

Dredge Site

Phragmites reeds
growing in marsh

Hydraulic Dredge

Sediment dewatering
using Geotubes

Photos courtesy of J.F. Brennan Co., Inc.
Phone: (608) 784-7173 • www.jfbrennan.com

Site Description:

The Grand Calumet River is a tributary located in Northwest Indiana, which flows into Lake Michigan. Years of industrial pollution caused by nearby steel mills, petro-chemical plants and oil refineries have contaminated the river with oil and other pollutants, which threaten human and ecological health in this watershed. The primary contaminants of concern are carcinogenic Polyaromatic Hydrocarbons in the sediment. PAHs are found in oil and include compounds such as anthracene, chrysene, benzo[a]pyrene and many others, which are detectable using Sitelab's ultraviolet fluorescence technology.

Beginning in 2011, J.F. Brennan (La Crosse, Wisconsin), removed the sediments from the river bottom down to 3 feet using a hydraulic dredge. The sediments were collected in Geotubes and the dewatered material was then transported off-site to an approved landfill facility. A total of 117,000 cubic yards (107,000m³) of contaminated sediment have been removed and dewatered on site.

Sitelab Corporation was hired by an environmental contractor to analyze 100 sediment samples collected from a post-dredge area covering a 1 mile stretch of river. The data was used to determine which of the 25 sample locations would require further assessment.

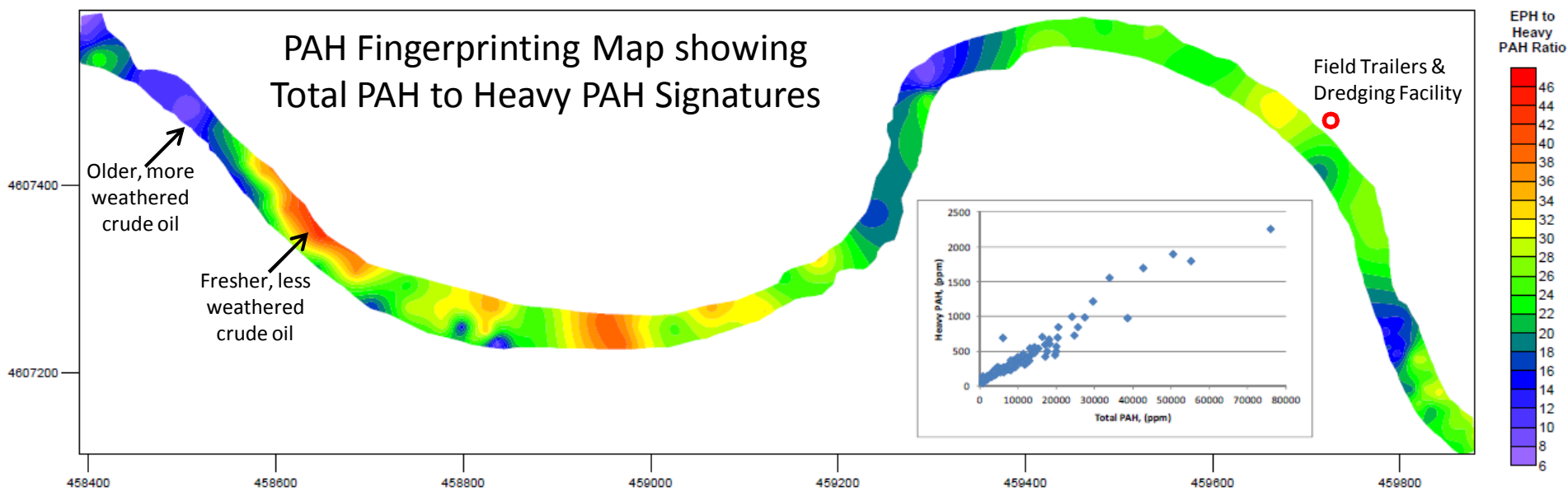
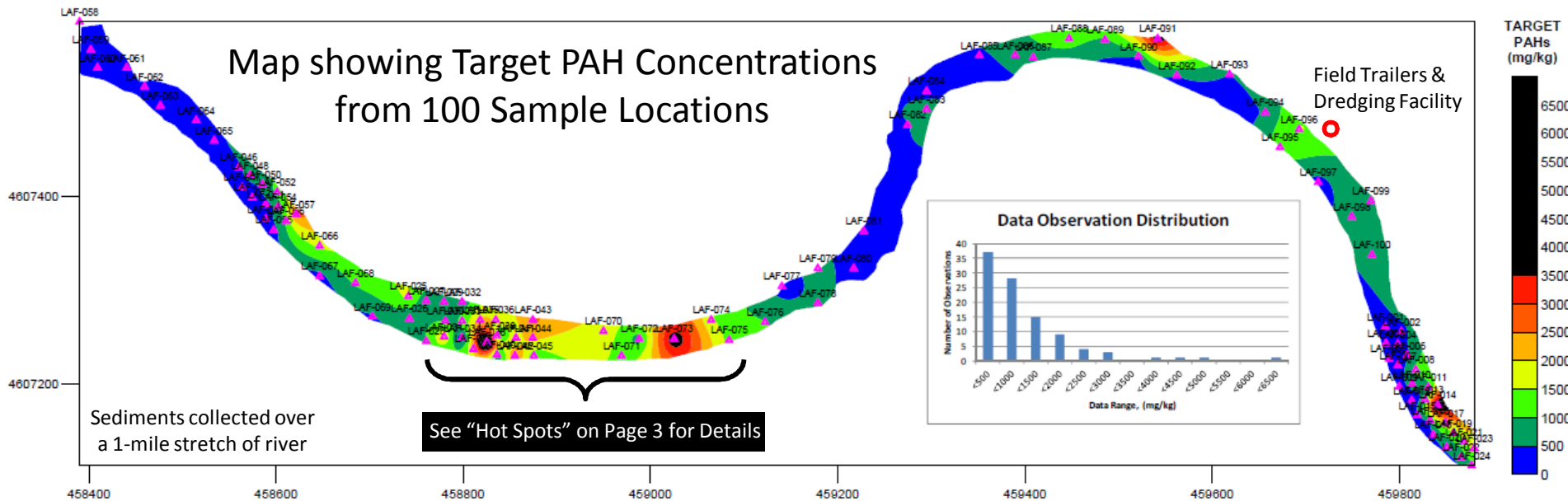
In 2012, J.F. Brennan will be installing a cap on the river bottom, which consists of a 12 inch layer of a sand and organoclay mixture. The cap is designed to prevent future exposure and pathways of the impacted sediments left behind. The cap will also suppress the growth and migration of Phragmites, or common reed, an invasive plant species which has choked much of the Grand Calumet River.

"We evaluated more than one technology to implement the on-site PAH screening, but ultimately felt that Sitelab offered the greatest understanding of our data needs and more flexibility and interpretive power in your data output. The screening data generated for us was presented professionally and was instrumental in advancing the site work to follow-on activities."

Customer/Project Manager

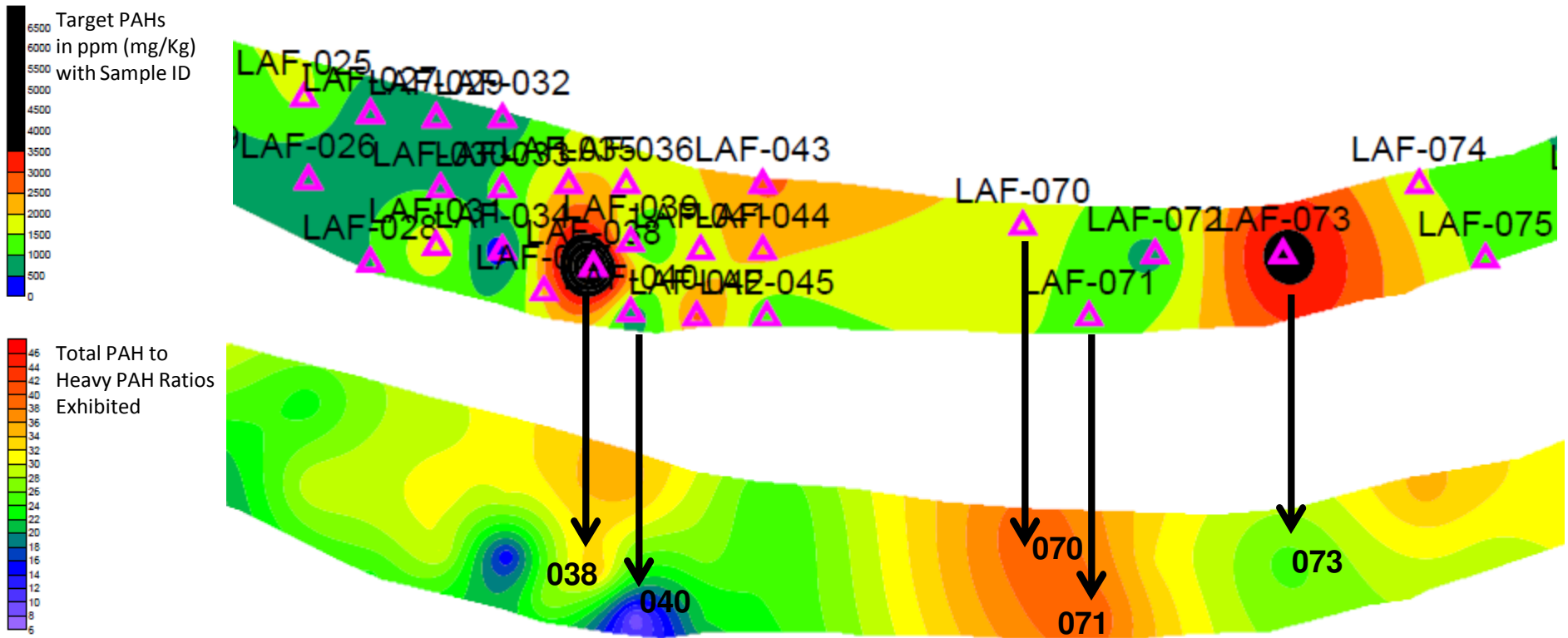
... "We also appreciate your hard work in the field and your ability to process samples rapidly and efficiently."

West Branch Grand Calumet River Sediment Contamination



Sediment maps were created for Sitalab by Subsurface Environmental Solutions, LLC (Andover, MA) using Surfer software with Sitalab field screening data and GPS coordinates provided by Battelle.

Close up of Sediment “Hot Spots”



Examples showing Sitelab Test Results and PAH Ratio “Signatures”

Sample ID Number	UVF-3100D Analyzer Total PAHs	UVF-3100D Analyzer Target PAHs	TD-500D Analyzer Heavy PAHs	Total PAH to Target PAH Ratios	Total PAH To Heavy PAH Ratios
LAF 038	75,900 ppm	6,240 ppm	2,260 ppm	12	34
LAF 040	5,940 ppm	590 ppm	696 ppm	10	9
LAF 070	19,840 ppm	1,860 ppm	500 ppm	11	40
LAF 071	17,000 ppm	1,420 ppm	426 ppm	12	40
LAF 073	42,600 ppm	4,000 ppm	1,700 ppm	11	25

This is crude oil. The Target PAH ratios are close, indicating the same source of petroleum exists in the river. The Heavy PAH ratios are more variable. Low ratios indicate older, more weathered contamination. Higher ratios indicate fresher, less weathered contamination (mapped above).

Test results reported by Sitelab on-site during 4 day site investigation

Costs & Services Provided:

Sitelab's price was \$9,500 to perform this project. Sitelab's equipment was set up in a truck parked on-site. Samples were collected by boat using manual push cores and provided them to Sitelab. Sediments were extracted in solvent using test kits and then measured for GRO, Total PAHs, Target PAHs and Heavy PAHs using Sitelab's UVF-3100D and TD-500D analyzers. A total of 100 samples were tested with 400 results reported during this 4 day site investigation. Service included hydrocarbon fingerprinting.

Target PAHs also reported using UVF-3100 software showing QA/QC performed

Page 1 of 3	Test 1: GRO C6-C10 Gasoline Range Hydrocarbons UVF-3100D Analyzer Calibrated to CAL-025 using Slot B Optics	Test 2: Total PAHs EPH C11-C22 Aromatics UVF-3100D Analyzer Calibrated to CAL-060 using Slot A Optics	Test 3: Target PAHs (EPA 8270 PAHs) UVF-3100D Analyzer Calibrated to CAL-060 using Slot D Optics	Test 4: Heavy PAHs TD-500 Analyzer Using same PAH Cal Kit as UVF-3100
Sample ID No.	Concentrations in ppm (mg/Kg)			
LAF-001				
LAF-002				
LAF-003				
LAF-004				
LAF-005				
LAF-006				
LAF-007				
LAF-008				
LAF-009				
LAF-010				
LAF-011				
LAF-012				
LAF-013				
LAF-014				
LAF-015				
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LAF-023				
LAF-024				
LAF-025				
LAF-026				
LAF-027				
LAF-028				
LAF-029				
LAF-030				
LAF-031	ND <1000	25,540	2,010	850
LAF-032				
LAF-033				
LAF-034				
LAF-035				
LAF-036				
LAF-037				
LAF-038				
LAF-039				
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LAF-071				
LAF-072				
LAF-073				
LAF-074				
LAF-075	ND <1000	16,970	1,330	600
LAF-076	ND <1000	11,050	1,020	344
LAF-077	240*	3,150	292	144
LAF-078	ND <1000	7,000	582	288
LAF-079	ND <1000	9,140	640	274
LAF-080	ND <1000	4,000	348	170
LAF-081	ND <1000	1,966	204	116
LAF-082	ND <1000	5,140	458	260
LAF-083	ND <1000	11,030	1,040	440
LAF-084	ND <1000	835	82	106
LAF-085	ND <1000	4,700	416	268
LAF-086	ND <1000	8,000	640	372
LAF-087	ND <1000	8,650	810	308
LAF-088	ND <1000	14,180	1,230	560
LAF-089	ND <1000	9,830	920	420
LAF-090	ND <1000	5,200	470	200
LAF-091	ND <1000	50,400	3,940	1,900
LAF-092	ND <1000	6,060	494	264
LAF-093	ND <1000	5,440	496	238
LAF-094	880, 1,280**	6,136	546	200
LAF-095	ND <1000	14,220	1,270	480
LAF-096	ND <1000	18,130	1,530	610
LAF-097	400*	3,800	338	210
LAF-098	ND <1000	7,360	740	280
LAF-099	ND <1000	7,940	750	290
LAF-100	ND <1000	8,010	740	300

siteLAB Target PAHs in Sediment Analysis Report - Page 1

Company Name: Battelle Environmental Restoration
Address: 301 South State Street
Newtown, PA 18940
Phone: (215) 504-5312
Contact: Andrew Bullard
Operator: Steve Greason
Signature: _____
Date: _____ Time: _____

Project Name: WBGR Sediment Site, Indiana
Job/File Number: 111065_TargetPAHs_1
Matrix: River Sediment
Date Collected: 12/5/2011 and 12/6/2011
Date Received: 12/6/2011
Date Extracted: 12/6/2011
Date Analyzed: 12/6/2011
Date Reported: 12/13/2011

Standard Concentration	UVF-3100 Calibration Raw Fluorescence
0	0
0.05	32
0.1	54
0.5	249
1.0	448
1.5	619

Sitelab Calibration Kit: CAL-060 Target PAHs
UVF-3100 Optics: Use Slot D Optical Filters
Concentration Units: ppm

Linearity = 0.997

Sample Run Number	Sample ID & Description	UVF Raw Fluorescence	Concentration Reading (ppm)	Dilution Factor	Test Result:
12/6/11 QC Tests at 8:45 AM	New Methanol Bottle - Blk	0	0.000	1	0.000 ppm - Good
	0.5 ppm PAH Cal Standard	248	0.497	1	0.497 ppm - Good
	2nd Source Solid Standard	136	0.271	1	0.271 ppm - No Drift
1	LAF - 046	108	0.212	2,000	424 ppm
2	LAF - 047	61	0.115	2,000	230 ppm
3	LAF - 048	165	0.33	2,000	660 ppm
4	LAF - 049	63	0.119	2,000	238 ppm
5	LAF - 050	150	0.299	2,000	598 ppm
6	LAF - 051	92	0.18	2,000	360 ppm
7	LAF - 052	60	0.115	10,000	1,150 ppm
8	LAF - 053	96	0.187	2,000	374 ppm
9	LAF - 054	38	0.065	10,000	650 ppm
10	LAF - 055	90	0.175	2,000	350 ppm
11	LAF - 056	55	0.103	10,000	1,030 ppm
12	LAF - 057	133	0.265	10,000	2,650 ppm
13	LAF - 061	52	0.098	2,000	196 ppm
14	LAF - 062	36	0.06	2,000	120 ppm
15	LAF - 063	35	0.059	2,000	118 ppm
16	LAF - 064	44	0.079	800	63 ppm
17	LAF - 065	100	0.195	2,000	390 ppm
QC Test at 4 PM	Methanol Blank Check	0	0.000	1	0.000 ppm - Good

Detection Limits? The 0.05 ppm PAH calibrator dictates the detection limit. Readings between zero and 0.05 ppm are too low (ND)
Comments:



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(USA) 978-363-2299
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