XRF and Urban Soils: Outreach and Assistance

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Allegheny County, PA

Your Conservation Solution Center℠

ACCD Enters Urban Sector

- 2015- District expands education and technical assistance for urban constituents. NACD grant awarded in 2016.
- Focused on building relationships and assessing needs / developing coalitions.
- 30,000+ vacant lots in Allegheny County that could be urban ag sites, with much of the acreage in less affluent areas.
- Accurate soil testing is cost prohibitive for many groups.

Urban Soil Contamination

- Formerly industrial cities like Pittsburgh have higher rates of lead and other heavy metal contamination.
- Often we think of old pipes and lead paint in houses, but lead migrates or is deposited in many urban soils. Soil lead is typically relatively immobile, although some portion is bio-available.
- High levels in blood can lead to issues in infants, the young and the elderly.

Sources of Contamination

- Lead Smelters
- Slag heaps
- Car batteries
- Gasoline
- Stormwater
- Lead Paint
- Pipes
- Trash/Dumping

Risks and Pathways

- Lead is a primary concern, although arsenic, cadmium, and other heavy metals can be an issue.
- Risks are from inhalation of dust, eating dirt on or in vegetables, hand to mouth pathways, and skin contact.
- Soil lead can contribute to over 70% of child toxicity.

ACCD/Pittsburgh Lead Guidelines

- 0-150 ppm: Use with no or limited restrictions.
- 151-400 ppm: “Clean Hands” Policy and mulched pathways (3-4”).
- 401-1,000 ppm: Modified use only (raised beds, mulch).
- >1,000 ppm: Restricted use. Disqualified from Vacant Lot Adoption program.

Finding Lead

- UMass (acid digestion) or Penn State (ICP) both can be expensive ($15 per test up to $66)
- Even composite tests must be in a small area to avoid dilution.
- Lead levels can be highly toxic in small area with clean soil nearby.
- Use records and historical maps to identify areas of concern.

XRF Analysis

- Ability to accurately screen for total lead and heavy metals in 30-60 seconds.
- Can be done in the office or on–site if conditions are dry enough (potential for GIS linking).
- In-situ use accurate enough for rapid screenings, but processed samples can give lab quality results.
- For the first year at least, 10% of samples lab verified.

XRF Analysis for Urban Ag

- Units cost between $20-30,000 for a portable, handheld unit.
- Can be done in the office or on–site if conditions are dry enough (potential for GIS linking).
- Allows for timely and cost effective contamination mapping of sites.
- Ability to test hundreds of times a day.
- Soil moisture should be low to prevent dilution.

XRF at ACCD

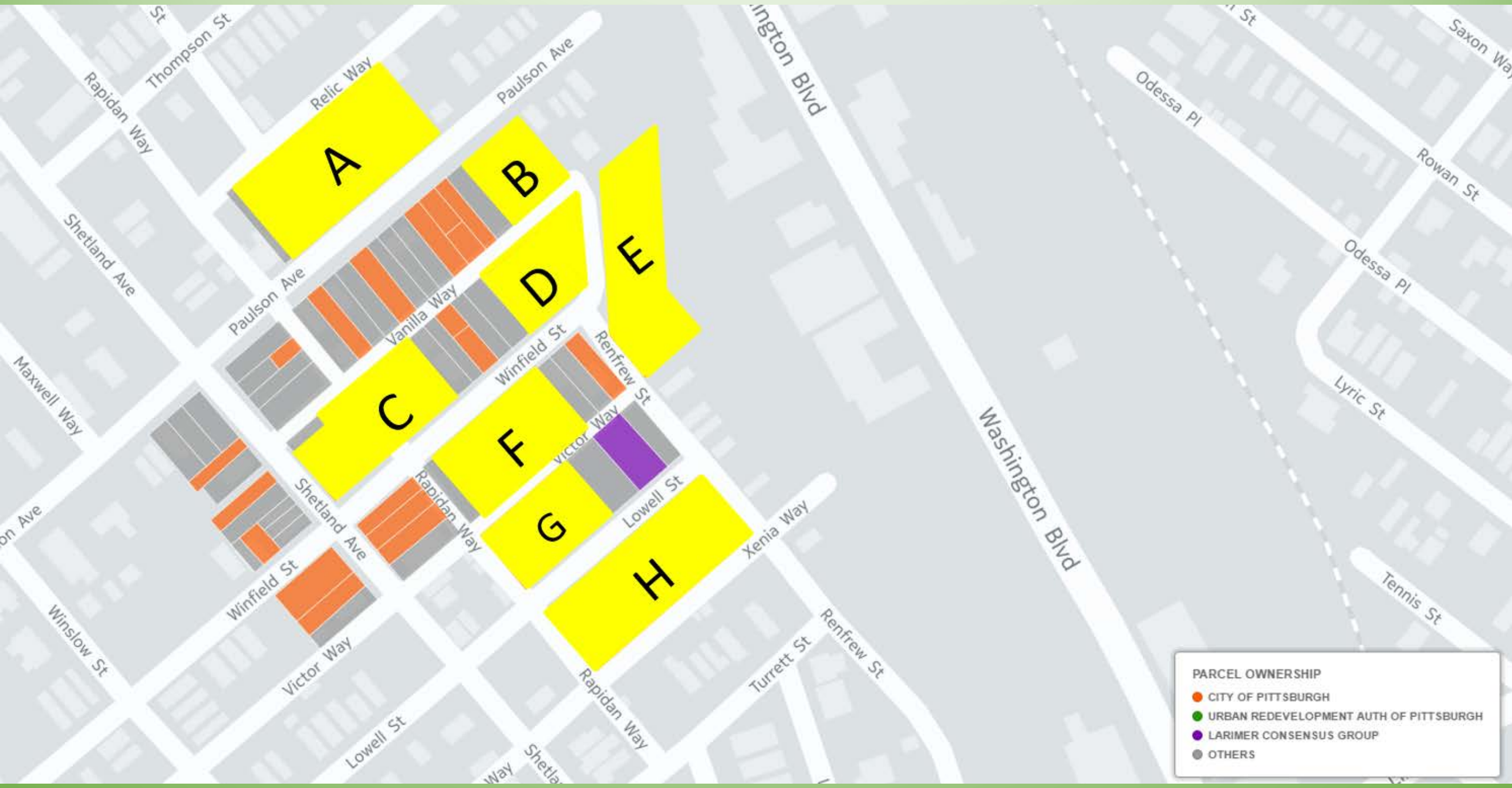
- In 2016 ACCD used Hillman Foundation grant funds to purchase a handheld XRF Analyzer.
- In the first 10 months, ACCD has conducted over $60,000 worth of soil heavy metal screenings.
- Can be done in the office or on–site if conditions are dry enough (potential for GIS linking).
- Allows for timely and cost effective contamination mapping of sites, helping groups garden safely.

XRF and Mapping

- Time consuming to take hundreds of samples.
- We require community/org involvement for larger requests.
- Using community volunteers ACCD is able to educate while sampling.
- Partnerships allow for responsibly thorough analysis.
- Gives communities a connection to the data and results.
- Develops relationships that can extend into further technical assistance and support.

XRF and Soil Mapping

XRF Neighborhood Projects



Victor-Winfield Block

Winfield

441	387	675	663	220	353	671	324	325	127	914	448	672	1034
523	387	874	616	115	344	37	29	41	149	607	916	840	913
621	175	1348	792	616	347	28	<18	29	81	383	1342	1092	1157
402	263	897	827	658	359	<22	<19	33	114	329	432	599	403
280	1091	915	789	734	555	160	55	101	203	784	557	576	497
815	760	1279	882	567	379	176	109	220	104	674	349	934	901
779	892	877	394	313	201	149	382	109	203	1436	446	2010	860
858	470	491	484	424	227	326	192	340	298	1623	899	2673	1982
1833	344	396	351	437	417	114	262	937	1487	1809	752	1207	2282
1082	941	1156	621	833	518	1142	1209	909	1585	1065	1200	1129	2133

Rapidan

Renfrew

Victor

Lead Level	Risk
0 to 150ppm	None to very low
151 to 400ppm	Low
401 to 1,000ppm	Medium
Greater than 1,000ppm	High

Xenia-Lowell Lots

Lowell Street

Rapidan Way

Renfrew Street

701	621	620	912	456	373	188	169	455	452	1568	311	644	508	193	325	1781	494	164	242	62	136
747	565	1100	488	1038	967	223	245	365	640	833	141	636	239	43	237	282	52	263	85	202	647
918	998	1048	1305	1988	911	347	104	304	549	454	276	1459	402	54	280	6255	171	562	291	187	1126
800	662	1740	859	1134	1243	181	103	997	107	411	2759	704	205	28	277	2208	394	105	171	153	277
1220	938	2425	1155	1983	339	464	128	650	197	749	2344	231	391	35	187	229	402	341	92	148	357
4036	1601	3003	2063	1815	560	281	673	429	354	2159	899	237	267	42	70	460	1200	538	518	335	276
1036	1976	2939	1242	836	1361	548	445	599	115	1949	2034	314	699	104	523	410	1338	658	302	796	265
1578	2234	3019	2035	481	1255	1417	1664	756	239	1496	1776	1143	338	120	746	1486	1305	1441	491	298	119
924	2150	2140	1258	1511	1176	1627	1639	1147	106	2280	1266	1393	566	485	1152	1556	1735	1268	282	1151	45
X	X	905	907	646	1031	1733	2291	1128	192	397	181	1127	1032	326	797	1467	1082	733	267	50	234

Xenia Way

Lead Level	Risk
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Soil Screening Events

- Education and Outreach
- Tests residential soil
- Offers safe gardening recommendations
- Going out to the community
- Free screening

FREE SOIL LEAD SCREENING

with soil contamination and remediation information

ALLEGHENY COUNTY CONSERVATION DISTRICT
DECO RESOURCES
GROW PITTSBURGH
SHARPSBURG NEIGHBORHOOD ORGANIZATION

SHARPSBURG COMMUNITY LIBRARY

1212 Main Street
Pittsburgh, PA 15215

Join the Allegheny County Conservation District and partners on September 10th at the Sharpsburg Community Library to learn why soil lead contamination is a serious problem in Pittsburgh. Bring a properly collected, dry soil sample from your yard or garden and we will screen it for lead and other heavy metals free of charge. Staff will be available to answer questions and provide information.

SEPTEMBER 10TH
10AM-1PM

FOR MORE INFORMATION, CONTACT:
JONATHAN BURGESS (ACCD) @ (412) 291-8017

Instructions on how to collect a soil sample can be found at:
http://www.growpittsburgh.org/start-a-garden/growers-resources/soil-compost/
see Soil Sampling diagram on reverse


SERVICE
QUEST
Your Conservation
Solution Center
TESTING
STATION
CAUTION
X-RAYS
PLEASE
STAY
BACK

Safe Use

Remediation Strategy

- Bio-availability and Phytoremediation **or…**
- Limitation and Dilution with pH and organic control
- Soil Removal
- Soil Washing with Chelates or phosphorus binding

Next Steps

- Develop a more detailed policy at City level with improved remediation resources. Advocacy at all levels.

- Continued outreach to low-income communities

- Comprehensive site testing and mapping around city.

- Research plots and pilot programs with community groups . Communicate with research teams elsewhere.

Questions?

For more information…

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