APPENDIX H

RISK BASED SCREENING OF DREDGED MATERIAL

MEMORANDUM FOR FILE
SUBJECT *Risk Based Screening of Dredged Material from Lorain River Channel and Outer Harbor for Potential Beneficial Use of Dredged Material, in Support of the Lorain Dredged Material Management Plan.*
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Introduction

As one of the first steps in assessing the feasibility of using sediments dredged from Black River and the Lorain Harbor for a beneficial use, the most recent (most relevant) dredged material data (Table 1) was screened against risk-based concentrations and environmental guidelines and standards (GLC 2004). Samples taken from Lake Reference areas are included for comparison sake. Older data (1999) from the Black River, Lorain Harbor, and Lorain CDF are also available, but these data were not included in this screen, as these represent historical sampling that may not be as representative of current sediment conditions in the Harbor and river. In general, the sediment concentrations of constituents have either stayed the same or decreased over time.

The risk-based concentrations, guidelines, and standards, were developed by various agencies, including the US Environmental Protection Agency, the Ohio Environmental Protection Agency, and the Canadian Ministry of the Environment (Tables 2 and 3, Figure 1). As this is only a screening level evaluation of constituent concentrations in dredged sediments, the presence of a constituent above its screening level does not necessarily mean that the dredged material is inappropriate for a given beneficial use. It simply means that further evaluation to make this determination may be warranted. For example, site-specific physical, chemical, or biological testing may be appropriate. If the constituent concentrations in the dredged material are below the risk based screening concentrations, guidelines, or standards, then it can be assumed that the dredged material is safe to use for the land use and receptors for which the screening levels were developed. It should, however, be noted that each set of screening levels were generated for specific exposures and receptors.

Potential beneficial use options

The land use scenario will determine what type of receptor (human or ecological) will be exposed to the dredged material. Different risk-based concentrations are developed for each type of land use scenario. The primary land use scenario being considered for the beneficial use of dredged material is for a wastewater treatment plant. In this scenario, the dredged material may be placed on the site where the new wastewater treatment plant is to be built. When sewage sludge becomes available, it may be mixed with the dredged material to form topsoil.

In this scenario, the primary receptors are considered people, working in an industrial setting. Depending on the chemistry of the specific dredged material involved, there may be potential for constituents to be picked up by storm water/percolating water and then be carried into streams/wetlands, etc. Therefore, ecological receptors may be considered secondary receptors for land-use scenarios where people are the primary receptors. For this reason, elutriate and leachate sampling results, when available, are also included in this screening evaluation.

Choice of screening levels

As various options for beneficial use of dredged material are being considered, various different risk based screening levels were used in this evaluation (Figure 1). Recommendations from the Ohio Environmental Protection Agency (EPA) Division of Surface Water, Ohio EPA Division of Emergency and Remedial Response, as well as Ohio EPA Office of Federal Facilities Oversight, were followed in choosing the screening levels. There are risk based screening levels that are designed to be protective of human health, and others that are designed to be protective of terrestrial or aquatic ecosystems, based on direct contact with contaminated dredged material. In addition, there are screening values based on exposure to contaminants that have moved into other media, either via plant or animal uptake, or via leaching of the constituents into surface or ground water. The screening values evaluated and used are as follows:

I. Human Health Screening Values (primary exposures)

a. Federal Screening Values

USEPA Region 9 Preliminary Remediation Goals (PRGs) (USEPA Region 9 2004). The PRGs were developed by the U.S. Environmental Protection Agency, Region 9, and are used routinely during site inspections of hazardous wastes sites by U.S. Army Corps of Engineer risk assessors. These PRGs were developed to address direct human exposure to potentially contaminated soils, and consider two different human exposure scenarios: a residential exposure, and an industrial exposure. Inhalation, ingestion, and dermal absorption of constituents from soil are the only pathways considered in development of the USEPA Region 9 PRGs.

b. Ohio State Guidelines

Voluntary Action Program (VAP) Standards

These cleanup standards were developed utilizing the most current, accepted scientific methodologies for minimizing the health risk posed by exposure to contaminants (Ohio EPA 2001). The VAP cleanup standards assume direct exposure to soils, in either a residential or industrial exposure. These standards are promulgated in Ohio Administrative Code (OAC) 3745-300-08.

c. Canadian Environmental Quality Guidelines.

Ohio may reference the Canadian Environmental Quality Guidelines for soil, in cases where industrial or residential land uses are being considered. Unlike the USEPA Region 9 PRGs, the Canadian Environmental Quality Guidelines for residential/park land uses also consider toxicity to soil nutrient cycling processes, soil invertebrates, plants and wildlife, in addition to toxicity to the primary human receptors. In addition, the Canadian guidelines include a check of the fate and transport of a constituent from soil to another media, to ensure that preliminary generic soil quality guidelines do not lead to unacceptable exposures from other media. Finally, the Canadian guidelines involve an evaluation against plant nutritional requirements, geochemical background, and analytical detection limits. Therefore, the Canadian guidelines are the result of a more comprehensive assessment than the strictly human health risk based USEPA Region 9 PRGs.

d. Conclusions:

The USEPA Region 9 PRGs were recommended by Ohio EPA, and so the data will initially be screened using these criteria. However, as the Ohio VAP standards are promulgated in OAC 3745-300-08, they will also be used. Finally, the Canadian Environmental Quality Guidelines for residential/park use consider more than simply potential risks to human health. Therefore, they will be used separately in their own screen.

II. Ecological Screening Values for Aquatic Ecosystems (secondary exposure)

a. Ohio EPA OFFO

Ohio EPA OFFO has a specific hierarchy for screening potentially contaminated sediments, using the following screening values:

i. Site Specific Background
ii. Ohio Sediment Reference values (SRV), available for metals only (Ohio EPA 2003). Values are presented from both the Erie/Ontario Lake Plain (EOLP) and Erie Corn Belt Plains (ECBP), as the origin of the dredged material in the Black River and Lorain Harbor likely spans both regions.
iii. Consensus threshold effects concentrations (TEC) values
iv. USEPA Region 5 RCRA Ecological Data Quality Levels (EDQL) for sediment (USEPA Region 5, 2003).

b. Ohio EPA DERR

Ohio EPA DERR's suggestion was to use the USEPA Region 5 RCRA EDQLs for sediment.

c. Federal Screening Values.

Sediment threshold effects concentrations (TEC), and sediment probable effects concentrations (PEC), were developed to be used in screening level evaluations (USEPA 2002b). The consensus TECs were developed to represent concentrations of individual constituents, below which the constituent was considered to be non-toxic in the sediment. The consensus PECs were developed to represent concentrations of individual constituents, above which the constituent was considered to be toxic. The consensus effects concentrations were validated with toxicity tests. These studies indicated that most of the TECs provide an accurate basis for predicting the absence of sediment toxicity. Similarly, most of the PECs provide an accurate basis for predicting sediment toxicity.

d. Conclusions: For metals, Ohio sediment reference values will be used when available. For organics, when they are available, USEPA's sediment TEC and PEC take precedence over other sediment screening levels, since they were developed most recently, using a comprehensive scientific approach.

III. Screening Values Based on Movement of Constituents from Dredged Material into Other Media (secondary exposure)

a. Plant and animal uptake of constituents from dredged material: The USEPA Biosolids Criteria, Rule 503 (USEPA 1993), and Ohio's Sewage Sludge Rules (Ohio EPA 2002), both were developed to look at exposure to humans when biosolids are applied to agricultural lands. Biosolids are the nutrient-rich organic materials resulting from the treatment of sewage sludge (the name for the solid, semisolid or liquid untreated residue generated during the treatment of domestic sewage in a treatment facility). When treated and processed, sewage sludge becomes biosolids, which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils, and stimulate plant growth. The biosolids rule established pollutant limits in biosolids when the biosolid is applied to agricultural lands, as well as the resulting soil concentration. Utilization of these pollutant limits is appropriate because the biosolids limits were established as a result of a risk assessment that included ingestion of crops grown in the biosolid-amended soil (which is relevant for human exposure to metals), ingestion of animals that have direct ingestion of biosolid-amended soils (which is relevant for human exposure to organic compounds), as well as direct ingestion of biosolid-amended soils. The most limiting exposure pathway was used to set the criteria concentrations (USEPA 1993). It should be noted that biosolids contain much higher concentrations of organic carbon than dredged material typically contains, and so the biosolids criteria may not be directly applicable to dredged material. However, they may be considered in the event that sewage sludge may be mixed with dredged material as part of the beneficial use option. Note that the sewage sludge rules were developed to be protective of humans, not ecological receptors. Ohio EPA has adopted pollutant limits for metals, in OAC 3745-40. The USEPA has proposed pollutant limits for some organics, which are listed in italics on the table with the Ohio EPA sewage sludge rule limits.

b. If the dredged material is to be placed near a potable groundwater aquifer, then protection of the source of drinking water may be a concern. Comparison of leachate concentrations to USEPA Maximum Contaminant Levels (MCLs) for drinking water was completed. Actual ground water concentrations resulting from any leaching from dredged material would be much lower than leachate concentrations, after dilution and attenuation of the leachate constituents.

c. In addition, movement of potential contaminants via leaching to surface water may be a concern. Environmental effects of leachate were considered to a limited extent in the evaluation of the Lorain CDF (USACE-LRB 2004). In this screen, the available elutriate and leaching data are compared to surface water quality criteria recommended by the USEPA (USEPA 2002c and 2003b) as well as the Ohio EPA (Ohio EPA 2004), for protection of both aquatic and human receptors. Human receptors are assumed to be exposed via consumption of fish from surface water, and not via using the surface water as a drinking water source. The Ohio EPA surface water quality criteria take precedence over the USEPA recommendations, as the former are promulgated in the Ohio Administrative Code, Chapter 3745-1.

d. Canadian Environmental Quality Guidelines for residential/park use. These were included in the discussion of human health screening values, but it is worth noting again that these values considered movement of constituents into other media. (See section I.c.)

IV. Ecological Screening Values for Terrestrial (Uplands) Ecosystems (secondary exposure)

a. Federal Screening Values
   i. USEPA Ecological Soil Screening Values (USEPA 2003a). These values were developed by the USEPA in conjunction with a large stakeholder group. To develop the ecological soil screening values, every relevant published article was reviewed, and the process used was peer-reviewed. Therefore, these values have wide acceptance and use. Unfortunately, the current list of constituents for which there is an ecological soil screening value is small, and consists mostly of metals.
   ii. Ecological Soil Screening Values recommended for use on Military Bases, as per agreement with USEPA Region 4 (USEPA Region 4, 2000). These screening values were compiled from studies completed at the Oak Ridge National Laboratories, as well as the Canadian Council of Ministers of the Environment, and the Directorate-General for Environmental Protection, the Netherlands. Many of the screening levels agreed upon by USEPA Region 4 defer to background (from the Netherlands) or laboratory analytical detection limits. Therefore, these are not strictly risk based concentrations.

b. Ohio EPA OFFO

   The Ohio EPA OFFO recommended hierarchy of ecological soil screening levels is to use values developed at the Oak Ridge National Laboratories, and then Ecological Data Quality Levels for the USEPA Region 5, RCRA programs (USEPA Region 5, 2003).

c. Ohio EPA Division of Emergency and Remedial Response

   The Ohio EPA DERR suggested that we use the USEPA Region 5 RCRA EDQLs. These are not cleanup standards, but rather, ecological risk based screening levels below which no threat to ecological receptors is likely.

d. Conclusions: When they are available, USEPA's ecological soil screening levels take precedence over other soil screening levels, since they were developed most recently, using a comprehensive scientific approach. When USEPA soil screening levels are not available, then USEPA Region V ecological soil screening values will be used, as these are also recommended by Ohio EPA OFFO, and they are based on risk to ecological receptors.

Screening Results:

Pre-dredged sediment data from the River and Harbor, soil and sediment data from the existing Lorain Harbor CDF, as well as corresponding elutriate and leachate analysis, were compared to the screening levels, according to the hierarchy above. Results reported below detection limits are indicated with a less-than symbol before the detection limit. The results of this screening are as follows:

I. Screening for industrial use scenarios, for protection of human receptors:

a. In Table 4A, the maximum detected sediment concentrations of four PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a)anthracene), exceed the USEPA Region 9 PRG for residential use. The average sediment concentrations of three of these PAHs (all but benzo(a)pyrene) are lower than the residential PRGs. However, the maximum and average concentrations of benzo(a)pyrene in the harbor and river are higher than both the residential and industrial Region 9 PRGs. The metals arsenic and iron also exceed Region 9 industrial or residential PRGs, respectively. However, as seen in Table 8, these metals do not exceed Ohio Sediment Reference Values, indicating that they are not elevated relative to reference or background sediment areas.

b. In Table 4B, it can be seen that the only constituent that exceeds the Ohio VAP standard for residential use is arsenic. However, the levels of arsenic in the dredged material are less than the Ohio VAP standard for industrial use.

c. In Table 5, it can be seen that none of the metals exceed the levels established in the Ohio EPA sewage sludge rules.

d. In Table 6, a comparison to Canadian Environmental Quality Guidelines is made. In the River samples, the maximum levels of benzo(a)pyrene, benzo(b)fluoranthene, naphthalene, and zinc exceed either the commercial/industrial or the residential guidelines. However, the corresponding average levels of these constituents do not exceed the Canadian guidelines, and so would not be considered a concern. Average levels of arsenic and selenium also fail Canadian industrial levels. As mentioned earlier, arsenic is not elevated relative to reference or background sediment areas. Although selenium may be elevated relative to Ohio sediment reference/background areas, it is well below levels that would pose a risk to human health via direct contact (when compared to USEPA Region 9 PRGs, found on Table 5). It should be noted that the Canadian environmental quality guidelines for selenium are two to three orders of magnitude lower than USEPA or Ohio human health risk based concentrations for selenium. Therefore, if the primary exposure to dredged material is via human contact, the concentrations of selenium should not be prohibitive.

e. In Table 7, it can be seen that the average leachate concentrations of all constituents are below their respective USEPA MCL standards for drinking water (although the detection limit for benzo(a)pyrene leachate concentrations exceed the MCL).

f. Conclusions for human contact in beneficial use options: The dredged material would be suitable for use in an industrial or park setting, where humans are the primary receptors of concern. For industrial use, cover over the dredged material should not be necessary. Leaching of constituents to an aquifer containing potable water is probably not a concern.

II. Comparison to aquatic (sediment) ecological screening values:

a. In Table 8, it can be seen that several metals, most notably cadmium, mercury, and selenium, exceed their Ohio Sediment Reference Values.

b. In Table 9, it can be seen that although several metals exceed their Ohio Sediment Reference Values and the USEPA threshold effects concentrations, average concentrations of these metals do not exceed their respective USEPA probable effects concentrations. In addition, several PAHs exceed their respective USEPA threshold effects concentrations, but average concentrations of these PAHs do not exceed their respective USEPA probable effects concentrations.
c. Conclusions: Although some metals in the River and Harbor sediments may be elevated relative to reference/background sediment concentrations (especially cadmium, mercury, and selenium), they are not elevated above probable effects concentrations that would indicate that they definitely pose a risk to aquatic receptors. However, as TEC and PEC values do not exist for selenium, there is some uncertainty as to whether or not the elevated levels of selenium would pose a risk to aquatic receptors. In addition, several PAHs are present in the River and Harbor sediments, but not at levels elevated above probable effects concentrations that would indicate that they definitely pose a risk to aquatic receptors.

II. Comparison to terrestrial (soil) ecological screening values:

a. In Table 10, it can be seen that the only PAH that exceeds ecological soil screening values is naphthalene, which may be because its screening value is so much lower than other PAH screening values.
b. In Table 10, it can be seen that several metals exceed USEPA soil screening levels, when available, or EPA Region 5 RCRA environmental data quality levels, when USEPA soil screening levels are not available. The three metals that were most significantly elevated above background (cadmium, mercury, selenium), also fail their respective ecological terrestrial screening values, although average concentration of mercury from the Harbor samples are only very slightly above the screening value.
c. Conclusions: Some metals may have the potential to pose unacceptable risks to terrestrial ecological receptors, if direct contact with the dredged material occurs in an upland setting. If the dredged material will be used for ecosystem restoration, in an upland scenario, then further evaluation of metal concentrations in the dredged material is warranted. However, this does not necessarily preclude the use of the dredged material in an industrial setting.

IV. Comparison of Elutriate Results to Surface Water Criteria:

a. As seen in Table 11, although the maximum elutriate concentration of copper exceeds the Ohio EPA Aquatic Life Outside Mixing Zone Average concentration, the average concentration of copper in elutriate samples is below all surface water quality criteria for aquatic life. No other elutriate concentration of any other constituent exceeds its aquatic life surface water quality criteria, although the detection limits for several organics are above their criteria.
b. As seen in Table 12, average concentrations of mercury in elutriate samples slightly exceed the USEPA water quality criterion for surface water to protect

people who consume fish. The state of Ohio does not have a similar surface water quality criterion for mercury. In addition, it should be noted that final surface water concentrations would be much lower than these elutriate concentrations. No other elutriate concentration of any other constituent exceeds its human health surface water quality criteria, although the detection limits for several organics are above their criteria.

c. Conclusions: It is unlikely that constituents from the dredged material would leach to surface water at concentrations exceeding surface water quality criteria. However, when future testing of elutriate and leachate is conducted, laboratory analytical limits should be compared to water quality criteria, and lowered appropriately, if possible.

Recommendations:

a. Decisions concerning use of dredged material in beneficial scenarios should consider average, not maximum, sediment concentrations, due to the mixing that occurs while the dredged material is handled.
b. If the dredged material will be used for ecosystem restoration, then further evaluation of metals (especially selenium, cadmium, mercury) and PAHs (especially benzo(a)pyrene) in the dredged material, and/or further evaluation of appropriateness of ecological risk based screening levels, is warranted. However, pesticides and PCBs could be eliminated from further analysis.

Conclusions:

- After this relatively simple screening step, it can be concluded that the dredged material may be used as is, without cover, in applications where only people would be exposed to the dredged material, in either a recreational, park, or industrial setting.
- Leaching of constituents from the dredged material to a potable groundwater aquifer, or to surface water, would most likely not result in unacceptable groundwater or surface water concentrations.
- If the dredged material will be used for ecosystem restoration, then further evaluation of metals (especially selenium, cadmium, mercury) and PAHs (especially benzo(a)pyrene) in the dredged material, and/or further evaluation of appropriateness of ecological risk based screening levels, is warranted.

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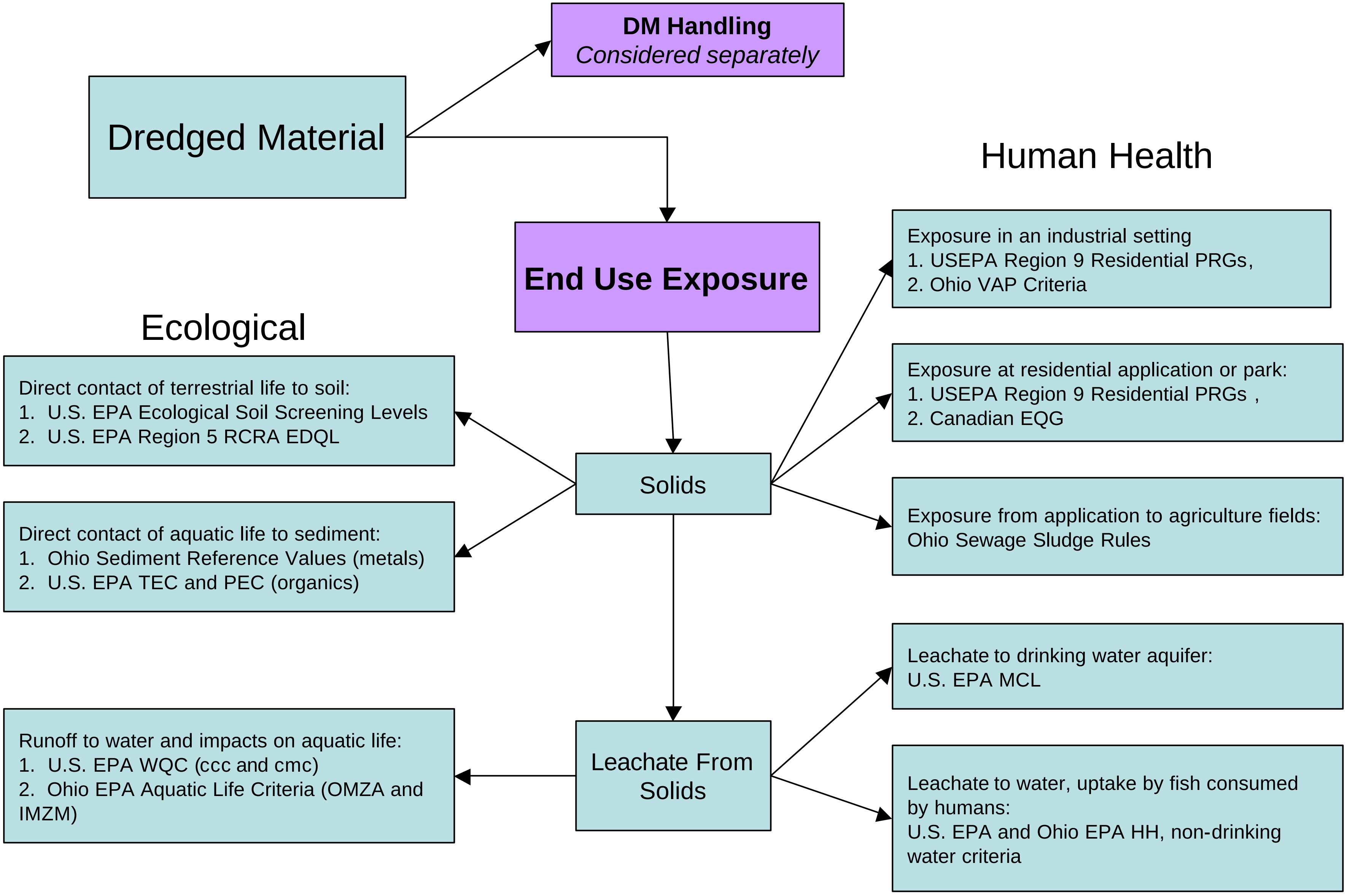

Figure 1: Identification of Screening Values for Beneficial Uses of Dredged Material

TABLE 1: MOST RECENT DATA AVAILABLE FROM THE LORAIN RIVER CHANNEL AND OUTER HARBOR

CONSTITUENT	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene	NA	NA	NA	NA	545	116.78	<8	<8
2-Methylnaphthalene	NA	NA	NA	NA	322	115.33	<8	<8
Acenaphthene	<94.7	<89.1	<114	<114	1467	203.22	<8	<8
Acenaphthylene	<261	<245.3	<314	<314	159	30.44	<8	<8
Anthracene	156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene	431	282.7	111	111	963	275.89	<8	<8
Benzo(a)pyrene	382	250.7	89.4	89.4	860	283.67	<8	<8
Benzo(b)flouranthene	561	375.7	<200	<200	1090	619.67	<8	<8
Benzo(ghi)Perylene	253	134.7	<200	<200	367	150.78	<8	<8
Benzo(k)Fluoranthene	190	101.7	<152	<152	639	407.44	<8	<8
Chrysene	459	323	131	131	778	307.44	<8	<8
Dibenzo(a,h)Anthracene	<134	<126	<162	<162	104	40.67	<8	<8
Dibenzofuran	NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene	959	619.7	287	287	3163	795.78	10	10
Fluorene	<118	<111.3	<143	<143	1371	211.44	<30	<30
Indeno(1,2,3-cd)Pyrene	227	114	<152	<152	365	145.44	<30	<30
Naphthalene	<103	<96.7	<124	<124	676	149.89	<8	<8
Phenanthrene	544	360.7	<114	<114	895	367.89	<30	<30
Pyrene	738	519.3	264	264	2033	579	8	8
TOTAL PAHs	5255.4	3522.1	1791.4	1791.4	16390	4960.78	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony	2.01	1.21	<1.69	<1.69	<0.043	<0.043	<0.043	<0.043
Arsenic	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium	88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium	0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium	19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium	29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt	12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper	46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron	33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium	8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese	623	568.33	528	528	575	497.22	373	373
Mercury	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium	2230	2083.33	2000	2000	1040	913.56	106	106
Selenium	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver	<1.29	<0.99	<0.84	<0.84	1.34	0.2	<0.051	<0.051
Thallium	<4.51	<3.80	<3.95	<3.95	0.61	0.2	<0.057	<0.057
Vanadium	31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1221	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1232	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1242	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1248	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1254	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1260	<79.0	<74.3	<190.0	<190.0	<17.0	<14.7	<8	<8
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD	NA	NA	NA	NA	<2	<2	<0.8	<0.8
4,4'-DDE	NA	NA	NA	NA	<2	<2	<0.8	<0.8
4,4'-DDT	NA	NA	NA	NA	<2	<2	<0.8	<0.8
Aldrin	NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC	NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC	NA	NA	NA	NA	<17	<17	<8	<8
Chlordane	NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC	NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	NA	NA	NA	NA	<2	<2	<0.8	<0.8
Endosulfan I	NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II	NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate	NA	NA	NA	NA	<17	<17	<8	<8
Endrin	NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde	NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide	NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor	NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene	NA	NA	NA	NA	<34	<34	<16	<16

TABLE 2: SOIL AND SEDIMENT SCREENING VALUES CONSIDERED FOR SCREENING POTENTIAL BENEFICIAL USE OPTIONS FOR DREDGED MATERIAL

	HUMAN HEALTH SOIL VALUES					ECOLOGICAL SOIL SCREENING VALUES			ECOLOGICAL SEDIMENT SCREENING VALUES						PLANT/ANIMAL UPTAKE	GW PROTECTION	
CONSTITUENT	EPA Reg9 PRG Residential	EPA Reg9 PRG Industrial	Canadian Resident/Park	Ohio VAP Residential	Ohio VAP Industrial	USEPA ECO SSL	EPA Reg4 Military Bases	EPA Reg5 RCRA EDQL	USEPA TEC	USEPA PEC	EPA Reg4 Military Bases	EPA Reg5 RCRA EDQL	Ohio EPA SRV - EOLP	Ohio EPA SRV - ECBP	Ohio EPA Sewage Sludge Rules	EPA Reg9 PRG SSL (DAF=1)	EPA Reg9 PRG SSL (DAF=20)
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene				1.20E+05	1.20E+05												
2-Methylnaphthalene								3.24E+03			3.30E+02	2.02E+01					
Acenaphthene	3.70E+06	2.90E+07		4.60E+06	1.80E+08		2.00E+04	6.82E+05			3.30E+02	6.71E+00				2.90E+04	5.70E+05
Acenaphthylene								6.82E+05			3.30E+02	5.87E+00					
Anthracene	2.19E+07	1.00E+08		2.30E+07	8.80E+08		1.00E+02	1.48E+06	5.72E+01	8.45E+02	3.30E+02	5.72E+01				5.90E+05	1.20E+07
Benzo(a)anthracene	6.21E+02	2.10E+03	1.00E+03	1.10E+04	6.30E+04			5.21E+03	1.08E+02	1.05E+03	3.30E+02	1.08E+02				8.00E+01	2.00E+03
Benzo(a)pyrene	6.21E+01	2.10E+02	7.00E+02	1.10E+03	6.30E+03		1.00E+02	1.52E+03	1.50E+02	1.45E+03	3.30E+02	1.50E+02			*1.50E+01*	4.00E+02	8.00E+03
Benzo(b)flouranthene	6.21E+02	2.10E+03	1.00E+03	1.10E+04	6.30E+04			5.98E+04				1.04E+04				2.00E+02	5.00E+03
Benzo(ghi)Perylene								1.19E+05				1.70E+02					
Benzo(k)Fluoranthene	6.20E+03	2.10E+04	1.00E+03	1.10E+05	6.30E+05			1.48E+05				2.40E+02				2.00E+03	4.90E+04
Chrysene	6.21E+04	2.10E+05		1.10E+06	3.00E+05			4.73E+03	1.66E+02	1.29E+03	3.30E+02	1.66E+02				8.00E+03	1.60E+05
Dibenzo(a,h)Anthracene	6.20E+01	2.10E+02	1.00E+03	1.10E+03	6.70E+03			1.84E+04			3.30E+02	3.30E+01				8.00E+01	2.00E+03
Dibenzofuran	2.90E+05	3.10E+06										4.49E+02					
Flouranthene	2.29E+06	2.20E+07		2.30E+06	3.30E+07		1.00E+02	1.22E+05	4.23E+02	2.23E+03	3.30E+02	4.23E+02				2.10E+05	4.30E+06
Fluorene	2.70E+06	2.60E+07		3.10E+06	1.20E+08			1.22E+05			3.30E+02	7.74E+01				2.80E+04	5.60E+05
Indeno(1,2,3-cd)Pyrene	6.21E+02	2.10E+03	1.00E+03	1.10E+04	6.70E+04			1.09E+05				2.00E+02				7.00E+02	1.40E+04
Naphthalene	5.60E+04	1.90E+05	6.00E+02	5.40E+04	5.30E+05		1.00E+02	9.94E+01				1.76E+02				4.00E+03	8.40E+04
Phenanthrene			5.00E+03				1.00E+02	4.57E+04	2.04E+02	1.17E+03	3.30E+02	2.04E+02					
Pyrene	2.32E+06	2.90E+07	1.00E+04	1.70E+06	2.50E+07		1.00E+02	7.85E+04	1.95E+02	1.52E+03	3.30E+02	1.95E+02				2.10E+05	4.20E+06
TOTAL PAHs							1.00E+03				1.68E+03						
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7.60E+04	1.00E+05		7.50E+04	1.00E+06		5.00E+01						2.90E+04	3.90E+04			
Antimony	3.10E+01	4.10E+02	2.00E+01	3.10E+01	1.20E+03	2.90E-01	3.50E+00	1.42E-01	NA	NA	1.20E+01		1.30E+00	9.20E-01		3.00E-01	5.00E+00
Arsenic	3.90E-01	1.60E+00	1.20E+01	6.80E+00	8.00E+01	NA	1.00E+01	5.70E+00	9.79E+00	3.30E+01	7.24E+00	9.79E+00	2.50E+01	1.80E+01	4.10E+01	1.00E+00	2.90E+01
Barium	5.40E+03	6.70E+04	5.00E+02	5.40E+03	2.00E+05	3.30E+02	1.65E+02	1.04E+00					2.40E+02	2.40E+02		8.20E+01	1.60E+03
Beryllium	1.50E+02	1.90E+03	4.00E+00	1.50E+02	5.70E+03	3.60E+01	1.10E+00	1.06E+00	NA	NA			8.00E-01	8.00E-01		3.00E+00	6.30E+01
Cadmium	3.70E+01	4.50E+02	1.00E+01	3.50E+01	7.70E+02	3.80E-01	1.60E+00	2.22E-03	9.90E-01	4.98E+00	1.00E+00	9.90E-01	7.90E-01	9.00E-01	3.90E+01	4.00E-01	8.00E+00
Calcium													2.10E+04	1.20E+05			
Chromium	2.10E+02	4.50E+02	6.40E+01	2.30E+02	8.90E+03	NA	4.00E-01	4.00E-01	4.34E+01	1.11E+02	5.23E+01	4.34E+01	2.90E+01	4.00E+01		2.00E+00	3.80E+01
Cobalt	9.00E+02	1.90E+03	5.00E+01	1.40E+03	4.00E+04	1.30E+01	2.00E+01	1.40E-01				5.00E+01	1.20E+01	1.20E+01			
Copper	3.10E+03	4.10E+04	6.30E+01			NA	4.00E+01	5.40E+00	3.16E+01	1.49E+02	1.87E+01	3.16E+01	3.20E+01	3.40E+01	1.50E+03		
Iron	2.30E+04	1.00E+05					2.00E+02						4.10E+04	3.30E+04			
Lead	4.00E+02	7.50E+02	1.40E+02	4.00E+02	1.80E+03	1.60E+01	5.00E+01	5.37E-02	3.58E+01	1.28E+02	3.02E+01	3.58E+01	4.70E+01	4.70E+01	3.00E+02		
Magnesium													7.10E+03	3.50E+04			
Manganese	1.80E+03	1.90E+04					1.00E+02						1.50E+03	7.80E+02			
Mercury	2.30E+01	3.10E+02	6.60E+00	7.80E+00	3.00E+02	NA	1.00E-01	1.00E-01	1.80E-01	1.06E+00	1.30E-01	1.74E-01	1.20E-01	1.20E-01	1.70E+01		
Nickel	1.60E+03	2.00E+04	5.00E+01	1.50E+03	5.70E+03	NA	3.00E+01	1.36E+01	2.27E+01	4.86E+01	1.59E+01	2.27E+01	3.30E+01	4.20E+01	4.20E+02	7.00E+00	1.30E+02
Potassium													6.80E+03	1.10E+04			
Selenium	3.90E+02	5.11E+03	1.00E+00	3.90E+02	1.50E+04	NA	8.10E-01	2.76E-02	NA	NA			1.70E+00	2.30E+00	1.00E+02	3.00E-01	5.00E+00
Silver	3.91E+02	5.11E+03	2.00E+01	3.90E+02	1.50E+04	NA	2.00E+00	4.04E+00	NA	NA	2.00E+00	5.00E-01	4.30E-01	4.30E-01			
Thallium	5.20E+00	6.70E+01	1.00E+00	6.20E+00	2.40E+02	NA	1.00E+00	5.69E-02	NA	NA			4.70E+00	4.70E+00			
Vanadium			1.30E+02	7.00E+02	2.70E+04		2.00E+00	1.59E+00					4.00E+01	4.00E+01		3.00E+02	6.00E+03
Zinc	2.30E+04	1.00E+05	2.00E+02	2.30E+04	9.00E+05	NA	5.00E+01	6.62E+00	1.21E+02	4.59E+02	1.24E+02	1.21E+02	1.60E+02	1.60E+02	2.80E+03	6.20E+02	1.24E+04
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	3.90E+03	2.10E+04	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Aroclor 1221	2.20E+02	7.40E+02	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Aroclor 1232	2.20E+02	7.40E+02	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Aroclor 1242	2.20E+02	7.40E+02	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Aroclor 1248	2.20E+02	7.40E+02	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Aroclor 1254	2.20E+02	7.40E+02	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Aroclor 1260	2.20E+02	7.40E+02	1.30E+03	1.10E+03	1.60E+04		2.00E+01	3.32E+02	5.98E+01	6.76E+02	3.30E+01	5.98E+01			*4.60E+03*		
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD	2.40E+03	1.00E+04		4.10E+04	5.00E+05		2.50E+00	7.58E+02	4.88E+00	2.80E+01	3.30E+00	4.88E+00				8.00E+02	1.60E+04
4,4'-DDE	1.70E+03	7.00E+03		2.90E+04	3.50E+05		2.50E+00	5.96E+02	3.16E+00	3.13E+01	3.30E+00	3.16E+00				3.00E+03	5.40E+04
4,4'-DDT	1.70E+03	7.00E+03	7.00E+02	2.90E+04	3.50E+05		2.50E+00	3.50E+00	4.16E+00	6.29E+01	3.30E+00	4.16E+00				2.00E+03	3.20E+04
Aldrin	2.90E+01	1.00E+02					2.50E+00	3.20E+00				2.00E+00			*2.70E+03*	2.00E+01	5.00E+02
alpha-BHC	9.00E+01	3.60E+02					2.50E+00									3.00E-02	5.00E-01
beta-BHC	3.20E+02	1.30E+03					1.00E+00									1.00E-01	3.00E+00
Chlordane	1.60E+03	6.50E+03		2.80E+04	3.00E+05		1.00E+02	2.24E+02	3.24E+00	1.76E+01	1.70E+00	3.24E+00			*8.60E+04*	5.00E+02	1.00E+04
delta-BHC																	
Dieldrin	3.00E+01	1.10E+02				2.80E-01	5.00E-01	2.38E+00	1.90E+00	6.18E+01	3.30E+00	1.90E+00			*2.70E+03*	2.00E-01	4.00E+00
Endosulfan I	3.70E+05	3.70E+06						1.19E+02				3.26E+00				9.00E+02	1.80E+04
Endosulfan II	3.70E+05	3.70E+06						1.19E+02				1.94E+00				9.00E+02	1.80E+04
Endosulfan sulfate	3.70E+05	3.70E+06						3.58E+01				3.46E+01					
Endrin	1.80E+04	1.80E+05		2.30E+04	8.70E+05		1.00E+00	1.00E+01	2.20E+00	2.07E+02	3.30E+00	2.20E+00				5.00E+01	1.00E+03
Endrin aldehyde	1.80E+04	1.80E+05						1.05E+01				4.80E+02					
gamma-BHC (Lindane)	4.40E+02	1.70E+03		7.60E+03	8.00E+04		5.00E-01		2.37E+00	4.99E+00	3.30E+00				*8.40E+04*	5.00E-01	9.00E+00
Heptachlor	1.10E+02	3.80E+02		2.50E+03	4.40E+04			5.98E+00				6.00E-01			*7.40E+03*	1.00E+03	2.30E+04
Heptachlor epoxide	5.30E+01	1.90E+02		1.00E+03	2.20E+04			1.52E+02	2.47E+00	1.60E+01		2.47E+00				3.00E+01	7.00E+02
Methoxychlor	3.10E+05	3.10E+06		3.90E+05	1.50E+04			1.99E+01				1.36E+01				8.00E+03	1.60E+05
Toxaphene	4.40E+02	1.60E+03		1.00E+04	1.80E+05			1.19E+02				7.70E-02			*1.00E+04*	2.00E+03	3.10E+04

TABLE 3: WATER SCREENING VALUES CONSIDERED

	AQUATIC LIFE CRITERIA				HUMAN HEALTH CRITERIA		
	USEPA WQC	USEPA WQC	Ohio EPA	Ohio EPA	USEPA WQC	Ohio EPA	USEPA MCL
CONSTITUENT	**CCC**	**CMC**	**Aquatic Life OMZA**	**Aquatic Life IMZM**	**HH, non-drinking**	**HH, non-drinking**	**HH, drinking**
PAHs	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Methylnaphthalene							
2-Methylnaphthalene							
Acenaphthene							
Acenaphthylene							
Anthracene			2.00E-02	3.50E-01	4.00E+04	6.30E+02	
Benzo(a)anthracene			4.70E+00	8.50E+01	1.80E-02		
Benzo(a)pyrene			6.00E-02	1.10E+00	1.80E-02	2.00E-04	2.00E-01
Benzo(b)flouranthene					1.80E-02		
Benzo(ghi)Perylene							
Benzo(k)Fluoranthene							
Chrysene			4.70E+00	8.50E+01	1.80E-02		
Dibenzo(a,h)Anthracene							
Dibenzofuran							
Flouranthene			8.00E-01	7.40E+00	1.40E+02	9.50E+00	
Fluorene			1.90E+01	2.20E+02		3.20E+02	
Indeno(1,2,3-cd)Pyrene					1.80E-02		
Naphthalene			2.10E+01	3.40E+02		1.20E+03	
Phenanthrene			2.30E+00	6.10E+01			
Pyrene					4.00E+03		
TOTAL PAHs							
Metals	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aluminum							
Antimony			1.90E+02	1.80E+03	6.40E+02	7.80E+02	6.00E+00
Arsenic	1.50E+02	3.40E+02	1.50E+02	6.80E+02	1.40E-01	5.80E+02	1.00E+01
Barium			2.20E+02	4.00E+03		1.60E+05	2.00E+03
Beryllium							4.00E+00
Cadmium	2.20E+00	4.30E+00	2.50E+00	9.00E+00		7.30E+02	5.00E+00
Calcium							
Chromium	7.40E+01	5.70E+02	8.60E+01	3.60E+03			1.00E+02
Cobalt			2.40E+01	4.40E+02			
Copper	9.00E+00	1.30E+01	9.30E+00	2.80E+01		6.40E+04	1.30E+03
Iron							
Lead	2.50E+00	6.50E+01	6.40E+00	2.40E+02		1.90E+02	1.50E+01
Magnesium							
Manganese						6.10E+04	
Mercury	7.70E-01	1.40E+00			5.10E-02		2.00E+00
Nickel	5.20E+01	4.70E+02	5.20E+01	9.40E+02	4.60E+03	4.30E+04	
Potassium							
Selenium		5.00E+00			1.10E+04		5.00E+01
Silver		3.40E+00					
Thallium			1.70E+01	1.60E+02	6.30E+00	3.70E+00	2.00E+00
Vanadium			4.40E+01	3.00E+02			
Zinc	1.20E+02	1.20E+02	1.20E+02	2.40E+02	2.60E+04	3.50E+04	
PCBs	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aroclor 1016	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Aroclor 1221	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Aroclor 1232	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Aroclor 1242	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Aroclor 1248	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Aroclor 1254	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Aroclor 1260	1.40E-02				6.40E-05	2.60E-05	5.00E-01
Pesticides	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
4,4'-DDD					2.20E-04		
4,4'-DDE					2.20E-04		
4,4'-DDT	1.10E+00	1.00E-03			2.20E-04		
Aldrin		3.00E+00			5.00E-05		
alpha-BHC					4.90E-03		
beta-BHC					1.70E-02	1.40E-02	
Chlordane	4.30E-03	2.40E+00			8.10E-04		2.00E+00
delta-BHC							
Dieldrin	5.60E-03	2.40E-01	5.60E-02	4.70E-01	5.40E-05	6.50E-06	
Endosulfan I	5.60E-02	2.20E-01			8.90E+01		
Endosulfan II	5.60E-02	2.20E-01			8.90E+01		
Endosulfan sulfate					8.90E+01		
Endrin	3.60E-02	8.60E-02	3.60E-02	1.70E-01	6.00E-02		2.00E+00
Endrin aldehyde					3.00E-01		
gamma-BHC (Lindane)		9.50E-01	5.70E-02	1.90E+00	1.80E+00	5.00E-01	
Heptachlor	3.80E-03	5.20E-01			7.90E-05		4.00E-01
Heptachlor epoxide	3.80E-03	5.20E-01			3.90E-05		2.00E-01
Methoxychlor							4.00E+01
Toxaphene	2.00E-04	7.30E-01			2.80E-04		3.00E+00

TABLE 4A. SCREENING AGAINST USEPA REGION 9 HUMAN HEALTH CRITERIA

	HUMAN HEALTH SOIL VALUES											
CONSTITUENT	EPA Reg9 PRG Residential	EPA Reg9 PRG Industrial	Ohio VAP Residential	Ohio VAP Industrial	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene			1.20E+05	1.20E+05	NA	NA	NA	NA	545	116.78	<8	<8
2-Methylnaphthalene					NA	NA	NA	NA	322	115.33	<8	<8
Acenaphthene	3.70E+06	2.90E+07	4.60E+06	1.80E+08	<95	<89	<114	<114	1467	203.22	<8	<8
Acenaphthylene					<261	<245.3	<314	<314	159	30.44	<8	<8
Anthracene	2.19E+07	1.00E+08	2.30E+07	8.80E+08	156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene	6.21E+02	2.10E+03	1.10E+04	6.30E+04	431	282.7	111	111	963	275.89	<8	<8
Benzo(a)pyrene	6.21E+01	2.10E+02	1.10E+03	6.30E+03	382	250.7	89.4	89.4	860	283.67	<8	<8
Benzo(b)flouranthene	6.21E+02	2.10E+03	1.10E+04	6.30E+04	561	375.7	<200	<200	1090	619.67	<8	<8
Benzo(ghi)Perylene					253	134.7	<200	<200	367	150.78	<8	<8
Benzo(k)Fluoranthene	6.20E+03	2.10E+04	1.10E+05	6.30E+05	190	101.7	<152	<152	639	407.44	<8	<8
Chrysene	6.21E+04	2.10E+05	1.10E+06	3.00E+05	459	323	131	131	778	307.44	<8	<8
Dibenzo(a,h)Anthracene	6.20E+01	2.10E+02	1.10E+03	6.70E+03	<134	<126	<162	<162	104	40.67	<8	<8
Dibenzofuran	2.90E+05	3.10E+06			NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene	2.29E+06	2.20E+07	2.30E+06	3.30E+07	959	619.7	287	287	3163	795.78	10	10
Fluorene	2.70E+06	2.60E+07	3.10E+06	1.20E+08	<118	<111.3	<143	<143	1371	211.44	<30	<30
Indeno(1,2,3-cd)Pyrene	6.21E+02	2.10E+03	1.10E+04	6.70E+04	227	114	<152	<152	365	145.44	<30	<30
Naphthalene	5.60E+04	1.90E+05	5.40E+04	5.30E+05	<103	<96.7	<124	<124	676	149.89	<8	<8
Phenanthrene					544	360.7	<114	<114	895	367.89	<30	<30
Pyrene	2.32E+06	2.90E+07	1.70E+06	2.50E+07	738	519.3	264	264	2033	579	8	8
TOTAL PAHs					5255.4	3522.1	1791.4	1791.4	16390	4960.78	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7.60E+04	1.00E+05	7.50E+04	1.00E+06	13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony	3.10E+01	4.10E+02	3.10E+01	1.20E+03	2.01	1.21	<1.69	<1.69	<0.043	<0.043	<0.043	<0.043
Arsenic	3.90E-01	1.60E+00	6.80E+00	8.00E+01	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium	5.40E+03	6.70E+04	5.40E+03	2.00E+05	88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium	1.50E+02	1.90E+03	1.50E+02	5.70E+03	0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	3.70E+01	4.50E+02	3.50E+01	7.70E+02	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium					19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium	2.10E+02	4.50E+02	2.30E+02	8.90E+03	29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt	9.00E+02	1.90E+03	1.40E+03	4.00E+04	12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper	3.10E+03	4.10E+04			46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron	2.30E+04	1.00E+05			33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	4.00E+02	7.50E+02	4.00E+02	1.80E+03	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium					8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese	1.80E+03	1.90E+04			623	568.33	528	528	575	497.22	373	373
Mercury	2.30E+01	3.10E+02	7.80E+00	3.00E+02	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel	1.60E+03	2.00E+04	1.50E+03	5.70E+03	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium					2230	2083.33	2000	2000	1040	913.56	106	106
Selenium	3.90E+02	5.11E+03	3.90E+02	1.50E+04	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver	3.91E+02	5.11E+03	3.90E+02	1.50E+04	<1.29	<0.99	<0.84	<0.84	1.34	0.2	<0.051	<0.051
Thallium	5.20E+00	6.70E+01	6.20E+00	2.40E+02	<4.51	<3.80	<3.95	<3.95	0.61	0.2	<0.057	<0.057
Vanadium			7.00E+02	2.70E+04	31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc	2.30E+04	1.00E+05	2.30E+04	9.00E+05	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	3.90E+03	2.10E+04	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1221	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1232	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1242	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1248	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1254	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1260	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<190	<190	<17	<15	<8	<8
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD	2.40E+03	1.00E+04	4.10E+04	5.00E+05	NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDE	1.70E+03	7.00E+03	2.90E+04	3.50E+05	NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDT	1.70E+03	7.00E+03	2.90E+04	3.50E+05	NA	NA	NA	NA	<2	<2	<1	<1
Aldrin	2.90E+01	1.00E+02			NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC	9.00E+01	3.60E+02			NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC	3.20E+02	1.30E+03			NA	NA	NA	NA	<17	<17	<8	<8
Chlordane	1.60E+03	6.50E+03	2.80E+04	3.00E+05	NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC					NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	3.00E+01	1.10E+02			NA	NA	NA	NA	<2	<2	<1	<1
Endosulfan I	3.70E+05	3.70E+06			NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II	3.70E+05	3.70E+06			NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate	3.70E+05	3.70E+06			NA	NA	NA	NA	<17	<17	<8	<8
Endrin	1.80E+04	1.80E+05	2.30E+04	8.70E+05	NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde	1.80E+04	1.80E+05			NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)	4.40E+02	1.70E+03	7.60E+03	8.00E+04	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor	1.10E+02	3.80E+02	2.50E+03	4.40E+04	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide	5.30E+01	1.90E+02	1.00E+03	2.20E+04	NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor	3.10E+05	3.10E+06	3.90E+05	1.50E+04	NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene	4.40E+02	1.60E+03	1.00E+04	1.80E+05	NA	NA	NA	NA	<34	<34	<16	<16
Other	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Dioxin (2,3,7,8-TCDD)	3.9E-03	1.6E-02										
Cyanide	1.1E+04	3.5E+04	1.60E+06	9.00E+02								

Exceeds USEPA Region 9 Residential PRG (green)

Exceeds USEPA Region 9 Industrial PRG (red)

TABLE 4B. SCREENING AGAINST OHIO VAP HUMAN HEALTH CRITERIA

	HUMAN HEALTH SOIL VALUES											
CONSTITUENT	EPA Reg9 PRG Residential	EPA Reg9 PRG Industrial	Ohio VAP Residential	Ohio VAP Industrial	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene			1.20E+05	1.20E+05	NA	NA	NA	NA	545	116.78	<8	<8
2-Methylnaphthalene					NA	NA	NA	NA	322	115.33	<8	<8
Acenaphthene	3.70E+06	2.90E+07	4.60E+06	1.80E+08	<95	<89	<114	<114	1467	203.22	<8	<8
Acenaphthylene					<261	<245.3	<314	<314	159	30.44	<8	<8
Anthracene	2.19E+07	1.00E+08	2.30E+07	8.80E+08	156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene	6.21E+02	2.10E+03	1.10E+04	6.30E+04	431	282.7	111	111	963	275.89	<8	<8
Benzo(a)pyrene	6.21E+01	2.10E+02	1.10E+03	6.30E+03	382	250.7	89.4	89.4	860	283.67	<8	<8
Benzo(b)flouranthene	6.21E+02	2.10E+03	1.10E+04	6.30E+04	561	375.7	<200	<200	1090	619.67	<8	<8
Benzo(ghi)Perylene					253	134.7	<200	<200	367	150.78	<8	<8
Benzo(k)Fluoranthene	6.20E+03	2.10E+04	1.10E+05	6.30E+05	190	101.7	<152	<152	639	407.44	<8	<8
Chrysene	6.21E+04	2.10E+05	1.10E+06	3.00E+05	459	323	131	131	778	307.44	<8	<8
Dibenzo(a,h)Anthracene	6.20E+01	2.10E+02	1.10E+03	6.70E+03	<134	<126	<162	<162	104	40.67	<8	<8
Dibenzofuran	2.90E+05	3.10E+06			NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene	2.29E+06	2.20E+07	2.30E+06	3.30E+07	959	619.7	287	287	3163	795.78	10	10
Fluorene	2.70E+06	2.60E+07	3.10E+06	1.20E+08	<118	<111.3	<143	<143	1371	211.44	<30	<30
Indeno(1,2,3-cd)Pyrene	6.21E+02	2.10E+03	1.10E+04	6.70E+04	227	114	<152	<152	365	145.44	<30	<30
Naphthalene	5.60E+04	1.90E+05	5.40E+04	5.30E+05	<103	<96.7	<124	<124	676	149.89	<8	<8
Phenanthrene					544	360.7	<114	<114	895	367.89	<30	<30
Pyrene	2.32E+06	2.90E+07	1.70E+06	2.50E+07	738	519.3	264	264	2033	579	8	8
TOTAL PAHs					5255.4	3522.1	1791.4	1791.4	16390	4960.78	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7.60E+04	1.00E+05	7.50E+04	1.00E+06	13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony	3.10E+01	4.10E+02	3.10E+01	1.20E+03	2.01	1.21	<1.69	<1.69	<0.043	<0.043	<0.043	<0.043
Arsenic	3.90E-01	1.60E+00	6.80E+00	8.00E+01	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium	5.40E+03	6.70E+04	5.40E+03	2.00E+05	88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium	1.50E+02	1.90E+03	1.50E+02	5.70E+03	0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	3.70E+01	4.50E+02	3.50E+01	7.70E+02	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium					19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium	2.10E+02	4.50E+02	2.30E+02	8.90E+03	29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt	9.00E+02	1.90E+03	1.40E+03	4.00E+04	12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper	3.10E+03	4.10E+04			46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron	2.30E+04	1.00E+05			33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	4.00E+02	7.50E+02	4.00E+02	1.80E+03	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium					8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese	1.80E+03	1.90E+04			623	568.33	528	528	575	497.22	373	373
Mercury	2.30E+01	3.10E+02	7.80E+00	3.00E+02	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel	1.60E+03	2.00E+04	1.50E+03	5.70E+03	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium					2230	2083.33	2000	2000	1040	913.56	106	106
Selenium	3.90E+02	5.11E+03	3.90E+02	1.50E+04	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver	3.91E+02	5.11E+03	3.90E+02	1.50E+04	<1.29	<0.99	<0.84	<0.84	1.34	0.2	<0.051	<0.051
Thallium	5.20E+00	6.70E+01	6.20E+00	2.40E+02	<4.51	<3.80	<3.95	<3.95	0.61	0.2	<0.057	<0.057
Vanadium			7.00E+02	2.70E+04	31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc	2.30E+04	1.00E+05	2.30E+04	9.00E+05	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	3.90E+03	2.10E+04	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1221	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1232	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1242	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1248	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1254	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1260	2.20E+02	7.40E+02	1.10E+03	1.60E+04	<79	<74	<190	<190	<17	<15	<8	<8
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD	2.40E+03	1.00E+04	4.10E+04	5.00E+05	NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDE	1.70E+03	7.00E+03	2.90E+04	3.50E+05	NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDT	1.70E+03	7.00E+03	2.90E+04	3.50E+05	NA	NA	NA	NA	<2	<2	<1	<1
Aldrin	2.90E+01	1.00E+02			NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC	9.00E+01	3.60E+02			NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC	3.20E+02	1.30E+03			NA	NA	NA	NA	<17	<17	<8	<8
Chlordane	1.60E+03	6.50E+03	2.80E+04	3.00E+05	NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC					NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	3.00E+01	1.10E+02			NA	NA	NA	NA	<2	<2	<1	<1
Endosulfan I	3.70E+05	3.70E+06			NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II	3.70E+05	3.70E+06			NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate	3.70E+05	3.70E+06			NA	NA	NA	NA	<17	<17	<8	<8
Endrin	1.80E+04	1.80E+05	2.30E+04	8.70E+05	NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde	1.80E+04	1.80E+05			NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)	4.40E+02	1.70E+03	7.60E+03	8.00E+04	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor	1.10E+02	3.80E+02	2.50E+03	4.40E+04	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide	5.30E+01	1.90E+02	1.00E+03	2.20E+04	NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor	3.10E+05	3.10E+06	3.90E+05	1.50E+04	NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene	4.40E+02	1.60E+03	1.00E+04	1.80E+05	NA	NA	NA	NA	<34	<34	<16	<16

Exceeds Ohio VAP residential standard

Exceeds Ohio VAP industrial standard

TABLE 5. SCREENING AGAINST OHIO SEWAGE SLUDGE RULES

CONSTITUENT	Plant/Animal Uptake Ohio EPA Sewage Sludge Rules	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene		NA	NA	NA	NA	545	116.78	<8	<8
2-Methylnaphthalene		NA	NA	NA	NA	322	115.33	<8	<8
Acenaphthene		<94.7	<89.1	<114	<114	1467	203.22	<8	<8
Acenaphthylene		<261	<245.3	<314	<314	159	30.44	<8	<8
Anthracene		156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene		431	282.7	111	111	963	275.89	<8	<8
Benzo(a)pyrene	*1.50E+04*	382	250.7	89.4	89.4	860	283.67	<8	<8
Benzo(b)flouranthene		561	375.7	<200	<200	1090	619.67	<8	<8
Benzo(ghi)Perylene		253	134.7	<200	<200	367	150.78	<8	<8
Benzo(k)Fluoranthene		190	101.7	<152	<152	639	407.44	<8	<8
Chrysene		459	323	131	131	778	307.44	<8	<8
Dibenzo(a,h)Anthracene		<134	<126	<162	<162	104	40.67	<8	<8
Dibenzofuran		NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene		959	619.7	287	287	3163	795.78	10	10
Fluorene		<118	<111.3	<143	<143	1371	211.44	<30	<30
Indeno(1,2,3-cd)Pyrene		227	114	<152	<152	365	145.44	<30	<30
Naphthalene		<103	<96.7	<124	<124	676	149.89	<8	<8
Phenanthrene		544	360.7	<114	<114	895	367.89	<30	<30
Pyrene		738	519.3	264	264	2033	579	8	8
TOTAL PAHs		5255.4	3522.1	1791.4	1791.4	16390	4960.78	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum		13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony		2.01	1.21	<1.69	<1.69	<0.043	<0.043	<0.043	<0.043
Arsenic	4.10E+01	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium		88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium		0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	3.90E+01	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium		19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium		29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt		12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper	1.50E+03	46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron		33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	3.00E+02	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium		8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese		623	568.33	528	528	575	497.22	373	373
Mercury	1.70E+01	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel	4.20E+02	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium		2230	2083.33	2000	2000	1040	913.56	106	106
Selenium	1.00E+02	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver		<1.29	<0.99	<0.84	<0.84	1.34	0.2	<0.051	<0.051
Thallium		<4.51	<3.80	<3.95	<3.95	0.61	0.2	<0.057	<0.057
Vanadium		31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc	2.80E+03	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	*4.60E+03*	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1221	*4.60E+03*	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1232	*4.60E+03*	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1242	*4.60E+03*	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1248	*4.60E+03*	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1254	*4.60E+03*	<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1260	*4.60E+03*	<79	<74	<190	<190	<17	<15	<8	<8
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD		NA	NA	NA	NA	<2	<2	<0.8	<0.8
4,4'-DDE		NA	NA	NA	NA	<2	<2	<0.8	<0.8
4,4'-DDT		NA	NA	NA	NA	<2	<2	<0.8	<0.8
Aldrin	*2.70E+03*	NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC		NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC		NA	NA	NA	NA	<17	<17	<8	<8
Chlordane	*8.60E+04*	NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC		NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	*2.70E+03*	NA	NA	NA	NA	<2	<2	<0.8	<0.8
Endosulfan I		NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II		NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate		NA	NA	NA	NA	<17	<17	<8	<8
Endrin		NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde		NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)	*8.40E+04*	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor	*7.40E+03*	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide		NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor		NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene	*1.00E+04*	NA	NA	NA	NA	<34	<34	<16	<16

Exceeds Ohio EPA Sewage Sludge Rule

TABLE 6. SCREENING AGAINST CANADIAN ENVIRONMENTAL CRITERIA

CONSTITUENT	HUMAN HEALTH SOIL VALUES: EPA Reg9 PRG Residential	EPA Reg9 PRG Industrial	Ohio VAP Residential	Ohio VAP Industrial	Canadian Resident/ Park	Candian Commercial/ Industrial	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene			1.20E+05	1.20E+05			NA	NA	NA	NA	545	117	<8	<8
2-Methylnaphthalene							NA	NA	NA	NA	322	115	<8	<8
Acenaphthene	3.70E+06	2.90E+07	4.60E+06	1.80E+08			<94.7	<89.1	<114	<114	1467	203	<8	<8
Acenaphthylene							<261	<245.3	<314	<314	159	30	<8	<8
Anthracene	2.19E+07	1.00E+08	2.30E+07	8.80E+08			156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene	6.21E+02	2.10E+03	1.10E+04	6.30E+04	1.00E+03	1.00E+04	431	282.7	111	111	963	276	<8	<8
Benzo(a)pyrene	6.21E+01	2.10E+02	1.10E+03	6.30E+03	7.00E+02	7.00E+02	382	250.7	89.4	89.4	860	284	<8	<8
Benzo(b)flouranthene	6.21E+02	2.10E+03	1.10E+04	6.30E+04	1.00E+03	1.00E+04	561	375.7	<200	<200	1090	620	<8	<8
Benzo(ghi)Perylene							253	134.7	<200	<200	367	151	<8	<8
Benzo(k)Fluoranthene	6.20E+03	2.10E+04	1.10E+05	6.30E+05	1.00E+03	1.00E+04	190	101.7	<152	<152	639	407	<8	<8
Chrysene	6.21E+04	2.10E+05	1.10E+06	3.00E+05			459	323	131	131	778	307	<8	<8
Dibenzo(a,h)Anthracene	6.20E+01	2.10E+02	1.10E+03	6.70E+03	1.00E+03	1.00E+04	<134	<126	<162	<162	104	41	<8	<8
Dibenzofuran	2.90E+05	3.10E+06					NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene	2.29E+06	2.20E+07	2.30E+06	3.30E+07			959	619.7	287	287	3163	796	10	10
Fluorene	2.70E+06	2.60E+07	3.10E+06	1.20E+08			<118	<111.3	<143	<143	1371	211	<30	<30
Indeno(1,2,3-cd)Pyrene	6.21E+02	2.10E+03	1.10E+04	6.70E+04	1.00E+03	1.00E+04	227	114	<152	<152	365	145	<30	<30
Naphthalene	5.60E+04	1.90E+05	5.40E+04	5.30E+05	6.00E+02	2.20E+04	<103	<97	<124	<124	676	150	<8	<8
Phenanthrene					5.00E+03	5.00E+04	544	360.7	<114	<114	895	368	<30	<30
Pyrene	2.32E+06	2.90E+07	1.70E+06	2.50E+07	1.00E+04	1.00E+05	738	519.3	264	264	2033	579	8	8
TOTAL PAHs							5255.4	3522.1	1791.4	1791.4	16390	4961	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	7.60E+04	1.00E+05	7.50E+04	1.00E+06			13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony	3.10E+01	4.10E+02	3.10E+01	1.20E+03	2.00E+01	4.00E+01	2.01	1.21	<1.7	<1.7	<0.04	<0.04	<0.04	<0.04
Arsenic	3.90E-01	1.60E+00	6.80E+00	8.00E+01	1.20E+01	1.20E+01	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium	5.40E+03	6.70E+04	5.40E+03	2.00E+05	5.00E+02	2.00E+03	88.7	80.97	80.4	80.4	102	87	46.3	46.3
Beryllium	1.50E+02	1.90E+03	1.50E+02	5.70E+03	4.00E+00	8.00E+00	0.85	0.76	0.811	0.811	1.58	1	0.32	0.32
Cadmium	3.70E+01	4.50E+02	3.50E+01	7.70E+02	1.00E+01	2.20E+01	1.99	1.52	1.91	1.91	6.24	4	0.27	0.27
Calcium							19900	17600	15100	15100	65900	34711	35500	35500
Chromium	2.10E+02	4.50E+02	2.30E+02	8.90E+03	6.40E+01	8.70E+01	29	26	27.8	27.8	43.8	31	5.71	5.71
Cobalt	9.00E+02	1.90E+03	1.40E+03	4.00E+04	5.00E+01	3.00E+02	12.6	11.1	10.9	10.9	12.6	12	4.5	4.5
Copper	3.10E+03	4.10E+04			6.30E+01	9.10E+01	46.8	40.37	46.8	46.8	80.7	50	6.68	6.68
Iron	2.30E+04	1.00E+05					33900	30033.33	30100	30100	29900	26489	16900	16900
Lead	4.00E+02	7.50E+02	4.00E+02	1.80E+03	1.40E+02	2.60E+02	38.1	31.2	37.2	37.2	60.7	46	11.5	11.5
Magnesium							8200	7363.33	6550	6550	6370	5487	11800	11800
Manganese	1.80E+03	1.90E+04					623	568.33	528	528	575	497	373	373
Mercury	2.30E+01	3.10E+02	7.80E+00	3.00E+02	6.60E+00	2.40E+01	0.139	0.11	0.096	0.096	0.65	1	0.28	0.28
Nickel	1.60E+03	2.00E+04	1.50E+03	5.70E+03	5.00E+01	5.00E+01	39.9	35.13	34.4	34.4	43.6	38	12.1	12.1
Potassium							2230	2083.33	2000	2000	1040	914	106	106
Selenium	3.90E+02	5.11E+03	3.90E+02	1.50E+04	1.00E+00	3.90E+00	2.49	2.06	1.72	1.72	35.4	28	7.16	7.16
Silver	3.91E+02	5.11E+03	3.90E+02	1.50E+04	2.00E+01	4.00E+01	<1.3	<1.0	<0.8	<0.8	1.34	0	<0.1	<0.1
Thallium	5.20E+00	6.70E+01	6.20E+00	2.40E+02	1.00E+00	1.00E+00	<5	<4	<4	<4	0.61	0	<0.1	<0.1
Vanadium			7.00E+02	2.70E+04	1.30E+02	1.30E+02	31.3	28.17	27.7	27.7	28.4	25	6.82	6.82
Zinc	2.30E+04	1.00E+05	2.30E+04	9.00E+05	2.00E+02	3.60E+02	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	3.90E+03	2.10E+04	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1221	2.20E+02	7.40E+02	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1232	2.20E+02	7.40E+02	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1242	2.20E+02	7.40E+02	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1248	2.20E+02	7.40E+02	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1254	2.20E+02	7.40E+02	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8	<8
Aroclor 1260	2.20E+02	7.40E+02	1.10E+03	1.60E+04	1.30E+03	3.30E+04	<79.0	<74.3	<190.0	<190.0	<17.0	<14.7	<8	<8
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD	2.40E+03	1.00E+04	4.10E+04	5.00E+05			NA	NA	NA	NA	<2	<2	<0.8	<0.8
4,4'-DDE	1.70E+03	7.00E+03	2.90E+04	3.50E+05			NA	NA	NA	NA	<2	<2	<0.8	<0.8
4,4'-DDT	1.70E+03	7.00E+03	2.90E+04	3.50E+05	7.00E+02	1.20E+04	NA	NA	NA	NA	<2	<2	<0.8	<0.8
Aldrin	2.90E+01	1.00E+02					NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC	9.00E+01	3.60E+02					NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC	3.20E+02	1.30E+03					NA	NA	NA	NA	<17	<17	<8	<8
Chlordane	1.60E+03	6.50E+03	2.80E+04	3.00E+05			NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC							NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	3.00E+01	1.10E+02					NA	NA	NA	NA	<2	<2	<0.8	<0.8
Endosulfan I	3.70E+05	3.70E+06					NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II	3.70E+05	3.70E+06					NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate	3.70E+05	3.70E+06					NA	NA	NA	NA	<17	<17	<8	<8
Endrin	1.80E+04	1.80E+05	2.30E+04	8.70E+05			NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde	1.80E+04	1.80E+05					NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)	4.40E+02	1.70E+03	7.60E+03	8.00E+04			NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor	1.10E+02	3.80E+02	2.50E+03	4.40E+04			NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide	5.30E+01	1.90E+02	1.00E+03	2.20E+04			NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor	3.10E+05	3.10E+06	3.90E+05	1.50E+04			NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene	4.40E+02	1.60E+03	1.00E+04	1.80E+05			NA	NA	NA	NA	<34	<34	<16	<16

(green) Exceeds Canadian guideline for residential/park

(red) Exceeds Canadian guidelines for commercial/industrial setting

TABLE 7. SCREENING AGAINST USEPA MAXIMUM CONTAMINANT LEVELS FOR DRINKING WATER

CONSTITUENT	USEPA MCL HH, drinking	Max Elutriate River 2001	Ave Elutriate River 2001
PAHs	µg/L	µg/L	µg/L
1-Methylnaphthalene		<1	<1
2-Methylnaphthalene		<1	<1
Acenaphthene		<1	<1
Acenaphthylene		<1	<1
Anthracene		<1	<1
Benzo(a)anthracene		<1	<1
Benzo(a)pyrene	2.00E-01	<1	<1
Benzo(b)flouranthene		<1	<1
Benzo(ghi)Perylene		<1	<1
Benzo(k)Fluoranthene		<1	<1
Chrysene		<1	<1
Dibenzo(a,h)Anthracene		<1	<1
Dibenzofuran		<1	<1
Flouranthene		<1	<1
Fluorene		<1	<1
Indeno(1,2,3-cd)Pyrene		<1	<1
Naphthalene		<1	<1
Phenanthrene		<1	<1
Pyrene		<1	<1
TOTAL PAHs		<18	<18
Metals	µg/L	µg/L	µg/L
Aluminum		582	121.44
Antimony	6.00E+00	0.67	0.34
Arsenic	1.00E+01	15.6	8.15
Barium	2.00E+03	62	38.93
Beryllium	4.00E+00	0.4	0.4
Cadmium	5.00E+00	0.73	0.31
Calcium		91100	56866.67
Chromium	1.00E+02	2.55	1.17
Cobalt		1.94	1.24
Copper	1.30E+03	10.6	3.81
Iron		520	231.27
Lead	1.50E+01	2.82	0.71
Magnesium		21400	12275.56
Manganese		2960	1168.67
Mercury	2.00E+00	0.1	0.06
Nickel		18.6	12.08
Potassium		4790	1015.39
Selenium	5.00E+01	<1.0	<1.0
Silver		<0.4	<0.4
Thallium	2.00E+00	<0.68	<0.68
Vanadium		3.75	1.87
Zinc		33.1	14.54
PCBs	µg/L	µg/L	µg/L
Aroclor 1016	5.00E-01	<0.5	<0.5
Aroclor 1221	5.00E-01	<0.5	<0.5
Aroclor 1232	5.00E-01	<0.5	<0.5
Aroclor 1242	5.00E-01	<0.5	<0.5
Aroclor 1248	5.00E-01	<0.5	<0.5
Aroclor 1254	5.00E-01	<0.5	<0.5
Aroclor 1260	5.00E-01	<0.5	<0.5
Pesticides	µg/L	µg/L	µg/L
4,4'-DDD		<0.1	<0.1
4,4'-DDE		<0.1	<0.1
4,4'-DDT		<0.1	<0.1
Aldrin		<0.1	<0.1
alpha-BHC		<0.1	<0.1
beta-BHC		<0.1	<0.1
Chlordane	2.00E+00	<0.1	<0.1
delta-BHC		<0.1	<0.1
Dieldrin		<0.1	<0.1
Endosulfan I		<0.1	<0.1
Endosulfan II		<0.1	<0.1
Endosulfan sulfate		<0.1	<0.1
Endrin	2.00E+00	<0.1	<0.1
Endrin aldehyde		<0.1	<0.1
gamma-BHC (Lindane)		<0.1	<0.1
Heptachlor	4.00E-01	<0.1	<0.1
Heptachlor epoxide	2.00E-01	<0.1	<0.1
Methoxychlor	4.00E+01	<0.5	<0.5
Toxaphene	3.00E+00	<0.5	<0.5

Exceeds USEPA MCL

TABLE 8. SCREENING AGAINST OHIO SEDIMENT REFERENCE VALUES

CONSTITUENT	Ohio EPA SRV - EOLP	Ohio EPA SRV - ECBP	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	2.90E+04	3.90E+04	13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony	1.30E+00	9.20E-01	2.01	1.21	<1.7	<1.7	<0.04	<0.04	<0.04	<0.04
Arsenic	2.50E+01	1.80E+01	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium	2.40E+02	2.40E+02	88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium	8.00E-01	8.00E-01	0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	7.90E-01	9.00E-01	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium	2.10E+04	1.20E+05	19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium	2.90E+01	4.00E+01	29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt	1.20E+01	1.20E+01	12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper	3.20E+01	3.40E+01	46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron	4.10E+04	3.30E+04	33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	4.70E+01	4.70E+01	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium	7.10E+03	3.50E+04	8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese	1.50E+03	7.80E+02	623	568.33	528	528	575	497.22	373	373
Mercury	1.20E-01	1.20E-01	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel	3.30E+01	4.20E+01	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium	6.80E+03	1.10E+04	2230	2083.33	2000	2000	1040	913.56	106	106
Selenium	1.70E+00	2.30E+00	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver	4.30E-01	4.30E-01	<1.3	<1.0	<0.8	<0.8	1.34	0.2	<0.1	<0.1
Thallium	4.70E+00	4.70E+00	<4.5	<3.8	<4.0	<4.0	0.61	0.2	<0.1	<0.1
Vanadium	4.00E+01	4.00E+01	31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc	1.60E+02	1.60E+02	169	152.33	170	170	279	198	43.1	43.1

(green) Exceeds the lower regional Ohio Sediment Reference Value (SRV)

(red) Exceeds the higher regional, or the state-wide, Ohio Sediment Reference Value (SRV)

TABLE 9. SCREENING AGAINST ECOLOGICAL SEDIMENT CRITERIA

	ECOLOGICAL SEDIMENT SCREENING VALUES													
CONSTITUENT	USEPA TEC	USEPA PEC	EPA Reg4 Military Bases	EPA Reg5 RCRA EDQL	Ohio EPA SRV - EOLP	Ohio EPA SRV - ECBP	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene							NA	NA	NA	NA	545	116.78	<8	<8
2-Methylnaphthalene			3.30E+02	2.02E+01			NA	NA	NA	NA	322	115.33	<8	<8
Acenaphthene			3.30E+02	6.71E+00			<94.7	<89.1	<114	<114	1467	203.22	<8	<8
Acenaphthylene			3.30E+02	5.87E+00			<261	<245.3	<314	<314	159	30.44	<8	<8
Anthracene	5.72E+01	8.45E+02	3.30E+02	5.72E+01			156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene	1.08E+02	1.05E+03	3.30E+02	1.08E+02			431	282.7	111	111	963	275.89	<8	<8
Benzo(a)pyrene	1.50E+02	1.45E+03	3.30E+02	1.50E+02			382	250.7	89.4	89.4	860	283.67	<8	<8
Benzo(b)flouranthene				1.04E+04			561	375.7	<200	<200	1090	619.67	<8	<8
Benzo(ghi)Perylene				1.70E+02			253	134.7	<200	<200	367	150.78	<8	<8
Benzo(k)Fluoranthene				2.40E+02			190	101.7	<152	<152	639	407.44	<8	<8
Chrysene	1.66E+02	1.29E+03	3.30E+02	1.66E+02			459	323	131	131	778	307.44	<8	<8
Dibenzo(a,h)Anthracene			3.30E+02	3.30E+01			<134	<126	<162	<162	104	40.67	<8	<8
Dibenzofuran				4.49E+02			NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene	4.23E+02	2.23E+03	3.30E+02	4.23E+02			959	619.7	287	287	3163	795.78	10	10
Fluorene			3.30E+02	7.74E+01			<118	<111.3	<143	<143	1371	211.44	<30	<30
Indeno(1,2,3-cd)Pyrene				2.00E+02			227	114	<152	<152	365	145.44	<30	<30
Naphthalene				1.76E+02			<103	<96.7	<124	<124	676	149.89	<8	<8
Phenanthrene	2.04E+02	1.17E+03	3.30E+02	2.04E+02			544	360.7	<114	<114	895	367.89	<30	<30
Pyrene	1.95E+02	1.52E+03	3.30E+02	1.95E+02			738	519.3	264	264	2033	579	8	8
TOTAL PAHs			1.68E+03				5255.4	3522.1	1791.4	1791.4	16390	4960.78	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum					2.90E+04	3.90E+04	13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony			1.20E+01		1.30E+00	9.20E-01	2.01	1.21	<1.7	<1.7	<0.04	<0.04	<0.04	<0.04
Arsenic	9.79E+00	3.30E+01	7.24E+00	9.79E+00	2.50E+01	1.80E+01	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium					2.40E+02	2.40E+02	88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium					8.00E-01	8.00E-01	0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	9.90E-01	4.98E+00	1.00E+00	9.90E-01	7.90E-01	9.00E-01	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium					2.10E+04	1.20E+05	19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium	4.34E+01	1.11E+02	5.23E+01	4.34E+01	2.90E+01	4.00E+01	29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt				5.00E+01	1.20E+01	1.20E+01	12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper	3.16E+01	1.49E+02	1.87E+01	3.16E+01	3.20E+01	3.40E+01	46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron					4.10E+04	3.30E+04	33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	3.58E+01	1.28E+02	3.02E+01	3.58E+01	4.70E+01	4.70E+01	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium					7.10E+03	3.50E+04	8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese					1.50E+03	7.80E+02	623	568.33	528	528	575	497.22	373	373
Mercury	1.80E-01	1.06E+00	1.30E-01	1.74E-01	1.20E-01	1.20E-01	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel	2.27E+01	4.86E+01	1.59E+01	2.27E+01	3.30E+01	4.20E+01	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium					6.80E+03	1.10E+04	2230	2083.33	2000	2000	1040	913.56	106	106
Selenium					1.70E+00	2.30E+00	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver			2.00E+00	5.00E-01	4.30E-01	4.30E-01	<1.3	<1.0	<0.8	<0.8	1.34	0.2	<0.1	<0.1
Thallium					4.70E+00	4.70E+00	<4.5	<3.8	<4.0	<4.0	0.61	0.2	<0.1	<0.1
Vanadium					4.00E+01	4.00E+01	31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc	1.21E+02	4.59E+02	1.24E+02	1.21E+02	1.60E+02	1.60E+02	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1221	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1232	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1242	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1248	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1254	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<95	<95	<17	<15	<8	<8
Aroclor 1260	5.98E+01	6.76E+02	3.30E+01	5.98E+01			<79	<74	<190	<190	<17	<15	<8	<8
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD	4.88E+00	2.80E+01	3.30E+00	4.88E+00			NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDE	3.16E+00	3.13E+01	3.30E+00	3.16E+00			NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDT	4.16E+00	6.29E+01	3.30E+00	4.16E+00			NA	NA	NA	NA	<2	<2	<1	<1
Aldrin				2.00E+00			NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC							NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC							NA	NA	NA	NA	<17	<17	<8	<8
Chlordane	3.24E+00	1.76E+01	1.70E+00	3.24E+00			NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC							NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	1.90E+00	6.18E+01	3.30E+00	1.90E+00			NA	NA	NA	NA	<2	<2	<1	<1
Endosulfan I				3.26E+00			NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II				1.94E+00			NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate				3.46E+01			NA	NA	NA	NA	<17	<17	<8	<8
Endrin	2.20E+00	2.07E+02	3.30E+00	2.20E+00			NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde				4.80E+02			NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)	2.37E+00	4.99E+00	3.30E+00				NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor				6.00E-01			NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide	2.47E+00	1.60E+01		2.47E+00			NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor				1.36E+01			NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene				7.70E-02			NA	NA	NA	NA	<34	<34	<16	<16

Exceeds Ohio EPA sediment reference values (SRV) ("background"), in absence of TEC/PEC values

Exceeds USEPA threshold effects concentrations (TEC)

Exceeds USEPA probable effects concentrations (PEC)

TABLE 10. SCREENING AGAINST ECOLOGICAL SOIL CRITERIA

	ECOLOGICAL SOIL SCREENING VALUES										
CONSTITUENT	USEPA ECO SSL	EPA Reg4 Military Bases	EPA Reg5 RCRA EDQL	Max Sed Value Harbor 2000	Ave. Sed Value Harbor 2000	Max Sed Value Ref 2000	Ave. Sed Value Ref 2000	Max Sed Value River 2001	Ave. Sed Value River 2001	Max Sed Value Ref 2001	Ave. Sed Value Ref 2001
VOCs			µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Dichlorodifluoromethane			3.95E+04	NA	NA	NA	NA	NA	NA	NA	NA
PAHs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Methylnaphthalene				NA	NA	NA	NA	545	116.78	<8	<8
2-Methylnaphthalene			3.24E+03	NA	NA	NA	NA	322	115.33	y	<8
Acenaphthene		2.00E+04	6.82E+05	<95	<89	<114	<114	1467	203.22	<8	<8
Acenaphthylene			6.82E+05	<261	<245	<314	<314	159	30.44	<8	<8
Anthracene		1.00E+02	1.48E+06	156	105.8	<143	<143	882	160	<8	<8
Benzo(a)anthracene			5.21E+03	431	282.7	111	111	963	275.89	<8	<8
Benzo(a)pyrene		1.00E+02	1.52E+03	382	250.7	89.4	89.4	860	283.67	<8	<8
Benzo(b)flouranthene			5.98E+04	561	375.7	<200	<200	1090	619.67	<8	<8
Benzo(ghi)Perylene			1.19E+05	253	134.7	<200	<200	367	150.78	<8	<8
Benzo(k)Fluoranthene			1.48E+05	190	101.7	<152	<152	639	407.44	<8	<8
Chrysene			4.73E+03	459	323	131	<131	778	307.44	<8	<8
Dibenzo(a,h)Anthracene			1.84E+04	<134	<126	<162	<162	104	40.67	<8	<8
Dibenzofuran				NA	NA	NA	NA	NA	NA	<8	<8
Flouranthene		1.00E+02	1.22E+05	959	619.7	287	287	3163	795.78	10	10
Fluorene			1.22E+05	<118	<111.3	<143	<143	1371	211.44	<30	<30
Indeno(1,2,3-cd)Pyrene			1.09E+05	227	114	<152	<152	365	145.44	<30	<30
Naphthalene		1.00E+02	9.94E+01	<103	<96.7	<124	<124	676	149.89	<8	<8
Phenanthrene		1.00E+02	4.57E+04	544	360.7	<114	<114	895	367.89	<30	<30
Pyrene		1.00E+02	7.85E+04	738	519.3	264	264	2033	579	8	8
TOTAL PAHs		1.00E+03		5255.4	3522.1	1791.4	1791.4	16390	4960.78	119	119
Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum		5.00E+01		13900	12366.67	12700	12700	18170	14851.11	2220	2220
Antimony	2.90E-01	3.50E+00	1.42E-01	2.01	1.21	<1.69	<1.69	<0.043	<0.043	<0.043	<0.043
Arsenic		1.00E+01	5.70E+00	14.9	13.4	13	13	15.1	13.13	8.66	8.66
Barium	3.30E+02	1.65E+02	1.04E+00	88.7	80.97	80.4	80.4	102	87.29	46.3	46.3
Beryllium	3.60E+01	1.10E+00	1.06E+00	0.85	0.76	0.811	0.811	1.58	1.24	0.32	0.32
Cadmium	3.80E-01	1.60E+00	2.22E-03	1.99	1.52	1.91	1.91	6.24	3.74	0.27	0.27
Calcium				19900	17600	15100	15100	65900	34711.11	35500	35500
Chromium		4.00E-01	4.00E-01	29	26	27.8	27.8	43.8	31.28	5.71	5.71
Cobalt	1.30E+01	2.00E+01	1.40E-01	12.6	11.1	10.9	10.9	12.6	11.78	4.5	4.5
Copper		4.00E+01	5.40E+00	46.8	40.37	46.8	46.8	80.7	49.99	6.68	6.68
Iron		2.00E+02		33900	30033.33	30100	30100	29900	26488.89	16900	16900
Lead	1.60E+01	5.00E+01	5.37E-02	38.1	31.2	37.2	37.2	60.7	45.88	11.5	11.5
Magnesium				8200	7363.33	6550	6550	6370	5486.67	11800	11800
Manganese		1.00E+02		623	568.33	528	528	575	497.22	373	373
Mercury		1.00E-01	1.00E-01	0.139	0.11	0.096	0.096	0.65	0.5	0.28	0.28
Nickel		3.00E+01	1.36E+01	39.9	35.13	34.4	34.4	43.6	38.13	12.1	12.1
Potassium				2230	2083.33	2000	2000	1040	913.56	106	106
Selenium		8.10E-01	2.76E-02	2.49	2.06	1.72	1.72	35.4	27.87	7.16	7.16
Silver		2.00E+00	4.04E+00	<1.3	<1.0	<0.8	<0.8	1.34	0.2	<0.1	<0.1
Thallium		1.00E+00	5.69E-02	<4.5	<3.8	<4.0	<4.0	0.61	0.2	<0.1	<0.1
Vanadium		2.00E+00	1.59E+00	31.3	28.17	27.7	27.7	28.4	25.27	6.82	6.82
Zinc		5.00E+01	6.62E+00	169	152.33	170	170	279	198	43.1	43.1
PCBs	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Aroclor 1016		2.00E+01	3.32E+02	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8.0	<8.0
Aroclor 1221		2.00E+01	3.32E+02	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8.0	<8.0
Aroclor 1232		2.00E+01	3.32E+02	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8.0	<8.0
Aroclor 1242		2.00E+01	3.32E+02	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8.0	<8.0
Aroclor 1248		2.00E+01	3.32E+02	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8.0	<8.0
Aroclor 1254		2.00E+01	3.32E+02	<79.0	<74.3	<95.1	<95.1	<17.0	<14.7	<8.0	<8.0
Aroclor 1260		2.00E+01	3.32E+02	<79.0	<74.3	<190.0	<190.0	<17.0	<14.7	<8.0	<8.0
Pesticides	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
4,4'-DDD		2.50E+00	7.58E+02	NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDE		2.50E+00	5.96E+02	NA	NA	NA	NA	<2	<2	<1	<1
4,4'-DDT		2.50E+00	3.50E+00	NA	NA	NA	NA	<2	<2	<1	<1
Aldrin		2.50E+00	3.20E+00	NA	NA	NA	NA	<17	<17	<8	<8
alpha-BHC		2.50E+00		NA	NA	NA	NA	<17	<17	<8	<8
beta-BHC		1.00E+00		NA	NA	NA	NA	<17	<17	<8	<8
Chlordane		1.00E+02	2.24E+02	NA	NA	NA	NA	<17	<17	<8	<8
delta-BHC				NA	NA	NA	NA	<17	<17	<8	<8
Dieldrin	2.80E-01	5.00E-01	2.38E+00	NA	NA	NA	NA	<2	<2	<1	<1
Endosulfan I			1.19E+02	NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan II			1.19E+02	NA	NA	NA	NA	<17	<17	<8	<8
Endosulfan sulfate			3.58E+01	NA	NA	NA	NA	<17	<17	<8	<8
Endrin		1.00E+00	1.00E+01	NA	NA	NA	NA	<17	<17	<8	<8
Endrin aldehyde			1.05E+01	NA	NA	NA	NA	<17	<17	<8	<8
gamma-BHC (Lindane)		5.00E-01		NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor			5.98E+00	NA	NA	NA	NA	<17	<17	<8	<8
Heptachlor epoxide			1.52E+02	NA	NA	NA	NA	<17	<17	<8	<8
Methoxychlor			1.99E+01	NA	NA	NA	NA	<34	<34	<30	<30
Toxaphene			1.19E+02	NA	NA	NA	NA	<34	<34	<16	<16
Other	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Dioxin (2,3,7,8-TCDD)											
Cyanide		9.00E+02	1.33E+03								

Exceeds USEPA Region V EDQL

Exceeds USEPA Ecological Soil Screening Level

TABLE 11. SCREENING AGAINST SURFACE WATER CRITERIA FOR AQUATIC LIFE

	AQUATIC LIFE CRITERIA					
	USEPA WQC	USEPA WQC	Ohio EPA	Ohio EPA	Max Elutriate	Ave Elutriate
CONSTITUENT	**CCC**	**CMC**	**Aquatic Life OMZA**	**Aquatic Life IMZM**	**River 2001**	**River 2001**
PAHs	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1-Methylnaphthalene					<1	<1
2-Methylnaphthalene					<1	<1
Acenaphthene					<1	<1
Acenaphthylene					<1	<1
Anthracene			2.00E-02	3.50E-01	<1	<1
Benzo(a)anthracene			4.70E+00	8.50E+01	<1	<1
Benzo(a)pyrene			6.00E-02	1.10E+00	<1	<1
Benzo(b)flouranthene					<1	<1
Benzo(ghi)Perylene					<1	<1
Benzo(k)Fluoranthene					<1	<1
Chrysene			4.70E+00	8.50E+01	<1	<1
Dibenzo(a,h)Anthracene					<1	<1
Dibenzofuran					<1	<1
Flouranthene			8.00E-01	7.40E+00	<1	<1
Fluorene			1.90E+01	2.20E+02	<1	<1
Indeno(1,2,3-cd)Pyrene					<1	<1
Naphthalene			2.10E+01	3.40E+02	<1	<1
Phenanthrene			2.30E+00	6.10E+01	<1	<1
Pyrene					<1	<1
TOTAL PAHs					<18	<18
Metals	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aluminum					582	121.44
Antimony			1.90E+02	1.80E+03	0.67	0.34
Arsenic	1.50E+02	3.40E+02	1.50E+02	6.80E+02	15.6	8.15
Barium			2.20E+02	4.00E+03	62	38.93
Beryllium					<0.4	<0.4
Cadmium	2.20E+00	4.30E+00	2.50E+00	9.00E+00	0.73	0.31
Calcium					91100	56866.67
Chromium	7.40E+01	5.70E+02	8.60E+01	3.60E+03	2.55	1.17
Cobalt			2.40E+01	4.40E+02	1.94	1.24
Copper	9.00E+00	1.30E+01	9.30E+00	2.80E+01	10.6	3.81
Iron					520	231.27
Lead	2.50E+00	6.50E+01	6.40E+00	2.40E+02	2.82	0.71
Magnesium					21400	12275.56
Manganese					2960	1168.67
Mercury	7.70E-01	1.40E+00			0.1	0.06
Nickel	5.20E+01	4.70E+02	5.20E+01	9.40E+02	18.6	12.08
Potassium					4790	1015.39
Selenium		5.00E+00			<1.0	<1.0
Silver		3.40E+00			<0.4	<0.4
Thallium			1.70E+01	1.60E+02	<0.68	<0.68
Vanadium			4.40E+01	3.00E+02	3.75	1.87
Zinc	1.20E+02	1.20E+02	1.20E+02	2.40E+02	33.1	14.54
PCBs	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aroclor 1016	1.40E-02				<0.5	<0.5
Aroclor 1221	1.40E-02				<0.5	<0.5
Aroclor 1232	1.40E-02				<0.5	<0.5
Aroclor 1242	1.40E-02				<0.5	<0.5
Aroclor 1248	1.40E-02				<0.5	<0.5
Aroclor 1254	1.40E-02				<0.5	<0.5
Aroclor 1260	1.40E-02				<0.5	<0.5
Pesticides	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
4,4'-DDD					<0.1	<0.1
4,4'-DDE					<0.1	<0.1
4,4'-DDT	1.10E+00	1.00E-03			<0.1	<0.1
Aldrin		3.00E+00			<0.1	<0.1
alpha-BHC					<0.1	<0.1
beta-BHC					<0.1	<0.1
Chlordane	4.30E-03	2.40E+00			<0.1	<0.1
delta-BHC					<0.1	<0.1
Dieldrin	5.60E-03	2.40E-01	5.60E-02	4.70E-01	<0.10	<0.10
Endosulfan I	5.60E-02	2.20E-01			<0.1	<0.1
Endosulfan II	5.60E-02	2.20E-01			<0.1	<0.1
Endosulfan sulfate					<0.1	<0.1
Endrin	3.60E-02	8.60E-02	3.60E-02	1.70E-01	<0.10	<0.10
Endrin aldehyde					<0.1	<0.1
gamma-BHC (Lindane)		9.50E-01	5.70E-02	1.90E+00	<0.10	<0.10
Heptachlor	3.80E-03	5.20E-01			<0.1	<0.1
Heptachlor epoxide	3.80E-03	5.20E-01			<0.1	<0.1
Methoxychlor					<0.5	<0.5
Toxaphene	2.00E-04	7.30E-01			<0.5	<0.5

Exceeds Ohio EPA Outside Mixing Zone Average

Exceeds Ohio EPA Inside Mixing Zone Maximum Concentration

Exceeds USEPA Continuous Maximum Criteria, when Ohio EPA criteria are not available

TABLE 12. SCREENING AGAINST SURFACE WATER CRITERIA FOR HUMAN CONSUMPTION OF FISH

	HUMAN HEALTH CRITERIA			
	USEPA WQC	Ohio EPA	Max Elutriate	Ave Elutriate
CONSTITUENT	HH, non-drinking	HH, non-drinking	River 2001	River 2001
PAHs	μg/L	μg/L	μg/L	μg/L
1-Methylnaphthalene			<1	<1
2-Methylnaphthalene			<1	<1
Acenaphthene			<1	<1
Acenaphthylene			<1	<1
Anthracene	4.00E+04	6.30E+02	<1	<1
Benzo(a)anthracene	1.80E-02		<1	<1
Benzo(a)pyrene	1.80E-02	2.00E-04	<1	<1
Benzo(b)flouranthene	1.80E-02		<1	<1
Benzo(ghi)Perylene			<1	<1
Benzo(k)Fluoranthene			<1	<1
Chrysene	1.80E-02		<1	<1
Dibenzo(a,h)Anthracene			<1	<1
Dibenzofuran			<1	<1
Flouranthene	1.40E+02	9.50E+00	<1	<1
Fluorene		3.20E+02	<1	<1
Indeno(1,2,3-cd)Pyrene	1.80E-02		<1	<1
Naphthalene		1.20E+03	<1	<1
Phenanthrene			<1	<1
Pyrene	4.00E+03		<1	<1
TOTAL PAHs			<18	<18
Metals	μg/L	μg/L	μg/L	μg/L
Aluminum			582	121.44
Antimony	6.40E+02	7.80E+02	0.67	0.34
Arsenic	1.40E-01	5.80E+02	15.6	8.15
Barium		1.60E+05	62	38.93
Beryllium			<0.4	<0.4
Cadmium		7.30E+02	0.73	0.31
Calcium			91100	56866.67
Chromium			2.55	1.17
Cobalt			1.94	1.24
Copper		6.40E+04	10.6	3.81
Iron			520	231.27
Lead		1.90E+02	2.82	0.71
Magnesium			21400	12275.56
Manganese		6.10E+04	2960	1168.67
Mercury	5.10E-02		0.1	0.06
Nickel	4.60E+03	4.30E+04	18.6	12.08
Potassium			4790	1015.39
Selenium	1.10E+04		<1.0	<1.0
Silver			<0.4	<0.4
Thallium	6.30E+00	3.70E+00	<0.68	<0.68
Vanadium			3.75	1.87
Zinc	2.60E+04	3.50E+04	33.1	14.54
PCBs	μg/L	μg/L	μg/L	μg/L
Aroclor 1016	6.40E-05	2.60E-05	<0.5	<0.5
Aroclor 1221	6.40E-05	2.60E-05	<0.5	<0.5
Aroclor 1232	6.40E-05	2.60E-05	<0.5	<0.5
Aroclor 1242	6.40E-05	2.60E-05	<0.5	<0.5
Aroclor 1248	6.40E-05	2.60E-05	<0.5	<0.5
Aroclor 1254	6.40E-05	2.60E-05	<0.5	<0.5
Aroclor 1260	6.40E-05	2.60E-05	<0.5	<0.5
Pesticides	μg/L	μg/L	μg/L	μg/L
4,4'-DDD	2.20E-04		<0.1	<0.1
4,4'-DDE	2.20E-04		<0.1	<0.1
4,4'-DDT	2.20E-04		<0.1	<0.1
Aldrin	5.00E-05		<0.1	<0.1
alpha-BHC	4.90E-03		<0.1	<0.1
beta-BHC	1.70E-02	1.40E-02	<0.1	<0.1
Chlordane	8.10E-04		<0.1	<0.1
delta-BHC			<0.1	<0.1
Dieldrin	5.40E-05	6.50E-06	<0.1	<0.1
Endosulfan I	8.90E+01		<0.1	<0.1
Endosulfan II	8.90E+01		<0.1	<0.1
Endosulfan sulfate	8.90E+01		<0.1	<0.1
Endrin	6.00E-02		<0.1	<0.1
Endrin aldehyde	3.00E-01		<0.1	<0.1
gamma-BHC (Lindane)	1.80E+00	5.00E-01	<0.1	<0.1
Heptachlor	7.90E-05		<0.1	<0.1
Heptachlor epoxide	3.90E-05		<0.1	<0.1
Methoxychlor			<0.5	<0.5
Toxaphene	2.80E-04		<0.5	<0.5

Exceeds USEPA recommended surface water quality criteria (blue)

Exceeds Ohio EPA surface water quality criteria (green)