

Cuyahoga County Background Soil Determination and Case Study Applications

Karla Auker, U.S. EPA

**Janine Rybka, Cuyahoga Soil Water
Conservation District**

Vanessa Steigerwald-Dick, Ohio EPA

Cuyahoga County

Background Study, July 2011

- ▶ **Purpose:** To gather data to expand the existing metals background database for Cuyahoga County started in 2008 for the Dike 14 project
- ▶ Sampled for metals + polynuclear aromatic hydrocarbons (PAHs)
- ▶ Completed using U.S. EPA Targeted Brownfield Assessment (TBA) funds
- ▶ Data collected to assist Cuyahoga County and in making decisions about potential redevelopment of brownfields based on site characteristics and past contamination. The data is available to all stakeholders assessing or redeveloping brownfields in Cuyahoga County.

Previous 2008 Background Study for Dike 14 Environmental Assessment

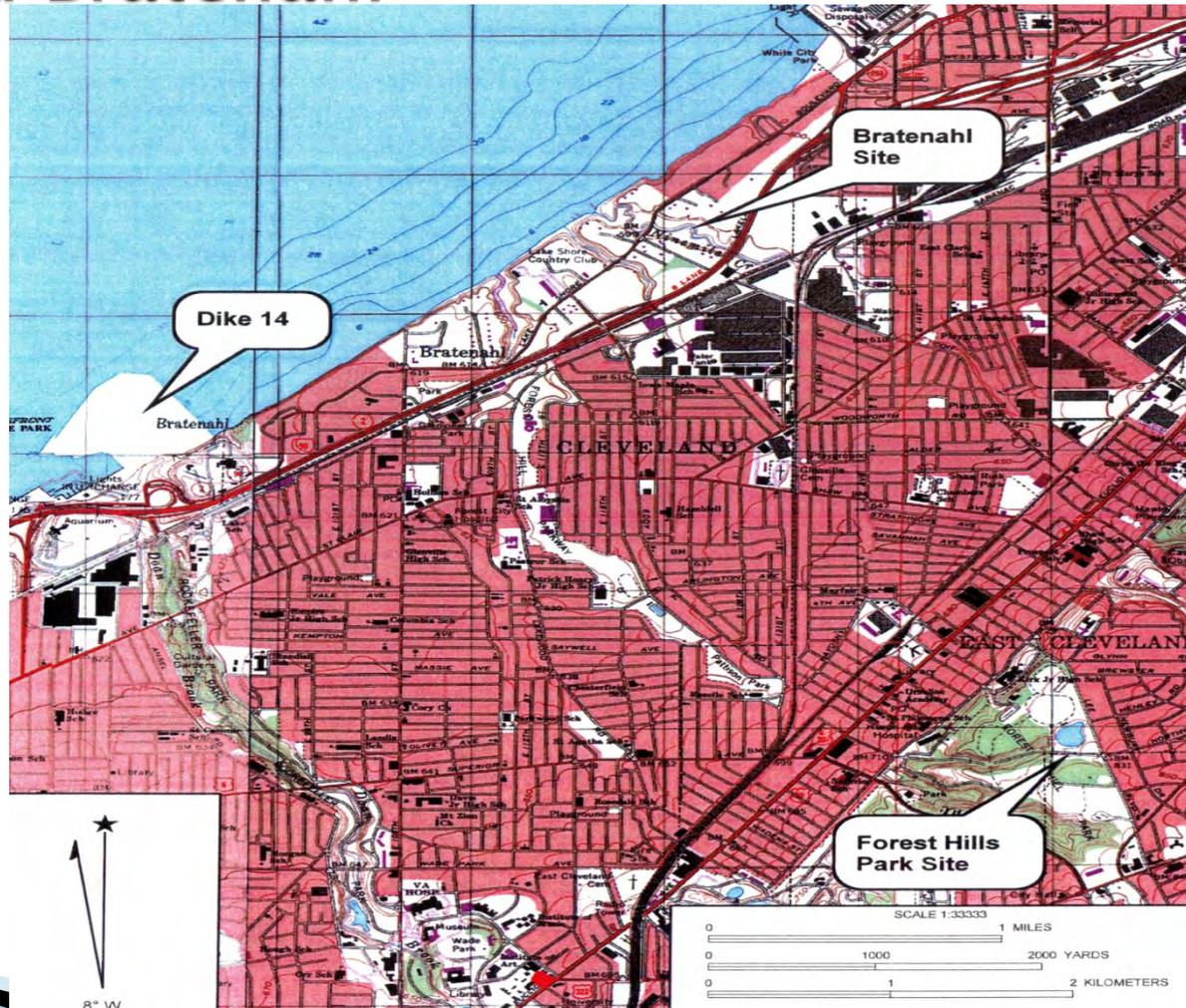


- ▶ In 2008, background soil sampling conducted for metals at both the Forest Hills Park and Bratenahl sites.
- ▶ Report generated titled: “Background Soil Determination” Dike 14 Confined Disposal Facility, Cleveland, Ohio

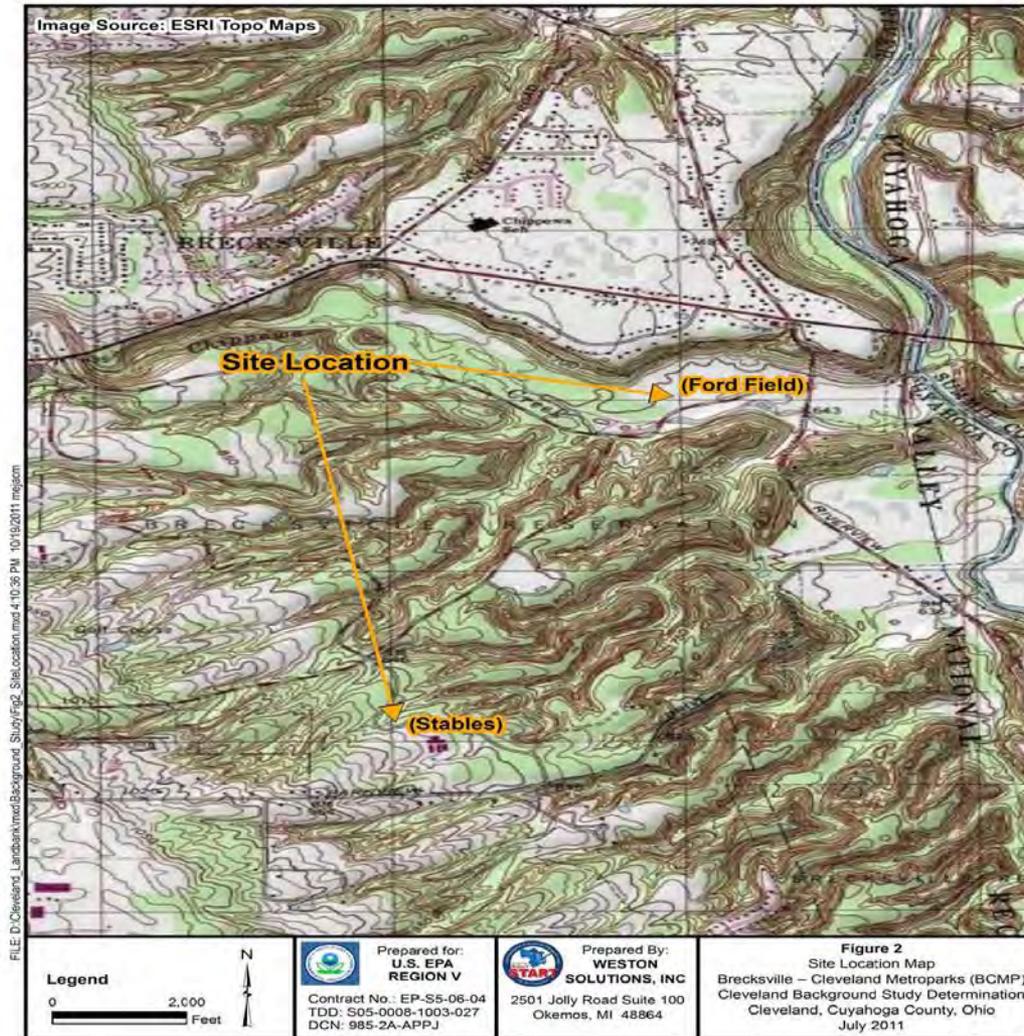
Background Sampling Site Locations and Sample Summary

- ▶ Cleveland Heights, Forest Hills Park, Lee Road
 - 2008 sampled RCRA metals
 - 2011 sampled PAHs, grain size and TOC
- ▶ Bratenahl, Mather Estate, Lake Shore Boulevard and Mather Lane
 - 2008 sampled RCRA metals
 - 2011 sampled additional locations for TAL metals
 - 2011 sampled PAHs, grain size and TOC
- ▶ Brecksville, Cleveland Metroparks, Riverview Road and Chippewa Creek Drive
 - 2011 sampled TAL metals, PAHs, grain size and TOC
- ▶ At each Site: 12 locations, 24 samples (two intervals each location at 0–2 ft and 2–4 ft)
- ▶ Analysis by VAP certified lab

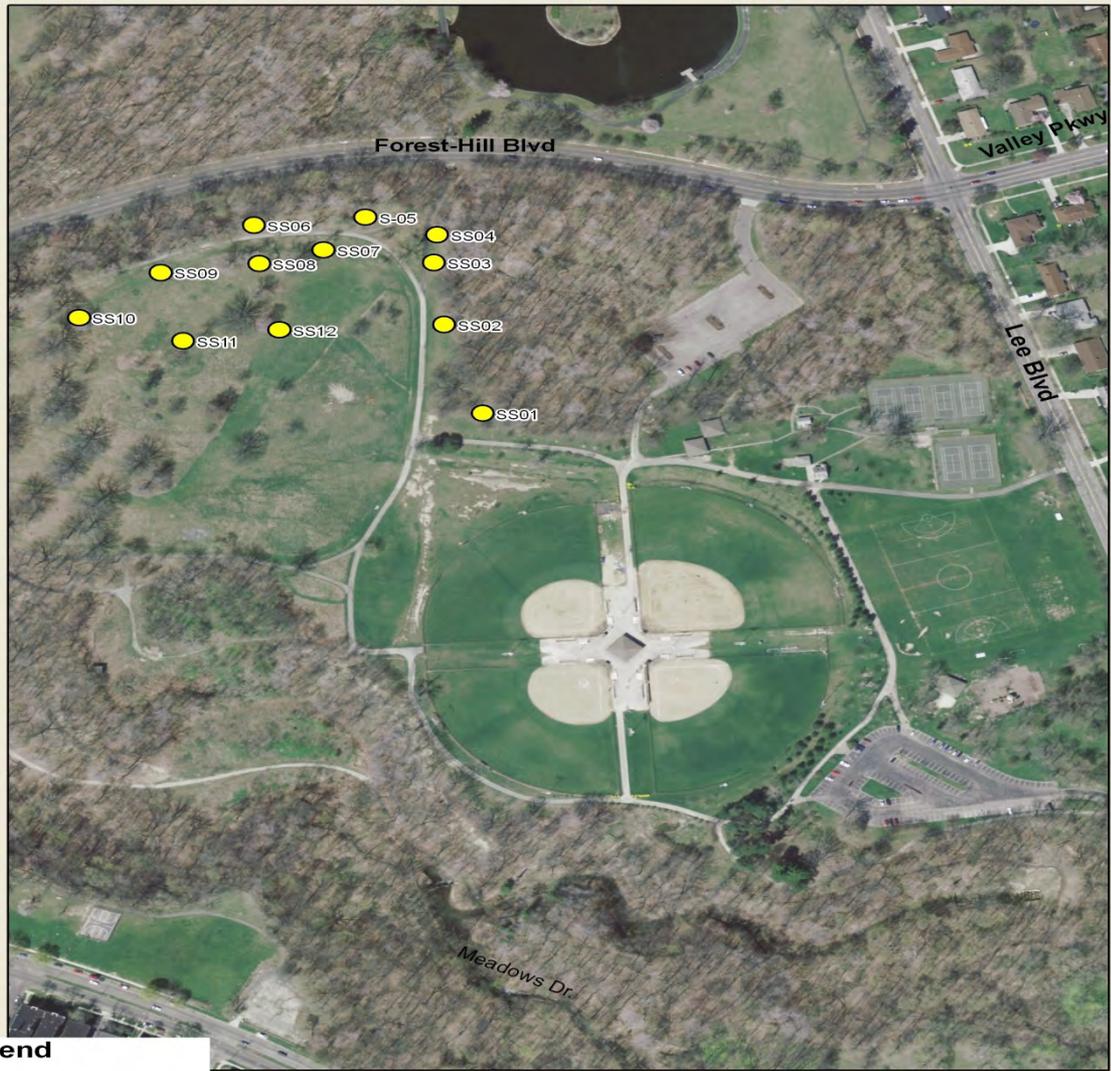
Site Location Map Cleveland Heights Forest Hills Park and Bratenahl



Site Location Map Brecksville – Cleveland Metroparks Stables and Ford Field

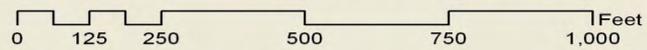


Cleveland Heights - Forest Hills Park Background Soil Sampling



Legend

- Sampling Locations

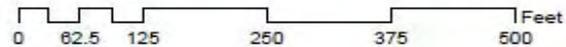


Bratenahl-Mather Estate Background Soil Sampling

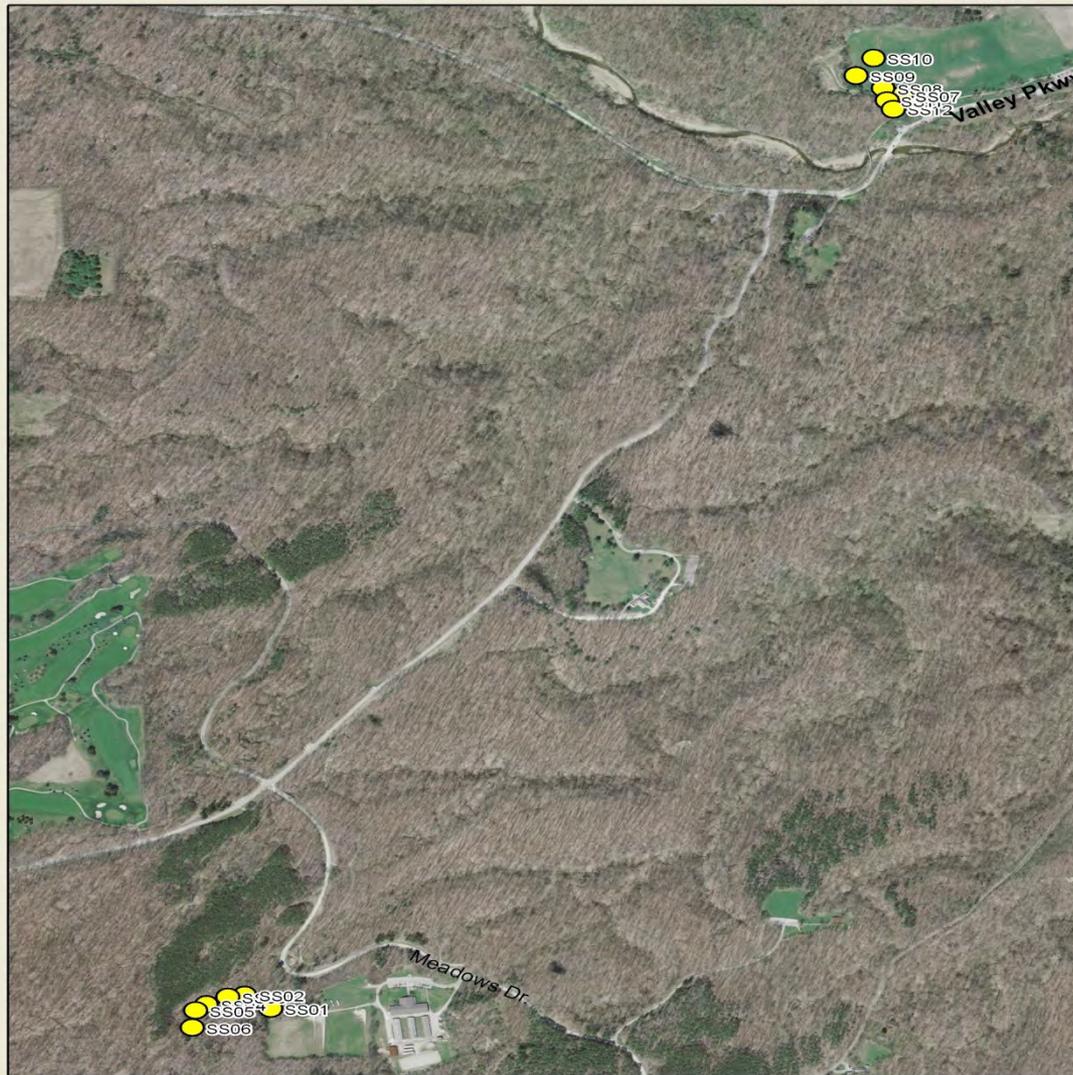


Legend

-  Sampling Locations
location Prefix (BHME)

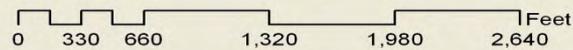


Brecksville Cleveland Metroparks - Stable Area and Chippewa Ford Field Background Soil Sampling



Legend

 Sampling Locations



Followed VAP Soil Background Rule Requirements and Samples Analyzed by VAP Certified Laboratories

- ▶ Phase II Property Assessment Rule, Background Levels, OAC 3745-300-07(H)
- ▶ Consider on property versus off property sampling locations
- ▶ Do not sample in inappropriate areas
- ▶ Must be representative of zones or depth intervals where background data will be used
- ▶ Conduct appropriate statistical analyses
- ▶ For off-property investigations, (H)(2):
 - Must be conducted on soil that is representative of the soil type at the property
 - Data must be demonstrated to be reliable and representative of background levels for the property

Background Value Determination

- ▶ Non-Detects
 - ▶ Outliers
 - ▶ Distribution
 - ▶ Background Mean
 - ▶ Standard Deviation
 - ▶ Coefficient of Variation
 - ▶ Upper Limits
 - ▶ Statistical Comparison of the
0–2 ft, 2–4 ft, and 0–4 ft intervals
- 

Background Sampling Results

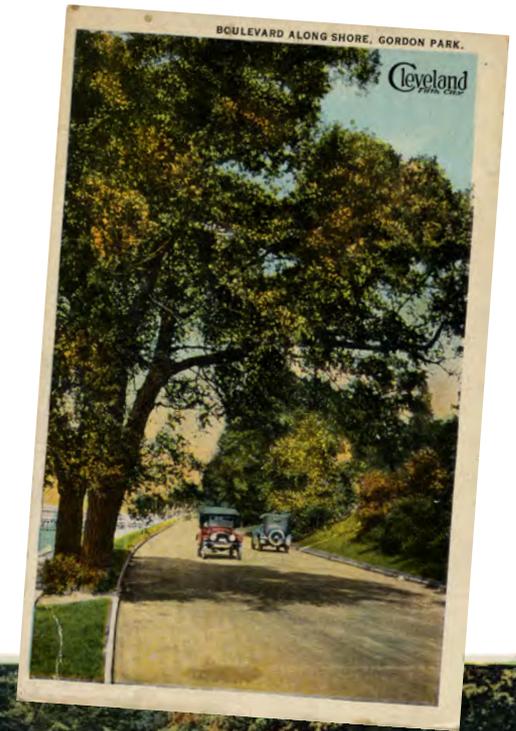
Summary of Background Upper Limits for Each Site

Background Upper Limits, mg/kg

Metals*	<i>0-2 foot Interval</i>			<i>2-4 foot Interval</i>			<i>0-4 foot Interval</i>		
	Forest Hills	Bratenahl	Brecksville	Forest Hills	Bratenahl	Brecksville	Forest Hills	Bratenahl	Brecksville
Arsenic	20.23	20.82	14.51	25.38	20.78	15.22	23.01	20.61	14.93
Barium	56.64	67.10	61.18	104	95.28	101.02	89.57	87.42	84.94
Chromium	21.75	18.86	22.11	22.26	17.77	20.06	22.06	19.31	21.13
Lead	17.93	25.67	19.14	29.36	13.96	14.63	26.28	15.81	18.78

*This Table only lists four of the metals sampled for summary purposes.

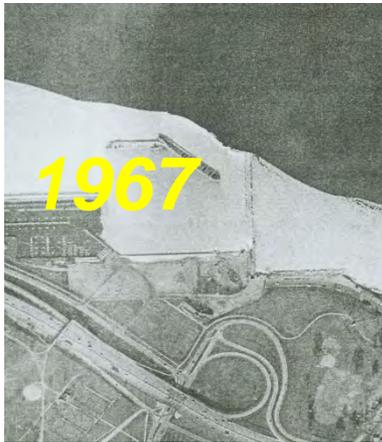
Historic Cleveland Lakefront



Dike 14 Timeline

mid-1900s: 8acre “Cleveland Lakefront Dump”

1979-1999: Dike 14 filled with dredged sediments from shipping channel in Cuyahoga River and Cleveland Harbor



From Blue to Brown to Green
Dike 14 is now known as
Cleveland Lakefront Nature
Preserve



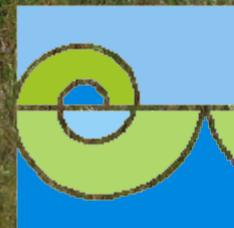
- ▶ Only accessible *naturalized area* along Cleveland Lakefront between Huron and Mentor Marsh
- ▶ Important bird migration stopover site



Using the VAP to Determine Safe Usage as a Nature Preserve

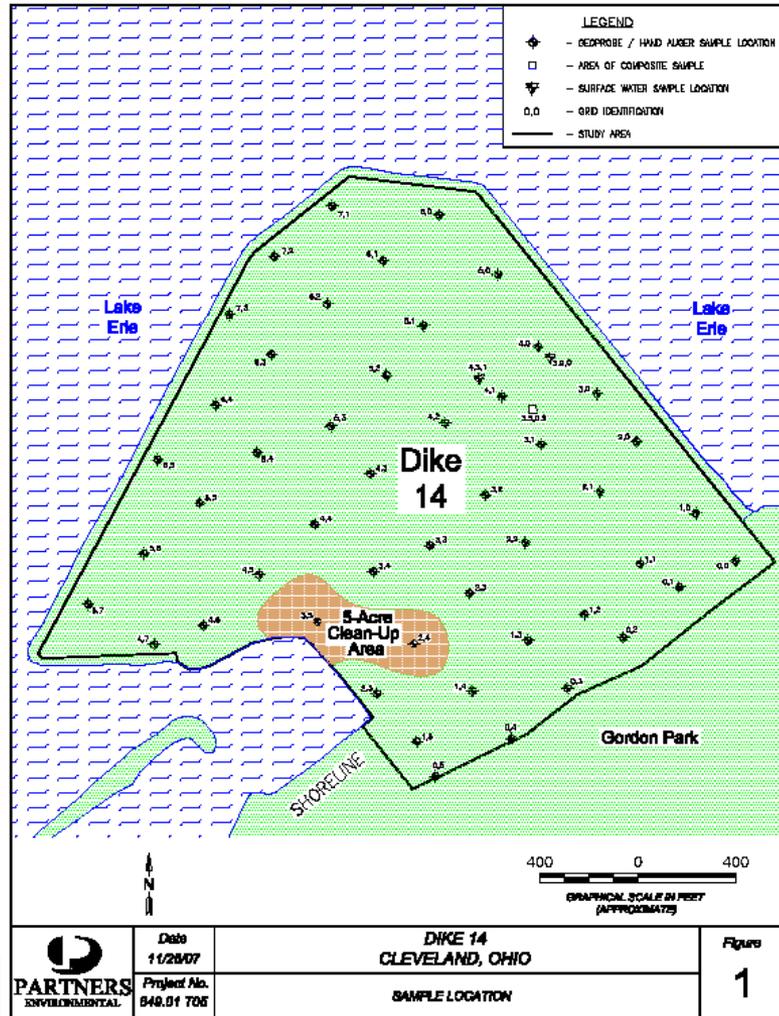


OhioEPA



Cuyahoga
Soil and Water
Conservation
District

Brownfield Assessment



Brownfield Assessment included:

- VAP Phase I Property Assessment
- Wetlands Delineation
- VAP Phase II Property Assessment
- Property Specific Human Health Risk Assessment
- Level 1, 2, and 3 Ecological Risk Assessment
- Background Soil Determination

Human Health Risk Assessment

- ▶ Dredged material considered as soils and need to meet direct contact soil standards
- ▶ Assessed exposures to both adults & children as frequent **recreational visitors** (90 days/year)
- ▶ Assessed exposures to construction & excavation workers
- ▶ Evaluated direct contact exposures to soil in 2 exposure areas



Ecological Risk Assessment

- ▶ Determine important ecological resources & habitat
- ▶ Evaluate exposures to most susceptible wildlife species



Comparison of VAP Direct-Contact Soil Standards and Dike 14 Concentrations

NA = Not Available

Compounds	VAP Residential	VAP Commercial Industrial	Dike 14 Exposure Unit 1	Dike14 Exposure Unit 2	Dike 14 Background 0-4'
Arsenic	6.7	82	14.5	25	21
Cadmium	72	2300	10.03	115	1.01
Lead	400	1800	105.4	666	24
Mercury	7.6	290	0.35	2.3	0.06
Benzo(a)pyrene	1.1	7.7	1.05	7.6	NA
Benzo(b)fluoranthene	11	77	2.2	11.0	NA
PCBs	1.2	18	0.6	6.5	NA

Is Confined Disposal Facility 10B Different from Dike 14?

- ▶ CDF 10B evaluation was conducted to determine if dredge material from it could be safely used for fill at an upland commercial/industrial property.
- ▶ Dike 14 was evaluated to determine if the area could be safely used as a nature preserve.

Different end uses: How the land will be used and the receptors that will be at that location are important considerations when assessing protection of human health and the environment.

Results of the CDF 10B Assessment

- ▶ Commercial/industrial land use: Cumulative non-cancer hazard index of 1 and cancer risk goal of 1 in 100,000 (1×10^{-5}) are met
- ▶ Residential levels: **exceeded**
- ▶ Land Use Restriction: needed for commercial/industrial use
- ▶ The dredged material will not cause adverse impacts from leaching to the Cuyahoga River.



Background Soil Determination Summary – Due out in June

- ▶ Combine the results of the 2008 and 2011 background studies
- ▶ Brief summary of the 2008 and 2011 work
- ▶ 4 tables
 - Cleveland Heights Forest Hills Park
 - Bratenahl Mather Estate
 - Brecksville Cleveland Metroparks Reservation
 - Potential Combination of data from all three sites for each metal if determined applicable

Summary Report

- ▶ Meant to be use as a quick reference for
 - General public looking at soils for gardens, playgrounds, parks, etc.
 - CPs as an alternative applicable standard for metals risk analysis in lieu of the VAP risk based number
- ▶ Look for soil type most representative to the soil at your project
 - Forest Hills Park - silty clay/glacial till over shale
 - Bratenahl - lacustrian plain deposits, silty, sandy clay
 - Brecksville - silty clay/glacial till over sandstone

Cuyahoga County Background Data Use Applications

- ▶ Used for direct comparison purposes at the Dike 14 Confined Disposal Facility
 - ▶ Used for acceptable criteria for fill and beneficial use of dredge material
 - ▶ Used for urban gardens and parks
 - ▶ Used as a comparison standard for background metals concentrations for assessing brownfield properties
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Questions?

- ▶ Karla Auker, U.S. EPA
 - Auker.Karla@epamail.epa.gov
 - 440-250-1741

 - ▶ Jan Rybka, Cuyahoga Soil and Water Conservation District
 - JRybka@cuyahogawcd.org
 - 216-524-6580 ext. 13

 - ▶ Vanessa Steigerwald-Dick, Ohio EPA
 - Vanessa.Steigerwald@epa.state.oh.us
 - 330-963-1219
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