

MEMORANDUM



To: Chris Hirsch, MA Division of Ecological Restoration
From: Sarah Widing, Inter-Fluve
Date: June 29, 2022
Re: Sediment Sampling Results for Old Swamp River and the Sediment and Nutrient Uptake Ponds (SNUP), Weymouth - Reconnaissance

Introduction

This memorandum provides a brief qualitative description of the results of the sediment sampling data collection effort conducted at the Old Swamp River and SNUP in May 2022. This document is supplemental to the Sediment Sampling Plan issued by Inter-Fluve on May 19, 2022¹.

In May, 2022, Inter-Fluve personnel conducted a data-collection effort to quantify the volume of sediment and to characterize the physical and chemical properties of the sediment within the Old Swamp River and Sediment and Nutrient Uptake Ponds (SNUPs). The results of this data-collection effort will inform future project development to remove the dam associated with the SNUP system. Refer to the Base Mapping and Field Data Collection Planset² produced jointly by BSC Group and Inter-Fluve for detailed mapping associated with this work.

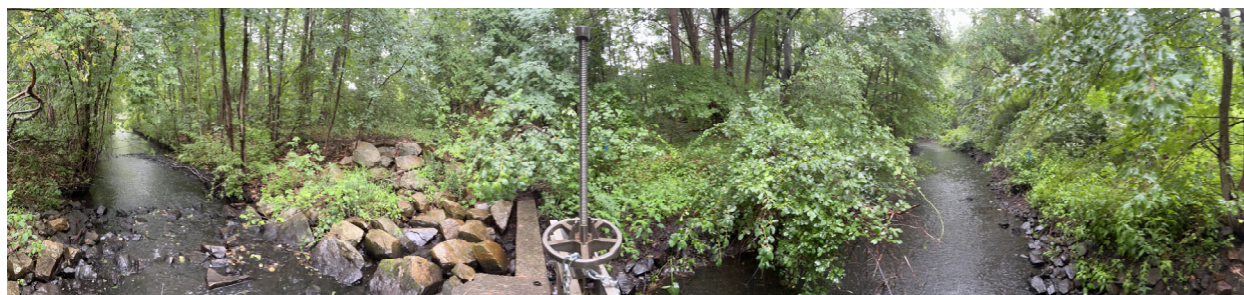


Figure 1. Old Swamp River, 180° panorama looking downstream (left) and upstream(right) at the SNUP complex dam feature.

Results

SEDIMENT VOLUME

In May 2022, Inter-Fluve conducted a bathymetric survey of the Old Swamp River and SNUP ponds. During this survey, we used Total Station equipment to measure the elevation of the water surface,

¹ Inter-Fluve, 2022. Sediment Sampling Plan for the Impoundment and Sediment Nutrient Uptake Ponds (SNUPs) on Old Swamp River, Weymouth – Reconnaissance.

² BSC Group & Inter-Fluve, 2022. Base Mapping and Field Data Collection. Old Swamp River and SNUP, Libbey Industrial Parkway, Weymouth, MA. June 30, 2022.

the elevation of the pond bed (top of sediment), and the elevation of the refusal layer (bottom of sediment).

The sediment thickness within the impounded areas is mapped on the Basemap (BSC Group & Inter-Fluve, 2022).

The total estimated volume of sediment (based on these data) is approximately **190 cubic yards within the Old Swamp River impoundment, 40 cubic yards in the Sediment Pond (Pond 1), and 65 cubic yards in the Nutrient Uptake Pond (Pond 2).**

SEDIMENT TESTING

This section of the memorandum summarizes the findings for standard analyte groups including metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides and herbicides, total and extractible petroleum hydrocarbons (TPH and EPH), and assorted physical characteristics.

Laboratory analyses were overseen by Absolute Resource Associates. Refer to the Attachments.

Refer to Figure 2 for sediment sampling locations. Refer to Table 1 for a summary of analytical results.

Metals

- **Cadmium:** One sample within the SNUP Ponds (1) contained measurable concentrations of cadmium (2.4 mg/kg) below **natural** soil background levels. The most downstream sample within the Old Swamp River (OSR-2022-DS2) contained measurable concentrations of cadmium (3.0 mg/kg) below **urban** soil background levels.
- **Chromium:** Ten out of ten samples contained measurable chromium concentrations. Six out of ten samples contained concentrations at or below **natural** soil background concentrations.
 - Two samples (SNUP-2022-01 and OSR-2022-DS2) contained concentrations that **exceed the Cleanup Standards (S-1/GW-1).**
- **Copper:** Seven out of ten samples contained measurable copper concentrations. Five out of ten samples contained concentrations at or below natural soil background concentrations.
 - Two samples (SNUP-2022-01 and OSR 2022 DS2) contained copper concentrations that exceed **natural** soil background levels.
- **Lead:** All samples contained measurable lead concentrations.
 - Two samples (SNUP-2022-01 and OSR 2022 DS2) contained lead concentrations that exceed **natural** soil background levels and the **Freshwater PEC.**
- **Mercury:** One sample (SNUP-2022-1) contained a measurable amount of mercury. The concentration did not exceed the **urban** soil background levels.

- **Nickel:** Three samples contained measurable nickel concentrations. All samples contained concentrations at or below natural soil background levels.
- **Zinc:** All samples contained measurable zinc concentrations. Eight of ten samples contained concentrations at or below natural soil background levels.
 - Two samples (SNUP-2022-01 and OSR-2022-DS2) contained zinc concentrations that did not exceed **urban** soil background levels.

With respect to metals, sediment within the Old Swamp River impoundment is consistent with natural soil background levels. Analytical results indicate that the sediment pond (SNUP Pond 1) and the Old Swamp River at the most downstream limit of the study area contained the highest concentrations. This may indicate that the sediment pond has functioned effectively to trap and retain fine material (which often attracts and binds to contaminants) throughout its operational life.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs were detected in ten out of ten samples.

- The highest concentrations were detected upstream of the impoundment within the Route 3 median (OSR-2022-US2), concentrations exceeded the **urban** soil background levels and the **Freshwater PEC** levels.
- the lowest concentrations were detected within the impoundment.

The data suggest a source of PAHs to the Old Swamp River in or near the Route 3 median between sediment samples OSR-2022-US1 and OSR-2002-US2. The sediment within the impoundment does not appear to be affected.

Polychlorinated Biphenyls (PCBs)

PCBs were detected in seven out of ten samples. The sum of the PCB congeners for five of those samples exceeded the Cleanup Standard (S-1/GW-1) and the Freshwater PEC.

- The highest concentration of PCB was detected in the most downstream in sample OSR-2022-DS2.
- PCBs were detected upstream at sample OSR-2022-US2.
- PCBs were detected in both SNUP Ponds (Pond 1 and Pond 2).
- Only one sample, the most upstream sample (IMP-2022-1) within the impoundment, contained concentrations of PCBs that exceed the Cleanup Standard.

PCBs are present in the study area. However, PCBs appear to be most prevalent in sediment upstream, downstream, and within the sediment and nutrient uptake ponds. Impounded sediment appears to be relatively clean.

Pesticides

No samples contained concentrations of pesticides that exceeded the reporting limits of the laboratory analyses.

Total and Estimated Petroleum Extractible Hydrocarbons (TPH and EPH)

One sample upstream of the impoundment, both samples downstream of the impoundment, both the sediment and nutrient uptake ponds, and the most upstream sample within the impoundment contained measurable concentrations of TPH and EPHs. The measured concentrations are significantly lower than the Cleanup Standard (S-1/GW-1).

Summary

This sediment analysis appears to indicate that the sediment impounded behind the Old Swamp River dam is relatively clean. However, one sample contained PCBs in excess of the Cleanup Standard (S-/GW-1).

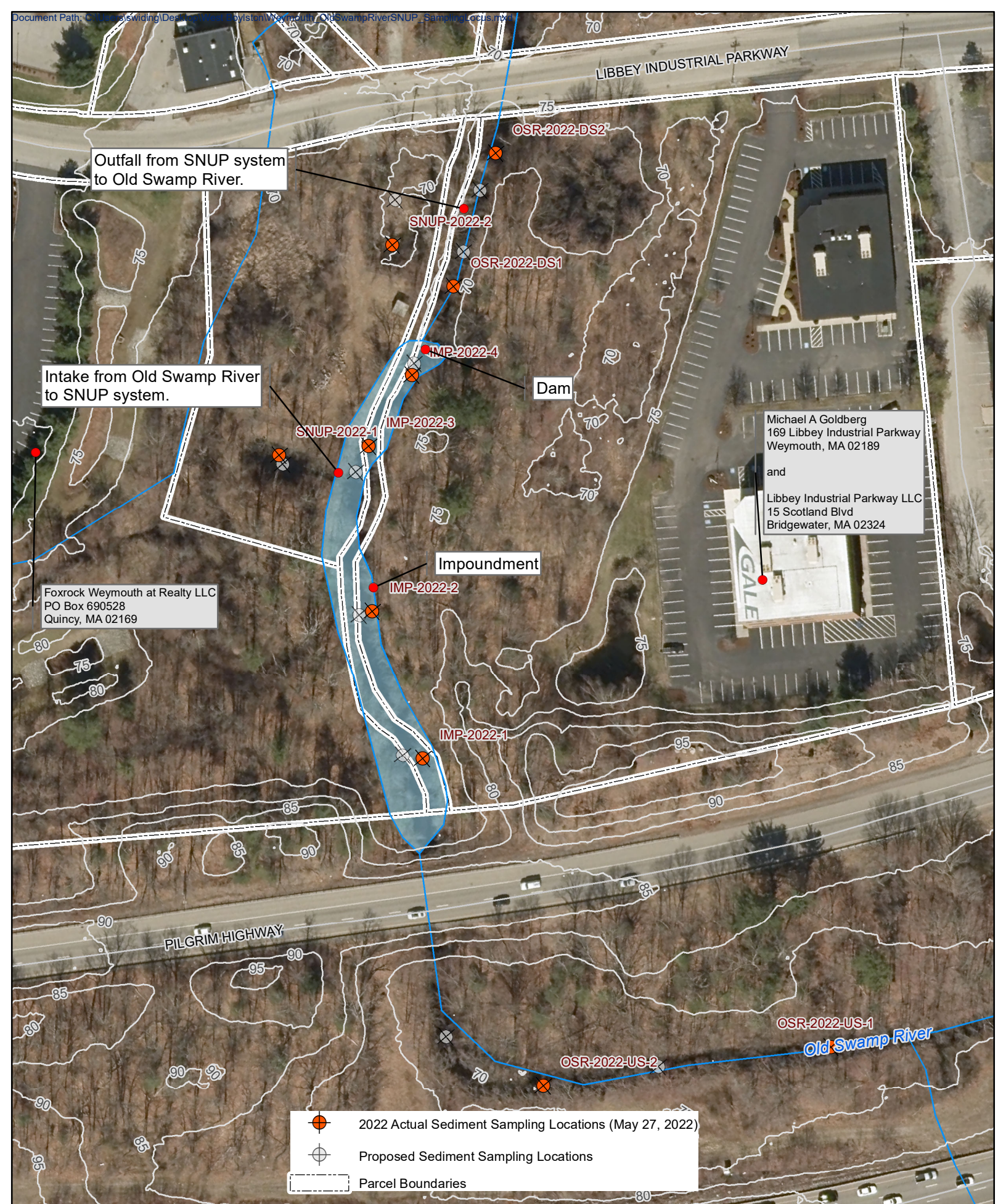
Sediment found within the SNUP ponds, especially the Sediment Pond (Pond 1) contains relatively high concentrations of metals. Sediment within both SNUP ponds contains PCBs in excess of the Cleanup Standards. The source of the PCBs is not clear, PCBs were detected in sediment both upstream and downstream of the impoundment.

Sediment upstream of the impoundment contains relatively high concentrations of PAHs, which suggests a potential source upstream of the study area.

Sediment downstream of the impoundment contains relatively high concentrations of metals.

Attachments

1. Absolute Resource Associates Laboratory Report. Job ID 61334.
61334 FinalRpt 061722.pdf
2. Grain Size Report by John Turner Consulting.
61334 Sub Grainsize Report 062022.pdf
3. Eurofins Pittsburg Analytical Report 180-139015-1.
61334 Sub Report J139010-1 UDS Level 2 Report Rev(1) Final Report
4. Electronic Data Deliverable, *61334 Standard EDD 062022.xls*






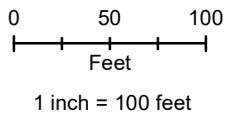
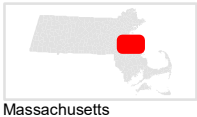
Outfall from SNUP system to Old Swamp River.

Intake from Old Swamp River to SNUP system.

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-  2022 Actual Sediment Sampling Locations (May 27, 2022)
-  Proposed Sediment Sampling Locations
-  Parcel Boundaries



Sediment Sampling Plan
Old Swamp River
and
SNUP

Old Swamp River
Libbey Industrial Parkway
Weymouth, MA

Date: 6/15/2022



	Screening Levels					Dam Impoundment						Downstream		Upstream		Summary Calculations						
	Cleanup Standard (S-1/GW-1)	"Natural Soil" Background	"Urban Soil" Background	Upper Concentration Limit (UCL)	Freshwater PEC	IMP-2022-1	IMP-2022-2	IMP-2022-3	IMP-2022-4	SNUP-2022-1	SNUP-2022-2	OSR-2022-DS1	OSR-2022-DS2	OSR-2022-US1	OSR-2022-US2	Impoundment			Downstream	Upstream		
						27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	27-May-22	Min	Max	Mean	Mean	Mean
Pesticides (ug/kg)																						
2-4' DDT						--	--	--	--	--	--	--	--	--	--	--	--	-	-	-	-	-
4,4'-DDT	6,000			600,000		25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Sum DDT				62.9		25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Total DDTs				572		--	--	--	--	--	--	--	--	--	--	--	--	-	-	-	-	-
4,4'-DDD						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Sum DDD				28		25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
2-4' DDE						--	--	--	--	--	--	--	--	--	--	--	--	-	-	-	-	-
4,4'-DDE	6,000			600,000		25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Sum DDE				31.3		25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Aldrin						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
alpha-BHC						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
alpha-Chlordane						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
beta-BHC						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Chlordane	5,000			600,000	17.6	--	--	--	--	--	--	--	--	--	--	--	--	-	-	-	-	-
delta-BHC						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Dieldrin	80			30,000	61.8	25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Endosulfan I						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Endosulfan II						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Endosulfan Sulfate						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Endrin	10,000			200,000	207	25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Endrin Aldehyde						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Endrin Ketone						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
gamma-BHC (Lindane)					4.99	25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
gamma-Chlordane						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Heptachlor						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Heptachlor Epoxide	100			10,000	16	25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Methoxychlor						25	25	26	29	90	28	35	115	24	25	25	90	37	75	24	24	
Toxaphene						125	125	130	145	445	135	170	600	120	125	125	445	184	385	123	123	
TPH and EPH (mg/kg)																						
TPH (ppm)	1,000			10,000		78	36	39	44	209	125	185	415	55	171	36	209	88	300	113	113	
C9-C18 Aliphatics	1,000			20,000		13	12	13	15	45	13	18	65	13	13	12	45	18	42	13	13	
C19-C36 Aliphatics	3,000			20,000		33	12	13	15	120	67	97	200	13	28	12	120	43	149	20	20	
C11-C22 Aromatics	1,000			10,000		32	12	13	15	45	45	70	150	30	130	12	45	27	110	80	80	
Physical Characteristics																						
Total Organic Carbon (mg/kg)						12,000	2,600	21,000	34,000	170,000	46,000	59,000	180,000	8,900	14,000	2,600.0	170,000.0	47,600.0	119,500.0	11,450.0	11,450.0	
Percent Dry Matter (Solids)						58.6	74.8	55.1	41.9	19.9	70.3	42.3	20.1	70.9	70.9	19.9	74.8	53.4	31.2	70.9	70.9	
Sieve No. 4 (% passing)						99.0	97.6	91.0	75.4	98.1	93.4	94.2	95.4	98.2	95.9	75.4	99.0	92.4	94.8	97.1	97.1	
Sieve No. 10 (% passing)						95.3	88.7	87.9	69.8	91.5	88.2	92.5	89.3	96.7	85.0	69.8	95.3	86.9	90.9	90.9	90.9	
Sieve No. 20 (% passing)						73.8	58.3	75.0	52.9	81.7	76.9	88.4	80.5	90.0	52.9	52.9	81.7	69.8	84.5	71.5	71.5	
Sieve No. 40 (% passing)						33.1	15.8	40.9	27.7	71.3	55.9	74.0	70.2	54.7	30.3	15.8	71.3	40.8	72.1	42.5	42.5	
Sieve No. 60 (% passing)						14.6	3.6	21.2	13.0	64.6	37.9	56.2	58.2	25.9	16.4	3.6	64.6	25.8	57.2	21.2	21.2	
Sieve No. 100 (% passing)						6.3	2.3	13.8	7.7	58.1	27.0	38.7	42.2	12.7	8.0	2.3	58.1	19.2	40.5	10.4	10.4	
Sieve No. 200 (% passing)						3.1	1.7	6.9	4.4	47.7	18.6	20.5	25.0	5.3	3.3	1.7	47.7	13.7	22.8	4.3	4.3	

OSR-2022-DS2 TCLP Chromium <0.10 mg/L ; TCLP Lead < 0.05 mg/L
 SNUP-2022-1 TCLP Chromium < 0.10 mg/L; TCLP Lead < 0.05 mg/L
 SNUP-2022-1 For some MA EPH results, the Surrogate showed recovery outside the acceptance limits as a result of matrix interference.
 Results in green text were below the laboratory detection limit. The values reported in this table are 1/2 of the detection limit for the corresponding lab test in accordance with the instructions associated with this reporting template.
 TPH (ppm) reported in this worksheet is the sum of C9-C18, C19-C36, and C11-C22 values.

Results are colored according to the highest screening level exceeded.

"<": concentration was below the indicated detection limit

"--": sample was not tested for analyte

