	USEPA Reg 5	2.05E+00	USEPA Reg 5
Dibromoethane	106-93-4	--	--	--	--	1.23	USEPA Reg 5	1.23E+00	USEPA Reg 5
2,4-Dichloroaniline	554-00-7	--	--	100	PRGs ^c	--	--	1.00E+02	PRGs
3,4-Dichloroaniline	95-76-1	--	--	20	PRGs ^c	--	--	2.00E+01	PRGs
1,2-Dichlorobenzene	95-50-1	--	--	--	--	2.96	USEPA Reg 5	2.96E+00	USEPA Reg 5
1,3-Dichlorobenzene	541-73-1	--	--	--	--	37.7	USEPA Reg 5	3.77E+01	USEPA Reg 5
1,4-Dichlorobenzene	106-46-7	--	--	20	PRGs	0.546	USEPA Reg 5	2.00E+01	PRGs
3,3'-Dichlorobenzidine	91-94-1	--	--	--	--	0.646	USEPA Reg 5	6.46E-01	USEPA Reg 5
Cis-1,4-dichloro-2-butene	1476-11-5	--	--	--	--	--	--	No ESV	No Source
Trans-1,4-dichloro-2-butene	110-57-6	--	--	--	--	--	--	No ESV	No Source
Dichlorodifluoromethane	75-71-8	--	--	--	--	39.5	USEPA Reg 5	3.95E+01	USEPA Reg 5
1,1-Dichloroethane	75-34-3	--	--	--	--	20.1	USEPA Reg 5	2.01E+01	USEPA Reg 5
1,2-Dichloroethane	107-06-2	--	--	--	--	21.2	USEPA Reg 5	2.12E+01	USEPA Reg 5
1,1-Dichloroethene	75-35-4	--	--	--	--	8.28	USEPA Reg 5	8.28E+00	USEPA Reg 5
1,2-Dichloroethene	540-59-0	--	--	--	--	0.784	USEPA Reg 5 (for trans form)	7.84E-01	USEPA Reg 5 (for trans form)
2,4-Dichlorophenol	120-83-2	--	--	--	--	87.5	USEPA Reg 5	8.75E+01	USEPA Reg 5
2,6-Dichlorophenol	87-65-0	--	--	--	--	1.17	USEPA Reg 5	1.17E+00	USEPA Reg 5
3,4-Dichlorophenol	95-77-2	--	--	20	PRGs	--	--	2.00E+01	PRGs
1,2-Dichloropropane	78-87-5	--	--	700	PRGs ^c	32.7	USEPA Reg 5	7.00E+02	PRGs
cis-1,3-Dichloropropene	10061-01-5	--	--	--	--	0.398	USEPA Reg 5	3.98E-01	USEPA Reg 5
trans-1,3-Dichloropropene	10061-02-6	--	--	--	--	0.398	USEPA Reg 5	3.98E-01	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Dieldrin	60-57-1	0.0049	mammalian EcoSSL for Dieldrin	--	--	0.00238	USEPA Reg 5	4.90E-03	mammalian EcoSSL for Dieldrin
O,O-Diethyl O-2-pyrazinylphosphorothioate	297-97-2	--	--	--	--	0.799	USEPA Reg 5	7.99E-01	USEPA Reg 5
Diethylphthalate	84-66-2	--	--	100	PRGs	24.8	USEPA Reg 5	1.00E+02	PRGs
Dimethoate	60-51-5	--	--	--	--	0.218	USEPA Reg 5	2.18E-01	USEPA Reg 5
Dimethylphthalate	131-11-3	--	--	200	PRGs ^c	734	USEPA Reg 5	2.00E+02	PRGs
3,3'-Dimethylbenzidine	119-93-7	--	--	--	--	0.104	USEPA Reg 5	1.04E-01	USEPA Reg 5
7,12'-Dimethylbenz(a)anthracene	57-97-6	--	--	--	--	16.3	USEPA Reg 5	1.63E+01	USEPA Reg 5
alpha,alpha-Dimethylphenethylamine	122-09-8	--	--	--	--	0.3	USEPA Reg 5	3.00E-01	USEPA Reg 5
2,4-Dimethylphenol	105-67-9	--	--	--	--	0.01	USEPA Reg 5	1.00E-02	USEPA Reg 5
Di-n-butyl phthalate	84-74-2	--	--	200	PRGs	0.15	USEPA Reg 5	2.00E+02	PRGs
Di-n-octylphthalate	117-84-0	--	--	--	--	709	USEPA Reg 5	7.09E+02	USEPA Reg 5
1,3-Dinitrobenzene	99-65-0	--	--	--	--	0.655	USEPA Reg 5	6.55E-01	USEPA Reg 5
2,4-Dinitrophenol	51-28-5	--	--	20	PRGs	0.0609	USEPA Reg 5	2.00E+01	PRGs
2,4-Dinitrotoluene	121-14-2	--	--	--	--	1.28	USEPA Reg 5	1.28E+00	USEPA Reg 5
2,6-Dinitrotoluene	606-20-2	--	--	--	--	0.0328	USEPA Reg 5	3.28E-02	USEPA Reg 5
4,6-Dinitro-2-methylphenol	534-52-1	--	--	--	--	0.144	USEPA Reg 5	1.44E-01	USEPA Reg 5
Dinoseb	88-85-7	--	--	--	--	0.0218	USEPA Reg 5	2.18E-02	USEPA Reg 5
1,4-Dioxane	123-91-1	--	--	--	--	2.05	USEPA Reg 5	2.05E+00	USEPA Reg 5
Diphenylamine	122-39-4	--	--	--	--	1.01	USEPA Reg 5	1.01E+00	USEPA Reg 5
Disulfoton	298-04-4	--	--	--	--	0.0199	USEPA Reg 5	1.99E-02	USEPA Reg 5
Endosulfan I (alpha)	959-98-8	--	--	--	--	0.119	USEPA Reg 5	1.19E-01	USEPA Reg 5
Endosulfan II (beta)	33213-65-9	--	--	--	--	0.119	USEPA Reg 5	1.19E-01	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Endosulfan, mixed isomers	115-29-7	--	--	--	--	--	--	No ESV	No Source
Endosulfan sulfate	1031-07-8	--	--	--	--	0.0358	USEPA Reg 5	3.58E-02	USEPA Reg 5
Endrin	72-20-8	--	--	--	--	0.0101	USEPA Reg 5	1.01E-02	USEPA Reg 5
Endrin aldehyde	7421-93-4	--	--	--	--	0.0105	USEPA Reg 5	1.05E-02	USEPA Reg 5
Ethyl methacrylate	97-63-2	--	--	--	--	30	USEPA Reg 5	3.00E+01	USEPA Reg 5
Ethylbenzene	100-41-4	--	--	--	--	5.16	USEPA Reg 5	5.16E+00	USEPA Reg 5
Famphur	52-85-7	--	--	--	--	0.0497	USEPA Reg 5	4.97E-02	USEPA Reg 5
Fluoranthene	206-44-0	--	--	--	--	122	USEPA Reg 5	1.22E+02	USEPA Reg 5
Fluorene	86-73-7	--	--	30	PRGs ^c	122	USEPA Reg 5	3.00E+01	PRGs
Furan	110-00-9	--	--	600	PRGs	--	--	6.00E+02	PRGs
Heptane	142-82-5	--	--	--	--	--	--	No ESV	No Source
Heptachlor	76-44-8	--	--	--	--	0.00598	USEPA Reg 5	5.98E-03	USEPA Reg 5
Heptachlor Epoxide	1024-57-3	--	--	--	--	0.152	USEPA Reg 5	1.52E-01	USEPA Reg 5
Hexachlorobenzene	118-74-1	--	--	--	--	0.199	USEPA Reg 5	1.99E-01	USEPA Reg 5
Hexachlorobutadiene	87-68-3	--	--	--	--	0.0398	USEPA Reg 5	3.98E-02	USEPA Reg 5
Hexachlorocyclopentadiene	77-47-4	--	--	10	PRGs	0.755	USEPA Reg 5	1.00E+01	PRGs
Hexachloroethane	67-72-1	--	--	--	--	0.596	USEPA Reg 5	5.96E-01	USEPA Reg 5
Hexachlorophene	70-30-4	--	--	--	--	0.199	USEPA Reg 5	1.99E-01	USEPA Reg 5
2-Hexanone	591-78-6	--	--	--	--	12.6	USEPA Reg 5	1.26E+01	USEPA Reg 5
HMX	2691-41-0	--	--	--	--	--	--	No ESV	No Source
Indeno(1,2,3-cd)pyrene	193-39-5	--	--	--	--	109	USEPA Reg 5	1.09E+02	USEPA Reg 5
Isobutyl alcohol	78-83-1	--	--	--	--	20.8	USEPA Reg 5	2.08E+01	USEPA Reg 5
Isodrin	465-73-6	--	--	--	--	0.00332	USEPA Reg 5	3.32E-03	USEPA Reg 5
Isophorone	78-59-1	--	--	--	--	139	USEPA Reg 5	1.39E+02	USEPA Reg 5
Isosafrole	120-58-1	--	--	--	--	9.94	USEPA Reg 5	9.94E+00	USEPA Reg 5
Kepone	143-50-0	--	--	--	--	0.0327	USEPA Reg 5	3.27E-02	USEPA Reg 5
Malathion	121-75-5	--	--	--	--	--	--	No ESV	No Source

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Methacrylonitrile	126-98-7	--	--	--	--	0.057	USEPA Reg 5	5.70E-02	USEPA Reg 5
Methapyrilene	91-80-5	--	--	--	--	2.78	USEPA Reg 5	2.78E+00	USEPA Reg 5
Methoxychlor	72-43-5	--	--	--	--	0.0199	USEPA Reg 5	1.99E-02	USEPA Reg 5
Methyl iodide	74-88-4	--	--	--	--	1.23	USEPA Reg 5	1.23E+00	USEPA Reg 5
Methyl methacrylate	80-62-6	--	--	--	--	984	USEPA Reg 5	9.84E+02	USEPA Reg 5
Methyl methanesulfonate	66-27-3	--	--	--	--	0.315	USEPA Reg 5	3.15E-01	USEPA Reg 5
Methyl parathion	298-00-0	--	--	--	--	0.00029	USEPA Reg 5	2.92E-04	USEPA Reg 5
4-Methyl-2-pentanone	108-10-1	--	--	--	--	443	USEPA Reg 5	4.43E+02	USEPA Reg 5
3-Methylcholanthrene	56-49-5	--	--	--	--	0.0779	USEPA Reg 5	7.79E-02	USEPA Reg 5
Methylene bromide	74-95-3	--	--	--	--	65	USEPA Reg 5	6.50E+01	USEPA Reg 5
Methylene chloride	75-09-2	--	--	--	--	4.05	USEPA Reg 5	4.05E+00	USEPA Reg 5
2-Methylnaphthalene	91-57-6	--	--	--	--	3.24	USEPA Reg 5	3.24E+00	USEPA Reg 5
2-Methylphenol	95-48-7	--	--	--	--	40.4	USEPA Reg 5	4.04E+01	USEPA Reg 5
4-Methylphenol	106-44-5	--	--	--	--	163	USEPA Reg 5	1.63E+02	USEPA Reg 5
Mirex	2385-85-5	--	--	--	--	--	--	No ESV	No Source
Naphthalene	91-20-3	--	--	--	--	0.0994	USEPA Reg 5	9.94E-02	USEPA Reg 5
1,4-Naphthoquinone	130-15-4	--	--	--	--	1.67	USEPA Reg 5	1.67E+00	USEPA Reg 5
1-Naphthylamine	134-32-7	--	--	--	--	9.34	USEPA Reg 5	9.34E+00	USEPA Reg 5
2-Naphthylamine	91-59-8	--	--	--	--	3.03	USEPA Reg 5	3.03E+00	USEPA Reg 5
2-Nitroaniline	88-74-4	--	--	--	--	74.1	USEPA Reg 5	7.41E+01	USEPA Reg 5
3-Nitroaniline	99-09-2	--	--	--	--	3.16	USEPA Reg 5	3.16E+00	USEPA Reg 5
4-Nitroaniline	100-01-6	--	--	--	--	21.9	USEPA Reg 5	2.19E+01	USEPA Reg 5
Nitrobenzene	99-95-3	--	--	40	PRGs ^c	1.31	USEPA Reg 5	4.00E+01	PRGs
Nitrocellulose	9004-70-0	--	--	--	--	--	--	No ESV	No Source
Nitroglycerin	55-63-0	--	--	--	--	--	--	No ESV	No Source
Nitroguanidine	556-88-7	--	--	--	--	--	--	No ESV	No Source
2-Nitrophenol	88-75-5	--	--	--	--	1.6	USEPA Reg 5	1.60E+00	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
4-Nitrophenol	100-02-7	--	--	7	PRGs	5.12	USEPA Reg 5	7.00E+00	PRGs
4-Nitroquinoline-1-oxide	56-57-5	--	--	--	--	0.122	USEPA Reg 5	1.22E-01	USEPA Reg 5
3-Nitrotoluene	99-08-1	--	--	--	--	--	--	No ESV	No Source
N-Nitrosodiethylamine	55-18-5	--	--	--	--	0.0693	USEPA Reg 5	6.93E-02	USEPA Reg 5
N-Nitrosodimethylamine	62-75-9	--	--	--	--	3.2E-05	USEPA Reg 5	3.21E-05	USEPA Reg 5
N-Nitrosodiphenylamine	86-30-6	--	--	20	PRGs ^c	0.545	USEPA Reg 5	2.00E+01	PRGs
N-Nitrosomethylethylamine	10595-95-6	--	--	--	--	0.00166	USEPA Reg 5	1.66E-03	USEPA Reg 5
N-Nitrosomorpholine	59-89-2	--	--	--	--	0.0706	USEPA Reg 5	7.06E-02	USEPA Reg 5
N-Nitrosopiperidine	100-75-4	--	--	--	--	0.00665	USEPA Reg 5	6.65E-03	USEPA Reg 5
N-Nitrosopyrrolidine	930-55-2	--	--	--	--	0.0126	USEPA Reg 5	1.26E-02	USEPA Reg 5
N-nitroso-di-n-propylamine	621-64-7	--	--	--	--	0.544	USEPA Reg 5	5.44E-01	USEPA Reg 5
2-Nitrotoluene	88-72-2	--	--	--	--	--	--	No ESV	No Source
5-nitro-o-Toluidine	99-55-8	--	--	--	--	8.73	USEPA Reg 5	8.73E+00	USEPA Reg 5
2,2'- oxybis(1-Chloropropane)	108-60-1	--	--	--	--	19.9	USEPA Reg 5	1.99E+01	USEPA Reg 5
Parathion	56-38-2	--	--	--	--	0.00034	USEPA Reg 5	3.40E-04	USEPA Reg 5
PCDDs	PCDD-S	--	--	--	--	2E-07	USEPA Reg 5	1.99E-07	USEPA Reg 5
Pentachloroaniline	527-20-8	--	--	100	PRGs ^c	--	--	1.00E+02	PRGs
Pentachlorobenzene	608-93-5	--	--	20	PRGs	0.497	USEPA Reg 5	2.00E+01	PRGs
Pentachloroethane	76-01-7	--	--	--	--	10.7	USEPA Reg 5	1.07E+01	USEPA Reg 5
Pentachloronitrobenzene	82-68-8	--	--	--	--	7.09	USEPA Reg 5	7.09E+00	USEPA Reg 5
Pentachlorophenol	87-86-5	2.1	avian EcoSSL for PCP	3	PRGs	0.119	USEPA Reg 5	2.10E+00	avian EcoSSL for PCP
PETN	78-11-5	--	--	--	--	--	--	No ESV	No Source
Phenacetin	62-44-2	--	--	--	--	11.7	USEPA Reg 5	1.17E+01	USEPA Reg 5
Phenanthrene	85-01-8	--	--	--	--	45.7	USEPA Reg 5	4.57E+01	USEPA Reg 5
Phenol	108-95-2	--	--	30	PRGs	120	USEPA Reg 5	3.00E+01	PRGs
p-Phenylenediamine	106-50-3	--	--	--	--	6.16	USEPA Reg 5	6.16E+00	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
Phorate	298-02-2	--	--	--	--	0.0005	USEPA Reg 5	4.96E-04	USEPA Reg 5
2-Picoline	109-06-8	--	--	--	--	9.9	USEPA Reg 5	9.90E+00	USEPA Reg 5
Polychlorinated biphenyls	1336-36-3	--	--	0.371	PRGs	0.00033	USEPA Reg 5	3.71E-01	PRGs
Polychlorinated dibenzofurans	51207-31-9	--	--	--	--	3.9E-05	USEPA Reg 5	3.86E-05	USEPA Reg 5
Polynuclear aromatic hydrocarbons	130498-29-2	1.1	mammalian EcoSSL for HMW PAHs	--	--	--	--	1.10E+00	mammalian EcoSSL for HMW PAHs
Pronamide	23950-58-5	--	--	--	--	0.0136	USEPA Reg 5	1.36E-02	USEPA Reg 5
Propionitrile	107-12-0	--	--	--	--	0.0498	USEPA Reg 5	4.98E-02	USEPA Reg 5
4-Nitrotoluene	99-99-0	--	--	--	--	--	--	No ESV	No Source
Pyrene	129-00-0	--	--	--	--	78.5	USEPA Reg 5	7.85E+01	USEPA Reg 5
Pyridine	110-86-1	--	--	--	--	1.03	USEPA Reg 5	1.03E+00	USEPA Reg 5
RDX	121-82-4	--	--	--	--	--	--	No ESV	No Source
Safrole	94-59-7	--	--	--	--	0.404	USEPA Reg 5	4.04E-01	USEPA Reg 5
Silvex (2,4,5-TP)	93-72-1	--	--	--	--	0.109	USEPA Reg 5	1.09E-01	USEPA Reg 5
Styrene	100-42-5	--	--	300	PRGs	4.69	USEPA Reg 5	3.00E+02	PRGs
TCDD (2,3,7,8-Tetrachlorodibenzo-p-dioxin)	1746-01-6	--	--	3.15E-06	PRGs	2E-07	USEPA Reg 5	3.15E-06	PRGs
TCDF	51207-31-9	--	--	8.40E-04	PRGs	3.9E-05	USEPA Reg 5	8.40E-04	PRGs
2,3,5,6-Tetrachloroaniline	3481-20-7	--	--	20	PRGs	--	--	2.00E+01	PRGs
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	--	--	2.02	USEPA Reg 5	2.02E+00	USEPA Reg 5
1,2,3,4-Tetrachlorobenzene	634-66-2	--	--	10	PRGs	--	--	1.00E+01	PRGs
1,1,1,2-Tetrachloroethane	630-20-6	--	--	--	--	225	USEPA Reg 5	2.25E+02	USEPA Reg 5
1,1,2,2-Tetrachloroethane	79-34-5	--	--	--	--	0.127	USEPA Reg 5	1.27E-01	USEPA Reg 5
Tetrachloroethene	127-18-4	--	--	--	--	9.92	USEPA Reg 5	9.92E+00	USEPA Reg 5
2,3,4,5-Tetrachlorophenol	4901-51-3	--	--	20	PRGs	--	--	2.00E+01	PRGs

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	--	--	0.199	USEPA Reg 5	1.99E-01	USEPA Reg 5
Tetraethyl dithiopyrophosphate	3689-24-5	--	--	--	--	0.596	USEPA Reg 5	5.96E-01	USEPA Reg 5
Tetryl	479-45-8	--	--	--	--	--	--	No ESV	No Source
Toluene	108-88-3	--	--	200	PRGs	5.45	USEPA Reg 5	2.00E+02	PRGs
o-Toluidine	95-53-4	--	--	--	--	2.97	USEPA Reg 5	2.97E+00	USEPA Reg 5
4-Toluidine	106-49-0	--	--	--	--	--	--	No ESV	No Source
Toxaphene	8001-35-2	--	--	--	--	0.119	USEPA Reg 5	1.19E-01	USEPA Reg 5
2,4,5-Trichloroaniline	636-30-6	--	--	20	PRGs	--	--	2.00E+01	PRGs
1,2,3-Trichlorobenzene	87-61-6	--	--	20	PRGs	--	--	2.00E+01	PRGs
1,2,4-Trichlorobenzene	120-82-1	--	--	20	PRGs	11.1	USEPA Reg 5	2.00E+01	PRGs
1,1,1-Trichloroethane	71-55-6	--	--	--	--	29.8	USEPA Reg 5	2.98E+01	USEPA Reg 5
1,1,2-Trichloroethane	79-00-5	--	--	--	--	28.6	USEPA Reg 5	2.86E+01	USEPA Reg 5
Trichloroethene	79-01-6	--	--	--	--	12.4	USEPA Reg 5	1.24E+01	USEPA Reg 5
Trichlorofluoromethane	75-69-4	--	--	--	--	16.4	USEPA Reg 5	1.64E+01	USEPA Reg 5
2,4,5-Trichlorophenol	95-95-4	--	--	9	PRGs	14.1	USEPA Reg 5	9.00E+00	PRGs
2,4,6-Trichlorophenol	88-06-2	--	--	4	PRGs	9.94	USEPA Reg 5	4.00E+00	PRGs
1,2,3-Trichloropropane	96-18-4	--	--	--	--	3.36	USEPA Reg 5	3.36E+00	USEPA Reg 5
2,4,5-Trichlorophenoxyacetic acid	93-76-5	--	--	--	--	0.596	USEPA Reg 5	5.96E-01	USEPA Reg 5
O,O,O-Triethyl phosphorothioate	126-68-1	--	--	--	--	0.818	USEPA Reg 5	8.18E-01	USEPA Reg 5

Table H-6. Ecological Screening Values for Chemical Analytes in Soil (continued)

Analyte	CAS Registry Number	Soil Screening Values							
		USEPA EcoSSLs		DOE (1997a) Preliminary Remediation Goals for Ecological Endpoints ^a		USEPA Region 5 Ecological Screening Levels (2003) (update of 1998 EDQLs)		Preferred Ecological Screening Value (ESV) ^d	
		Number (mg/kg dry soil)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source	Number (mg/kg)	Source
1,3,5-Trinitrobenzene	99-35-4	--	--	--	--	0.376	USEPA Reg 5	3.76E-01	USEPA Reg 5
2,4,6-Trinitrotoluene	118-96-7	--	--	--	--	--	--	No ESV	No Source
Vinyl acetate	108-05-4	--	--	--	--	12.7	USEPA Reg 5	1.27E+01	USEPA Reg 5
Vinyl chloride	75-01-4	--	--	--	--	0.646	USEPA Reg 5	6.46E-01	USEPA Reg 5
Xylenes (total)	1330-20-7	--	--	--	--	10	USEPA Reg 5	1.00E+01	USEPA Reg 5

Hierarchy of values found in updated Ohio Environmental Protection Agency (Ohio EPA) Risk Assessment Guidance, section 3.3.5: <http://www.epa.ohio.gov/portals/30/rules/RR-031.pdf>
 EcoSSLs: <http://www.epa.gov/ecotox/ecossi/>

Ecological screening levels (ESLs), USEPA Region 5, 2003: <http://www.epa.gov/reg5rcra/ca/edql.htm>

^aU.S. Department of Energy (DOE) (1997a). *Preliminary Remediation Goals for Ecological Endpoints*. ES/ER/TM-162/R2. August 1997.

<http://www.esd.ornl.gov/programs/ecorisk/documents/tm162r2.pdf>

^bValues for which plant benchmark is lowest. According to DOE (1997a), the PRG is the lowest of three values (earthworm, plant, or wildlife). The only values shown in DOE 1997a are the ones for which the calculated value is lower than earthworm and plant values. Plant values found in: DOE 1997b. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants*. ES/ER/TM-85/R3. November 1997.

^cValues for which earthworm benchmark is lowest. According to DOE (1997a), the PRG is the lowest of three values (earthworm, plant, or wildlife). The only values shown in DOE 1997a are the ones for which the calculated value is lower than earthworm and plant values. Earthworm values found in: DOE 1997c. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process*. ES/ER/TM-126/R2.

^dThe preferred soil value is the EcoSSLs, followed by DOE (1997a), followed by USEPA Region 5 ESLs.

*Aluminum is identified as a chemical of potential concern only at sites where the soil pH is less than 5.5

**In well-aerated soils between pH 5 and 8, iron is not expected to be toxic to plants. A determination of the geochemical conditions (i.e., pH and Eh at a minimum) of the environmental setting, as well as the presence of iron floc and the toxic metals, is critical to the determination of the relative importance of iron at an area of concern.

BHC = Hexachlorocyclohexane.

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

PRG = Preliminary remediation goal.

CAS = Chemical Abstract Service.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

DDD = Dichlorodiphenyldichloroethane.

mg/kg = Milligrams per kilogram.

Reg = Region.

DDE = Dichlorodiphenyldichloroethylene.

PAH = Polycyclic aromatic hydrocarbon.

TCDF = 2,3,7,8-Tetrachlorodibenzofuran.

DDT = Dichlorodiphenyltrichloroethane.

PCB = Polychlorinated biphenyl.

USEPA = U.S. Environmental Protection Agency.

EDQL = Ecological data quality level.

PCDD = Polychlorinated dibenzodioxins.

-- = No value.

EcoSSL = Ecological soil screening level.

PCP = Pentachlorophenol.

HMX = High molecular weight.

PETN = Pentaerythritol tetranitrate.

Table H-7. SRC and Integrated COPEC Screening with Maximum Ratio for Shallow Surface Soil (0-1 ft bgs ISM Samples) at Building F-15

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	Background Criteria ^a	PBT ^b Compound? (yes/no)	SRC? (yes/no)	SRC Justification	ESV	ESV Source ^c	COPEC? (yes/no)	COPEC Justification	Ratio of Max to ESV
<i>Inorganic Chemicals</i>														
Aluminum	7429-90-5	16/ 16	7300	16000	12600	17700	No	No	Below background	50	PRGs	No	Below background	320
Antimony	7440-36-0	6/ 15	0.16	1.4	0.617	0.96	No	Yes	Exceeds background	0.27	EcoSSL	Yes	Exceeds ESV	5.19
Arsenic	7440-38-2	16/ 16	2.7	20	11	15.4	No	Yes	Exceeds background	18	EcoSSL	Yes	Exceeds ESV	1.11
Barium	7440-39-3	16/ 16	72	100	85.1	88.4	No	Yes	Exceeds background	330	EcoSSL	No	Below ESV	0.30
Beryllium	7440-41-7	16/ 16	0.58	1.4	0.883	0.88	No	Yes	Exceeds background	21	EcoSSL	No	Below ESV	0.07
Cadmium	7440-43-9	6/ 16	0.17	1.03	0.266	0	No	Yes	Exceeds background	0.36	EcoSSL	Yes	Exceeds ESV	2.86
Calcium	7440-70-2	16/ 16	2800	29000	7810	15800	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Chromium	7440-47-3	16/ 16	16.5	58.4	23.7	17.4	No	Yes	Exceeds background	26	EcoSSL	Yes	Exceeds ESV	2.25
Cobalt	7440-48-4	16/ 16	5.9	12	9.43	10.4	No	Yes	Exceeds background	13	EcoSSL	No	Below ESV	0.92
Copper	7440-50-8	16/ 16	12.4	38.4	20.2	17.7	No	Yes	Exceeds background	28	EcoSSL	Yes	Exceeds ESV	1.37
Iron	7439-89-6	16/ 16	21000	27900	24600	23100	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Lead	7439-92-1	16/ 16	13	58	23.3	26.1	No	Yes	Exceeds background	11	EcoSSL	Yes	Exceeds ESV	5.27
Magnesium	7439-95-4	16/ 16	1100	6600	3400	3030	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Manganese	7439-96-5	16/ 16	260	870	481	1450	No	No	Below background	220	EcoSSL	No	Below background	3.95
Mercury	7439-97-6	16/ 16	0.03	0.072	0.0477	0.036	Yes	Yes	Exceeds background, PBT Compound	0.00051	PRGs	Yes	Exceeds ESV, PBT Compound	141.18
Nickel	7440-02-0	16/ 16	17	55	28.8	21.1	No	Yes	Exceeds background	38	EcoSSL	Yes	Exceeds ESV	1.45
Potassium	7440-09-7	16/ 16	680	2000	1280	927	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Selenium	7782-49-2	8/ 16	0.367	1.3	0.74	1.4	No	No	Below background	0.52	EcoSSL	No	Below background	2.50
Silver	7440-22-4	3/ 15	0.037	0.043	0.43	0	No	Yes	Exceeds background	4.2	EcoSSL	No	Below ESV	0.01
Sodium	7440-23-5	16/ 16	47.9	430	246	123	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Thallium	7440-28-0	7/ 16	0.14	0.59	0.315	0	No	Yes	Exceeds background	1	PRGs	No	Below ESV	0.59
Vanadium	7440-62-2	16/ 16	16.9	29	22.1	31.1	No	No	Below background	7.8	EcoSSL	No	Below background	3.72
Zinc	7440-66-6	16/ 16	47.6	110	66.9	61.8	No	Yes	Exceeds background	46	EcoSSL	Yes	Exceeds ESV	2.39
<i>Explosives</i>														
Nitrocellulose	9004-70-0	1/ 2	0.93	0.93	1.09	0	No	Yes	Detected organic	No ESV	No Source	Yes	Detected organic	No ESV
<i>Semi-volatile Organic Compounds</i>														
2-Methylnaphthalene	91-57-6	2/ 2	0.053	0.098	0.0755	0	No	Yes	Detected organic	3.24	USEPA Reg 5	No	Below ESV	0.03
Acenaphthene	83-32-9	1/ 6	0.08	0.08	0.0487	0	No	Yes	Detected organic	20	PRGs	No	Below ESV	0.004
Acenaphthylene	208-96-8	1/ 6	0.022	0.022	0.0391	0	No	Yes	Detected organic	682	USEPA Reg 5	No	Below ESV	3.23E-05
Anthracene	120-12-7	3/ 6	0.023	0.13	0.036	0	No	Yes	Detected organic	1480	USEPA Reg 5	No	Below ESV	8.78E-05
Benz(a)anthracene	56-55-3	5/ 6	0.013	0.49	0.115	0	No	Yes	Detected organic	5.21	USEPA Reg 5	No	Below ESV	0.09
Benzo(a)pyrene	50-32-8	5/ 6	0.014	0.48	0.116	0	No	Yes	Detected organic	1.52	USEPA Reg 5	No	Below ESV	0.32
Benzo(b)fluoranthene	205-99-2	4/ 6	0.026	0.69	0.191	0	No	Yes	Detected organic	59.8	USEPA Reg 5	No	Below ESV	0.01
Benzo(ghi)perylene	191-24-2	4/ 6	0.012	0.33	0.107	0	No	Yes	Detected organic	119	USEPA Reg 5	No	Below ESV	0.003
Benzo(k)fluoranthene	207-08-9	4/ 6	0.01	0.26	0.0911	0	No	Yes	Detected organic	148	USEPA Reg 5	No	Below ESV	0.002
Chrysene	218-01-9	5/ 6	0.014	0.54	0.131	0	No	Yes	Detected organic	4.73	USEPA Reg 5	No	Below ESV	0.11
Dibenz(a,h)anthracene	53-70-3	1/ 6	0.089	0.089	0.0502	0	No	Yes	Detected organic	18.4	USEPA Reg 5	No	Below ESV	0.005
Dibenzofuran	132-64-9	1/ 2	0.017	0.017	0.091	0	No	Yes	Detected organic	No ESV	No Source	Yes	Detected organic	No ESV
Fluoranthene	206-44-0	5/ 6	0.028	1.2	0.266	0	No	Yes	Detected organic	122	USEPA Reg 5	No	Below ESV	0.01
Fluorene	86-73-7	1/ 6	0.062	0.062	0.0457	0	No	Yes	Detected organic	30	PRGs	No	Below ESV	0.002
Indeno(1,2,3-cd)pyrene	193-39-5	4/ 6	0.011	0.3	0.0989	0	No	Yes	Detected organic	109	USEPA Reg 5	No	Below ESV	0.003

Table H-7. SRC and Integrated COPEC Screening with Maximum Ratio for Shallow Surface Soil (0–1 ft bgs ISM Samples) at Building F-15 (continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	Background Criteria ^a	PBT ^b Compound? (yes/no)	SRC? (yes/no)	SRC Justification	ESV	ESV Source ^c	COPEC? (yes/no)	COPEC Justification	Ratio of Max to ESV
Naphthalene	91-20-3	5/ 6	0.038	0.13	0.0639	0	No	Yes	Detected organic	0.0994	USEPA Reg 5	Yes	Exceeds ESV	1.31
Phenanthrene	85-01-8	5/ 6	0.029	0.71	0.174	0	No	Yes	Detected organic	45.7	USEPA Reg 5	No	Below ESV	0.02
Pyrene	129-00-0	5/ 6	0.02	0.85	0.192	0	No	Yes	Detected organic	78.5	USEPA Reg 5	No	Below ESV	0.01

^aBackground criteria for soil 0–1 ft bgs from final facility-wide background values for Ravenna Army Ammunition Plant, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^bPBT compounds are defined by Ohio Environmental Protection Agency (Ohio EPA) 2008 as: aldrin/dieldrin; chlordane; 1,1'-(2,2,2trichloroethylidene)bis(4-chlorobenzene) [dichlorodiphenyldichloroethane (DDT)] and metabolites (dichlorodiphenyldichloroethane (DDD)+ dichlorodiphenyldichloroethylene (DDE)]; hexachlorobenzene; hexachlorobutadiene (hexachloro-1,3-butadiene); hexachlorocyclohexanes (BHCs, alpha-BHC, beta-BHC, delta-BHC); lindane (gammahexachlorocyclohexane); alkyl-lead, mercury and its compounds; mirex; photomirex; octachlorostyrene; polychlorinated biphenyls (PCBs); 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); dioxin, PCDF (furans); 1,2,3,4-tetrachlorobenzene; 1,2,4,5-tetrachlorobenzene; toxaphene; and other chemicals that are reasonably anticipated to bioaccumulate in animal tissues

^cScreening level source: See soil ESV table. Hierarchy of values according to Ohio EPA Risk Assessment Guidance is EcoSSLs, followed by U.S. Department of Energy (1997a) *Preliminary Remediation Goals for Ecological Endpoints*, followed by USEPA Region 5 ecological screening levels.

bgs = Below ground surface.

CAS = Chemical Abstract Service.

COPEC = Chemical of potential ecological concern.

EcoSSL = Ecological soil screening level.

ESV = Ecological screening value.

Freq = Frequency.

ft = Feet.

ISM = Incremental sampling methodology.

Max = Maximum concentration.

mg/kg = Milligrams per kilogram.

PBT = Persistent, bioaccumulative, and toxic.

PRG = Preliminary remediation goal.

Reg = Region.

SRC = Site-related contaminant.

USEPA = U.S. Environmental Protection Agency.

Bold = Chemical is a COPEC.

Table H-8. SRC and Integrated COPEC Screening with Maximum Ratio for Shallow Surface Soil (0-1 ft bgs ISM Samples) at Building F-16

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	Background Criteria ^a	PBT ^b Compound? (yes/no)	SRC? (yes/no)	SRC Justification	ESV	ESV Source ^c	COPEC? (yes/no)	COPEC Justification	Ratio of Max to ESV
<i>Inorganic Chemicals</i>														
Aluminum	7429-90-5	11/ 11	9410	16000	12400	17700	No	No	Below background	50	PRGs	No	Below background	320
Antimony	7440-36-0	6/ 11	0.17	1.5	0.676	0.96	No	Yes	Exceeds background	0.27	EcoSSL	Yes	Exceeds ESV	5.56
Arsenic	7440-38-2	11/ 11	9.8	18	12.2	15.4	No	Yes	Exceeds background	18	EcoSSL	No	Max = ESV	1.00
Barium	7440-39-3	11/ 11	58.4	200	96.4	88.4	No	Yes	Exceeds background	330	EcoSSL	No	Below ESV	0.61
Beryllium	7440-41-7	11/ 11	0.495	2.9	1.05	0.88	No	Yes	Exceeds background	21	EcoSSL	No	Below ESV	0.14
Cadmium	7440-43-9	6/ 11	0.17	2.5	0.515	0	No	Yes	Exceeds background	0.36	EcoSSL	Yes	Exceeds ESV	6.94
Calcium	7440-70-2	11/ 11	3700	25000	9020	15800	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Chromium	7440-47-3	11/ 11	15.8	65.3	37.2	17.4	No	Yes	Exceeds background	26	EcoSSL	Yes	Exceeds ESV	2.51
Cobalt	7440-48-4	11/ 11	4.6	12	8.74	10.4	No	Yes	Exceeds background	13	EcoSSL	No	Below ESV	0.92
Copper	7440-50-8	11/ 11	14.4	200	40	17.7	No	Yes	Exceeds background	28	EcoSSL	Yes	Exceeds ESV	7.14
Iron	7439-89-6	11/ 11	20700	29300	25400	23100	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Lead	7439-92-1	11/ 11	13	120	36	26.1	No	Yes	Exceeds background	11	EcoSSL	Yes	Exceeds ESV	10.91
Magnesium	7439-95-4	11/ 11	2800	4600	3580	3030	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Manganese	7439-96-5	11/ 11	320	1200	572	1450	No	No	Below background	220	EcoSSL	No	Below background	5.45
Mercury	7439-97-6	10/ 11	0.019	0.05	0.0372	0.036	Yes	Yes	Exceeds background, PBT Compound	0.00051	PRGs	Yes	Exceeds ESV, PBT Compound	98.04
Nickel	7440-02-0	11/ 11	21.8	39.6	28.2	21.1	No	Yes	Exceeds background	38	EcoSSL	Yes	Exceeds ESV	1.04
Potassium	7440-09-7	11/ 11	826	2100	1460	927	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Selenium	7782-49-2	5/ 11	0.408	1.7	0.905	1.4	No	Yes	Exceeds background	0.52	EcoSSL	Yes	Exceeds ESV	3.27
Silver	7440-22-4	2/ 10	0.034	0.048	0.478	0	No	Yes	Exceeds background	4.2	EcoSSL	No	Below ESV	0.01
Sodium	7440-23-5	11/ 11	54.8	710	288	123	No	No	Essential Nutrient	No ESV	No Source	No	Essential Nutrient	No ESV
Thallium	7440-28-0	5/ 11	0.137	0.33	0.327	0	No	Yes	Exceeds background	1	PRGs	No	Below ESV	0.33
Vanadium	7440-62-2	11/ 11	16.8	26	20.8	31.1	No	No	Below background	7.8	EcoSSL	No	Below background	3.33
Zinc	7440-66-6	11/ 11	48.7	130	81.8	61.8	No	Yes	Exceeds background	46	EcoSSL	Yes	Exceeds ESV	2.83
<i>Explosives</i>														
Nitrocellulose	9004-70-0	2/ 3	1.1	2.1	1.48	0	No	Yes	Detected organic	No ESV	No Source	Yes	Detected organic	No ESV
Nitroglycerin	55-63-0	1/ 5	0.52	0.52	0.354	0	No	Yes	Detected organic	No ESV	No Source	Yes	Detected organic	No ESV
<i>Semi-volatile Organic Compounds</i>														
2-Methylnaphthalene	91-57-6	3/ 3	0.088	1	0.409	0	No	Yes	Detected organic	3.24	USEPA Reg 5	No	Below ESV	0.31
Anthracene	120-12-7	2/ 4	0.024	0.053	0.0476	0	No	Yes	Detected organic	1480	USEPA Reg 5	No	Below ESV	3.58E-05
Benz(a)anthracene	56-55-3	4/ 5	0.007	0.14	0.0688	0	No	Yes	Detected organic	5.21	USEPA Reg 5	No	Below ESV	0.03
Benzo(a)pyrene	50-32-8	4/ 5	0.0071	0.11	0.064	0	No	Yes	Detected organic	1.52	USEPA Reg 5	No	Below ESV	0.07
Benzo(b)fluoranthene	205-99-2	5/ 5	0.0093	0.13	0.0681	0	No	Yes	Detected organic	59.8	USEPA Reg 5	No	Below ESV	0.002
Benzo(ghi)perylene	191-24-2	3/ 4	0.035	0.095	0.071	0	No	Yes	Detected organic	119	USEPA Reg 5	No	Below ESV	0.001
Benzo(k)fluoranthene	207-08-9	3/ 4	0.028	0.1	0.0668	0	No	Yes	Detected organic	148	USEPA Reg 5	No	Below ESV	0.001
Bis(2-ethylhexyl)phthalate	117-81-7	1/ 3	0.13	0.13	0.315	0	No	Yes	Detected organic	0.925	USEPA Reg 5	No	Below ESV	0.14
Carbazole	86-74-8	1/ 3	0.038	0.038	0.101	0	No	Yes	Detected organic	No ESV	No Source	Yes	Detected organic	No ESV
Chrysene	218-01-9	5/ 5	0.0079	0.2	0.0686	0	No	Yes	Detected organic	4.73	USEPA Reg 5	No	Below ESV	0.04
Dibenzofuran	132-64-9	1/ 3	0.26	0.26	0.358	0	No	Yes	Detected organic	No ESV	No Source	Yes	Detected organic	No ESV
Fluoranthene	206-44-0	5/ 5	0.012	0.26	0.111	0	No	Yes	Detected organic	122	USEPA Reg 5	No	Below ESV	0.002
Indeno(1,2,3-cd)pyrene	193-39-5	3/ 4	0.039	0.073	0.0638	0	No	Yes	Detected organic	109	USEPA Reg 5	No	Below ESV	0.001

Table H-8. SRC and Integrated COPEC Screening with Maximum Ratio for Shallow Surface Soil (0-1 ft bgs ISM Samples) at Building F-16 (continued)

Analyte (mg/kg)	CAS Number	Freq of Detect	Minimum Detect	Maximum Detect	Average Result	Background Criteria ^a	PBT ^b Compound?	SRC? (yes/no)	SRC Justification	ESV	ESV Source ^c	COPEC? (yes/no)	COPEC Justification	Ratio of Max to ESV
Naphthalene	91-20-3	4/ 4	0.054	0.73	0.235	0	No	Yes	Detected organic	0.0994	USEPA Reg 5	Yes	Exceeds ESV	7.34
Phenanthrene	85-01-8	4/ 4	0.05	0.52	0.192	0	No	Yes	Detected organic	45.7	USEPA Reg 5	No	Below ESV	0.01
Pyrene	129-00-0	5/ 5	0.0096	0.3	0.102	0	No	Yes	Detected organic	78.5	USEPA Reg 5	No	Below ESV	0.004
<i>Pesticides/PCBs</i>														
4,4'-DDE	72-55-9	1/ 2	0.012	0.012	0.0148	0	Yes	Yes	Detected organic, PBT Compound	0.021	EcoSSL	Yes	PBT Compound	0.57
4,4'-DDT	50-29-3	1/ 2	0.019	0.019	0.0198	0	Yes	Yes	Detected organic, PBT Compound	0.021	EcoSSL	Yes	PBT Compound	0.90
PCB-1260	11096-82-5	1/ 2	0.12	0.12	0.0685	0	Yes	Yes	Detected organic, PBT Compound	No ESV	No Source	Yes	PBT Compound	No ESV
<i>Volatile Organic Compounds</i>														
Chloroform	67-66-3	1/ 2	0.00068	0.00068	0.00199	0	No	Yes	Detected organic	1.19	USEPA Reg 5	No	Below ESV	0.001

^aBackground criteria for soil 0-1 ft bgs from final facility-wide background values for Ravenna Army Ammunition Plant, published in the *Final Phase II Remedial Investigation Report for Winklepeck Burning Grounds at Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001).

^bPBT compounds are defined by Ohio Environmental Protection Agency (Ohio EPA) 2008 as: aldrin/dieldrin; chlordane; 1,1'-(2,2,2trichloroethylidene)bis(4-chlorobenzene) [dichlorodiphenyldichloroethane (DDT)] and metabolites (dichlorodiphenyldichloroethane (DDD)+ dichlorodiphenyldichloroethylene (DDE)]; hexachlorobenzene; hexachlorobutadiene (hexachloro-1,3-butadiene); hexachlorocyclohexanes (BHCs, alpha-BHC, beta-BHC, delta-BHC); lindane (gammahexachlorocyclohexane); alkyl-lead, mercury and its compounds; mirex; photomirex; octachlorostyrene; polychlorinated biphenyls (PCBs); 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD); dioxin, PCDF (furans); 1,2,3,4-tetrachlorobenzene; 1,2,4,5-tetrachlorobenzene; toxaphene; and other chemicals that are reasonably anticipated to bioaccumulate in animal tissues

^cScreening level source: See soil ESV table. Hierarchy of values according to Ohio EPA Risk Assessment Guidance is EcoSSLs, followed by U.S. Department of Energy (1997a) *Preliminary Remediation Goals for Ecological Endpoints*, followed by USEPA Region 5 ecological screening levels.

bgs = Below ground surface.

CAS = Chemical Abstract Service.

COPEC = Chemical of potential ecological concern.

DDE = Dichlorodiphenyldichloroethylene.

DDT = Dichlorodiphenyltrichloroethane.

EcoSSL = Ecological soil screening level.

ESV = Ecological screening value.

Freq = Frequency.

ft = Feet.

ISM = Incremental sampling methodology.

Max = Maximum concentration

mg/kg = Milligrams per kilogram.

PBT = Persistent, bioaccumulative, and toxic.

PCB = Polychlorinated biphenyl.

PRG = Preliminary remediation goal.

Reg = Region.

SRC = Site-related contaminant.

USEPA = U.S. Environmental Protection Agency.

Bold = Chemical is a COPEC.

REFERENCES

- BTAG (U.S. Army Biological Technical Assistance Group) 2005. *Technical Document for Ecological Risk Assessment: Process for Developing Management Goals*. August 2005.
- DOE (U.S. Department of Energy) 1997a. *Preliminary Remediation Goals for Ecological Endpoints*. Oak Ridge National Laboratory, Oak Ridge Tennessee. August 1997.
- DOE 1997b. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process; 1997 Revision*. Oak Ridge National Laboratory, Oak Ridge Tennessee. November 1997.
- DOE 1997c. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision*. Oak Ridge National Laboratory, Oak Ridge, Tennessee. November 1997.
- Efroymson, R.A., G.W. Suter II, B.E. Sample, and D.S. Jones 1997a. *Preliminary Remediation Goals for Ecological Endpoints*. Oak Ridge National Laboratory, Oak Ridge Tennessee. August 1997. [See DOE 1997a]
- Efroymson, R.A., M.E. Will, and G.W. Suter II 1997b. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process; 1997 Revision*. Oak Ridge National Laboratory, Oak Ridge Tennessee. November 1997. [See DOE 1997b]
- Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten 1997c. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision*. Oak Ridge National Laboratory, Oak Ridge, Tennessee. November 1997. [See DOE 1997c]
- MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. *Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems*, Arch. Environ. Contam. Toxicol. 39, 20-31. 2000.
- OHARNG (Ohio Army National Guard) 2014. *Integrated Natural Resources Management Plan and Environmental Assessment for the Ravenna Training and Logistics Site, Portage and Trumbull Counties, Ohio*. December 2014.
- Ohio EPA (Ohio Environmental Protection Agency) 2008. *Guidance for Conducting Ecological Risk Assessments (Ohio EPA)*. Division of Emergency and Remedial Response. April 2008.
- USACE (U.S. Army Corps of Engineers) 2001. *Phase II Remedial Investigation Report for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. April 2001.

USEPA (U.S. Environmental Protection Agency) 1998. *Technical Approach for Developing EDQLs for Resource Conservation and Recovery Act (RCRA) Appendix IX Constituents and Other Significant Contaminants of Ecological Concern*. USEPA, Region 5. April 1998.

USEPA 2003. *Ecological Screening Levels*. USEPA, Region 5.
<http://www.epa.gov/reg5rcra/ca/edql.htm>. August 2003.

USEPA 2010. *Ecological Soil Screening Levels* (Eco-SSLs). Office of Solid Waste and Emergency Response, Washington, D.C. 2010. <http://www.epa.gov/ecotox/ecossi/>. 2010.