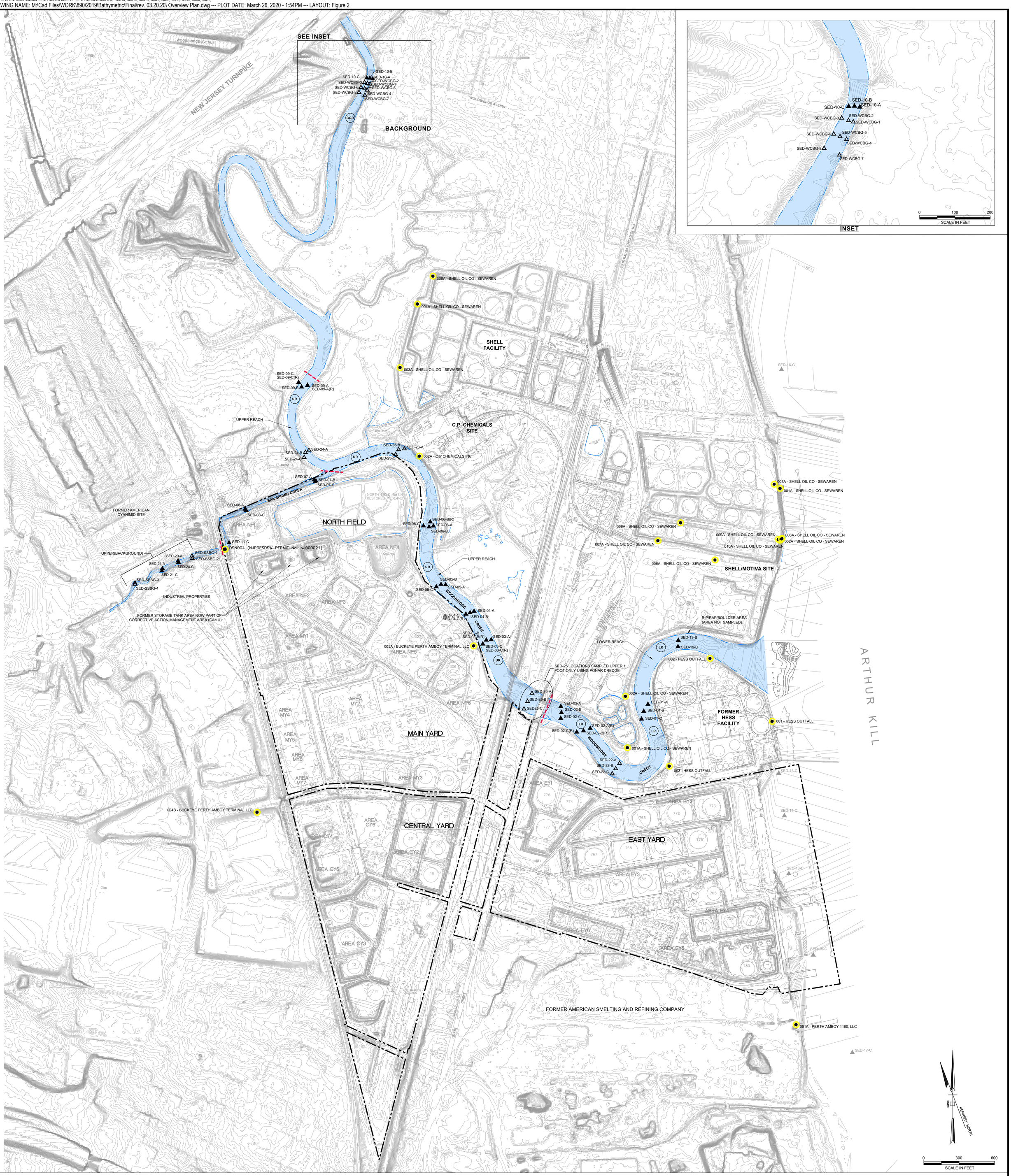
30x42 --- USER: MGiambattista --- ATTACHED XREF'S: --- ATTACHED IMAGES: J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\Bathymetric\Final\rev. 03.20.20\ Overview Plan.dwg --- PLOT DATE: March 26, 2020 - 1:54PM --- LAYOUT: Figure 2




## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- SEDIMENT SAMPLE LOCATIONS 2002 (NOT SUBSEQUENTLY SAMPLED)
- SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- LOCATIONS SAMPLED PREVIOUSLY IN 2002 OR 2014, RE-SAMPLED IN 2019
- NJDEP DISCHARGE POINT (FORMER OR ACTIVE)
- LR — WOODBRIDGE CREEK - LOWER REACH
- UR — WOODBRIDGE CREEK - UPPER REACH
- BGR — WOODBRIDGE CREEK - BACKGROUND REACH

## NOTES:

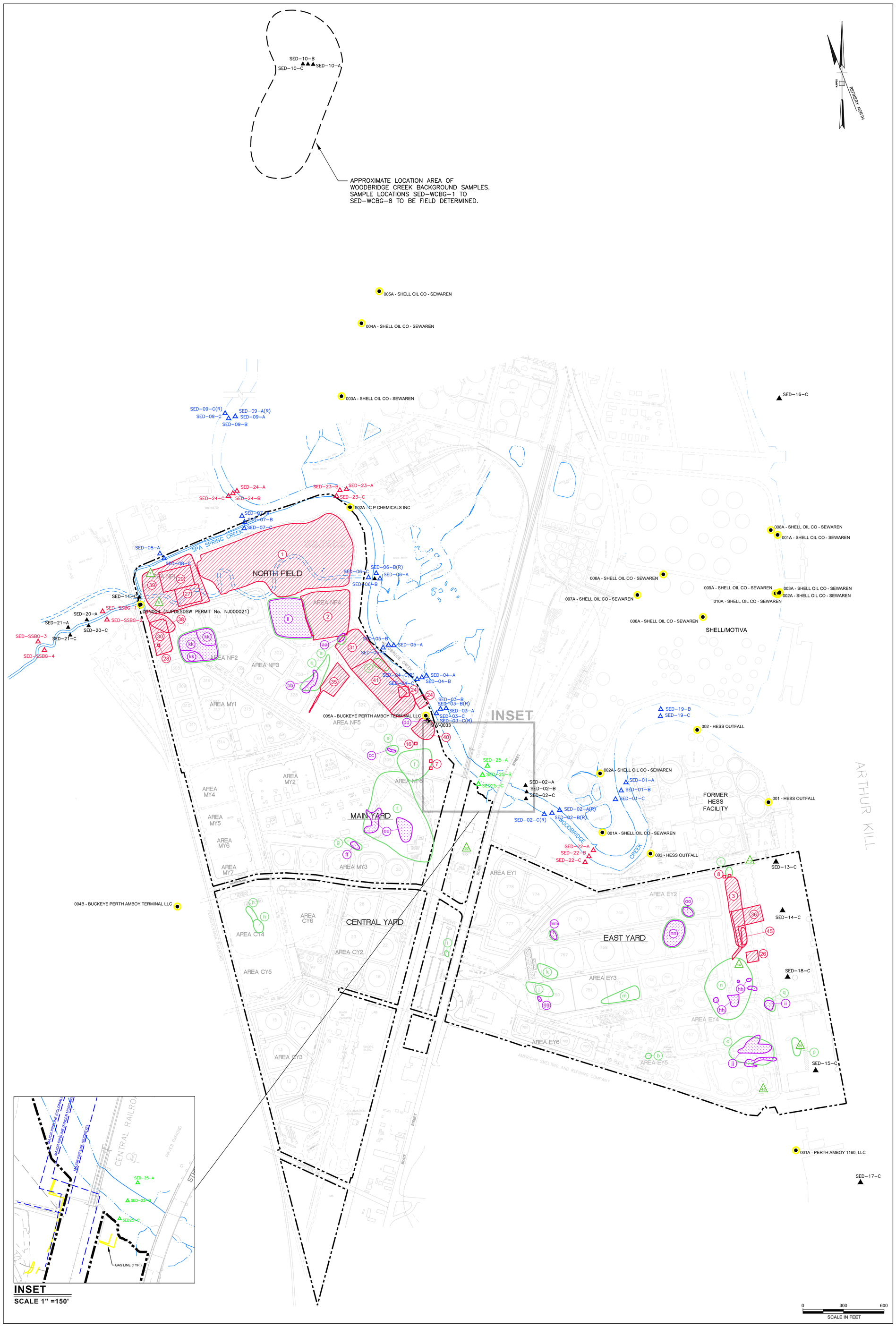
1. THE TOP OF BANK GROUND SURFACE ELEVATIONS ALONG CREEK ARE APPROXIMATE AND BASED ON EXISTING ESRI AERIAL IMAGERY ACESSED 9/18/2019.
2. REFERENCES TO THE BACKGROUND, UPPER, AND LOWER REACHES OF WOODBRIDGE CREEK PERTAIN ONLY TO THE SEDIMENT INVESTIGATION AND ARE NOT OFFICIAL DESIGNATIONS.

# DRAFT

| | |
|---|---|
| PROJECT: | SEDIMENT INVESTIGATION REPORT<br>CHEVRON FACILITY<br>PERTH AMBOY, NEW JERSEY |
| TITLE: | FACILITY AND AREA OVERVIEW PLAN<br>WITH SEDIMENT SAMPLE LOCATIONS |
| DRAWN BY: | M. GIAMBATTISTA |
| CHECKED BY: | W. CORDASCO |
| APPROVED BY: | R. LIPPENCOTT |
| DATE: | FEBRUARY 2020 |
| PROJ. NO.: | 326731.2020.0000 |
| | FIGURE 2 |

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

FILE NO.: Overview Plan.dwg




**SOLID WASTE MANAGEMENT UNITS (SWMUs)***

- 1 NORTH FIELD BASIN
- 2 SURGE POND
- 3 EAST YARD BASIN
- 7 TEL BURIAL
- 8 TEL BURIAL
- 16 TEL BURIAL
- 24 TEL WEATHERING AREA
- 26 TEL WEATHERING AREA
- 27 TEL WEATHERING AREA
- 28 REACTOR BURIAL
- 29 FINES TRANSFER AREA
- 30 SHORT TERM STORAGE AREA
- 31 EFFLUENT TREATMENT PLANT
- 35 NO. 4 SEPARATOR
- 36 OIL WATER SEPARATOR NEAR EAST YARD BASIN
- 38 NORTH FIELD SLOP POND
- 39 UNNAMED NORTH FIELD POND
- 40 OLD POND
- 41 DRYING AREA
- 45 IMPOUNDMENT S. OF EAST YARD BASIN

**AREAS OF CONCERN (AOCs)***

- 5 PETROLEUM SUBSTANCE NEAR UGST E3
- 7 TARRY MATERIAL AT MW-13
- 13 B-11 OILY FILL AREA
- 14 GWQAP OIL FILL AREA III
- 26 5 BERTH COAL TAR
- 45 TANK BASIN 748
- 46 BULK STATION

**FORMER LNAPL AREAS**

- a FORMER NF4 LNAPL AREA
- b FORMER AOC 28 LNAPL AREA
- c FORMER NF3 LNAPL AREA
- d FORMER SWMU 41 LNAPL AREA
- e FORMER NF5 LNAPL AREA
- f FORMER AOC 8 NF6 LNAPL AREA
- g FORMER AOC 19 LNAPL AREA
- h FORMER AOC 25 LNAPL AREA - AREA REMEDIATED, CURRENTLY NO LNAPL
- i FORMER STATE STREET PARKING LOT LNAPL AREA - AREA REMEDIATED, CURRENTLY NO LNAPL
- j FORMER SWMU 42 LNAPL AREA
- k FORMER EY1 LNAPL AREA
- l FORMER SWMU 8 LNAPL AREA - AREA REMEDIATED, CURRENTLY NO LNAPL
- m FORMER EY3 LNAPL AREA
- n FORMER EY4b LNAPL AREA
- o FORMER EY4a LNAPL AREA
- p FORMER AOC 29 LNAPL AREA - AREA REMEDIATED, CURRENTLY NO LNAPL
- q FORMER PAOC 15 LNAPL AREA

**CURRENT LNAPL AREAS**

- aa CURRENT NF4 LNAPL AREA
- bb CURRENT NF3 LNAPL AREA
- cc CURRENT NF5 LNAPL AREA
- dd CURRENT SWMU 40 LNAPL AREAS
- ee CURRENT AOC 8 NF6 LNAPL AREAS
- ff CURRENT AOC 19 LNAPL AREA
- gg CURRENT SWMU 42 LNAPL AREA
- hh CURRENT EY4b LNAPL AREAS
- ii CURRENT PAOC 15 LNAPL AREA
- jj CURRENT EY4a LNAPL AREAS
- kk NF2 LNAPL EXTENT UNCHANGED FROM ORIGINAL EXTENT
- ll SWMU 43 LNAPL EXTENT UNCHANGED FROM ORIGINAL EXTENT
- mm SWMU 10 LNAPL EXTENT UNCHANGED FROM ORIGINAL EXTENT
- nn AOC 31 LNAPL EXTENT UNCHANGED FROM ORIGINAL EXTENT
- oo MW-289 LNAPL EXTENT UNCHANGED FROM ORIGINAL EXTENT

## 2019 SEDIMENT SAMPLES

| Sample ID | Sample Depth | Analysis | Location |
|---|---|---|---|
| SED-WCBG-1[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-2[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-3[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.5-3.0 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-4[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 1.0-1.5 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-5[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-6[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-7[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-WCBG-8[2] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-01-A | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-01-B | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-01-C | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-02-A(R) | 0.5-1.0 | EPH and VOCs | Woodbridge Creek |
| | 6.0-6.5 | SVOCs, Metals, VOCs | |
| SED-02-B(R) | 0.0-0.5 | EPH, SVOCs, Metals | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 3.5-4.0 | SVOCs, Metals, VOCs | |
| SED-02-C(R) | 0.0-0.5 | EPH, SVOCs, Metals | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-03-A | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 6.0-6.5 | EPH, SVOCs, Metals, VOCs | |
| SED-03-B(R) | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 1.5-2.0 | SVOCs, Metals, VOCs | |
| | 4.5-5.0 | SVOCs, Metals, VOCs | |
| SED-03-C(R) | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 1.0-1.5 | EPH | |
| | 1.5-2.0 | SVOCs, Metals, VOCs | |
| | 2.5-3.0 | EPH | |
| | 6.0-6.5 | SVOCs, Metals, VOCs | |
| SED-04-A | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 3.25-3.75 | EPH, Metals | |
| SED-04-B | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-04-C(R) | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 1.5-2.0 | SVOCs, Metals, VOCs | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-05-A | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-05-B | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-05-C | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 6.0-6.5 | EPH, SVOCs, Metals, VOCs | |
| SED-06-A | 0.0-0.5 | EPH and Grain Size | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-06-B(R) | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 4.0-4.5 | SVOCs, Metals, VOCs | |
| SED-06-C | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 4.0-4.5 | EPH, SVOCs, Metals, VOCs | |
| SED-07-A | 0.0-0.5 | EPH | Spa Spring Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-07-B | 0.0-0.5 | EPH | Spa Spring Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-07-C | 0.0-0.5 | EPH and Grain Size | Spa Spring Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-08-A | 0.0-0.5 | EPH and Grain Size | Spa Spring Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-08-C | 0.0-0.5 | EPH and Grain Size | Spa Spring Creek |
| | 0.5-1.0 | EPH | |
| | 3.0-3.5 | EPH, SVOCs, Metals, VOCs | |
| SED-09-A(R) | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 3.0-3.5 | SVOCs, Metals, VOCs | |
| SED-09-B | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 5.0-5.5 | EPH, SVOCs, Metals, VOCs | |
| SED-09-C(R) | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.75-3.25 | EPH | |
| | 4.5-5.0 | SVOCs, Metals, VOCs | |
| SED-10-A | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-10-B | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-10-C | 0.0-0.5 | EPH | Woodbridge Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-11-C | 0.0-0.5 | EPH | Spa Spring Creek |
| | 0.5-1.0 | EPH | |
| | 2.0-2.5 | EPH, SVOCs, Metals, VOCs | |
| SED-19-B | 0.0-0.5 | EPH, SVOCs, and Metals | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| SED-19-C | 0.0-0.5 | EPH, SVOCs, and Metals | Woodbridge Creek |
| | 0.5-1.0 | EPH and VOCs | |
| SED-20-A | 2.0-2.5 | EPH, SVOCs, Metals, and VOCs | Spa Spring Creek |
| SED-20-C | 2.0-2.5 | EPH, SVOCs, Metals, and VOCs | Spa Spring Creek |
| SED-21-A | 2.0-2.5 | EPH, SVOCs, Metals, and VOCs | Spa Spring Creek |
| SED-21-C | 2.0-2.5 | EPH, SVOCs, Metals, and VOCs | Spa Spring Creek |
| SED-22-A | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Lower Reach |
| | 0.5-1.0 | VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-22-B | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Lower Reach |
| | 0.5-1.0 | VOCs | |
| | 9.0-9.5 | EPH, VOCs, SVOCs, Metals | |
| SED-22-C | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Lower Reach |
| | 0.5-1.0 | VOCs | |
| | 4.5-5.0 | EPH, VOCs, SVOCs, Metals | |
| SED-23-A | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Upper Reach |
| | 0.5-1.0 | VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-23-B | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Upper Reach |
| | 0.5-1.0 | VOCs | |
| | 6.5-7.0 | EPH, VOCs, SVOCs, Metals | |
| SED-23-C | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Upper Reach |
| | 0.5-1.0 | VOCs | |
| | 5.5-6.0 | EPH, VOCs, SVOCs, Metals | |
| SED-24-A | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Upper Reach |
| | 0.5-1.0 | VOCs | |
| | 5.5-6.0 | EPH, VOCs, SVOCs, Metals | |
| SED-24-B | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Upper Reach |
| | 0.5-1.0 | VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-24-C | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Upper Reach |
| | 0.5-1.0 | VOCs | |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-25-A[3] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Lower Reach |
| | 0.5-1.0 | VOCs | |
| SED-25-B[3] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Lower Reach |
| | 0.5-1.0 | VOCs | |
| SED-25-C[3] | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Woodbridge Creek Lower Reach |
| | 0.5-1.0 | VOCs | |
| SED-SSBG-1 | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Spa Spring Creek Background |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-SSBG-2 | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Spa Spring Creek Background |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-SSBG-3 | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Spa Spring Creek Background |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |
| SED-SSBG-4 | 0.0-0.5 | EPH, SVOCs, Metals, TOC, pH and grain size | Spa Spring Creek Background |
| | 2.0-2.5 | EPH, VOCs, SVOCs, Metals | |

**LEGEND**

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- FORMER SEDIMENT SAMPLE LOCATION (2002 AND 2014)
- 2019 SEDIMENT SAMPLE LOCATION
- FORMER (2002 AND 2014) SEDIMENT SAMPLE IN 2019
- PROPOSED SEDIMENT LOCATION LIMITED TO MANUAL SURFACE SAMPLING (0 - 0.5 FEET) DUE TO BURIED UTILITIES. LOCATION SUBJECT FOR APPROVAL FROM RESPECTIVE PIPELINE COMPANIES
- NJPDES SURFACE WATER DISCHARGE POINT
- CURRENT EXTENT OF LNAPL
- FORMER EXTENT OF LNAPL

**NOTES:**

1. ALL SAMPLING LOCATIONS SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND ACCESSIBILITY.
2. ALL LOCATIONS ARE UNDERSTOOD TO BE WITHIN LIMITS OF WATERWAYS - MORE PRECISE LOCATION INFORMATION WILL BE DETAILED IN SUPPLEMENTAL REPORT.
3. INSET NOTE: ALIGNMENT AND DEPTH OF BURIED UTILITIES BELOW CREEK BED IS NOT KNOWN, THERFORE, TRANSECT SED-25 LOCATION WILL BE SUBJECT TO SAFETY RESTRICTIONS IMPOSED BY THE PUBLIC UTILITY.
4. * SELECT SWMUS/AOCS SHOWN IN PROXIMITY TO WATERBODIES
5. SEE FIGURE 2 FOR ACTUAL SAMPLE LOCATIONS

DRAFT

| NO. | BY | DATE | REVISION | APP'D |
|---|---|---|---|---|
| 2 | MG | 3/25/20 | UPDATED FOLLOWING 2019 SAMPLING EVENT | WC |
| 1 | MG | 6/26/19 | UPDATED BASED ON USEPA'S MARCH 1, 2019 COMMENTS TO NOVEMBER 2018 SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN, INCLUDING 5 ADDITIONAL SAMPLE POINTS | WC |

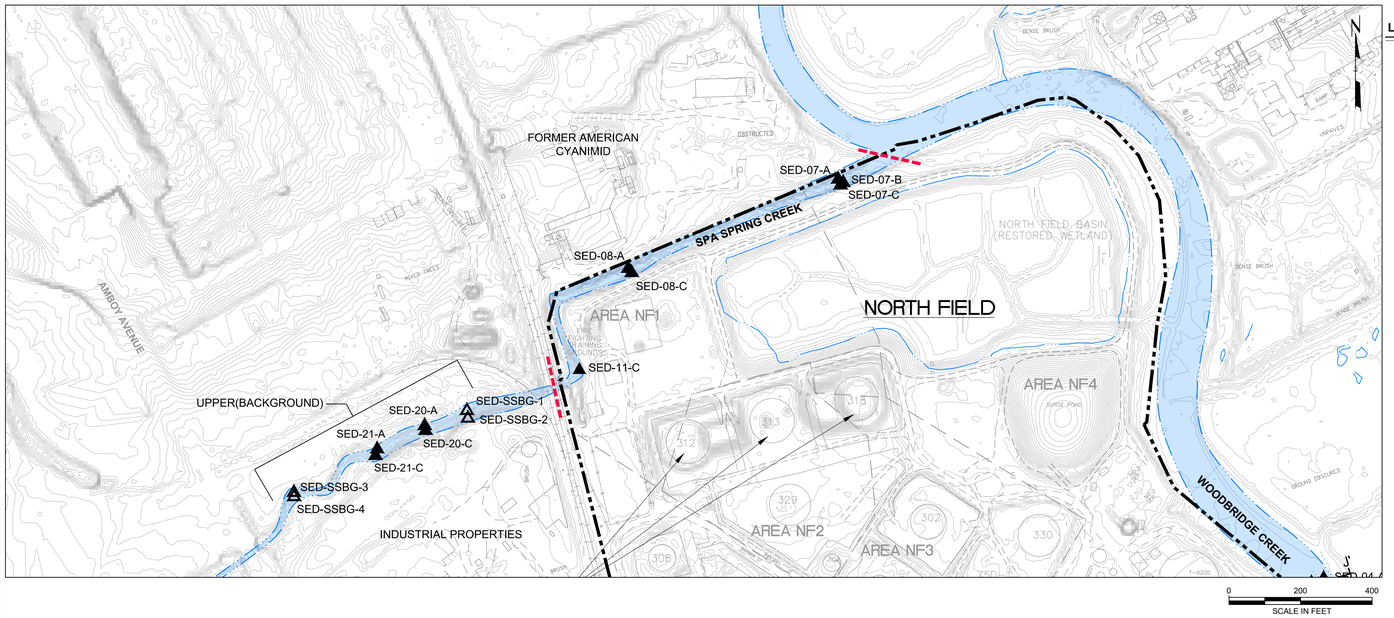
PROJECT:
**CHEVRON FACILITY**
**PERTH AMBOY, NEW JERSEY**

TITLE:
**SEDIMENT SAMPLE LOCATIONS AND SUPPLEMENTAL INFORMATION**

| | | | |
|---|---|---|---|
| DRAWN BY: | M. GIAMBATTISTA | PROJ. NO.: | ------ |
| CHECKED BY: | K. LOCKARD | **FIGURE 2A** | |
| APPROVED BY: | W. CORDASCO | | |
| DATE: | JUNE 2019 | | |

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

FILE NO.: FIGURE 2A.dwg

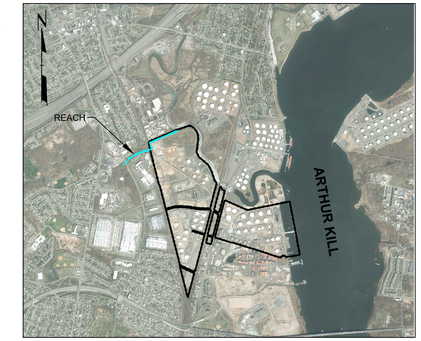



## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- △ SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- ▲ LOCATIONS SAMPLED PREVIOUSLY IN 2002 OR 2014, RE-SAMPLED IN 2019

## NOTES:

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).




## KEYMAP

SCALE: 1"=2500'

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-20-A | SED-20-A | 0-0.5 | 2/28/2014 | Arsenic | **8.8** |
| | | | | Benzo(a)anthracene | **0.345** |
| | | | | Benzo(ghi)perylene | **0.285** |
| | | | | Chrysene | **0.521** |
| | | | | Cobalt | 12.3 |
| | | | | Dibenz(a,h)anthracene | **0.0731** |
| | | | | Fluoranthene | **0.909** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.282** |
| | | | | Phenanthrene | **0.37** |
| | | | | Pyrene | **0.813** |
| | | | | Silver | **1.2** |
| | | | | Total PAHs | **4.7667** |
| | | | | EPH, TOTAL FRACTIONATED | 83.4 |
| | SED-20-A/2.0-2.5 | 2-2.5 | 10/8/2019 | Acenaphthene | ***0.2*** |
| | | | | Anthracene | **0.39** |
| | | | | Benzo(a)pyrene | **0.81** |
| | | | | Benzo(a)anthracene | **0.79** |
| | | | | Benzo(ghi)perylene | **0.61** |
| | | | | Benzo(k)fluoranthene | **0.45** |
| | | | | Chrysene | **0.85** |
| | | | | Cobalt | 10.8 |
| | | | | Copper | **39.3** |
| | | | | Dibenz(a,h)anthracene | **0.12** |
| | | | | Fluoranthene | **2.4** |
| | | | | Fluorene | ***0.19*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.83** |
| | | | | Phenanthrene | 1.9 |
| | | | | Pyrene | **1.9** |
| | | | | Total PAHs | **12.33** |
| | | | | Zinc | **221** |
| | | | | EPH, TOTAL FRACTIONATED | 46 |
| SED-20-C | SED-20-C | 0-0.5 | 2/28/2014 | Acenaphthene | **0.235** |
| | | | | Anthracene | **0.277** |
| | | | | Arsenic | **11.3** |
| | | | | Benzo(a)pyrene | **0.465** |
| | | | | Benzo(a)anthracene | **0.475** |
| | | | | Benzo(ghi)perylene | **0.317** |
| | | | | bis(2-Ethylhexyl)phthalate | **0.277** |
| | | | | Chrysene | **0.601** |
| | | | | Cobalt | 14.5 |
| | | | | Dibenz(a,h)anthracene | **0.0816** |
| | | | | Fluoranthene | **1.24** |
| | | | | Fluorene | **0.208** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.32** |
| | | | | 2-Methylnaphthalene | **0.438** |
| | | | | Naphthalene | **0.268** |
| | | | | Nickel | **25.1** |
| | | | | Phenanthrene | **1.15** |
| | | | | Pyrene | **1.09** |
| | | | | Silver | **1.2** |
| | | | | Total PAHs | **7.9876** |
| | | | | Zinc | **219** |
| | | | | EPH, TOTAL FRACTIONATED | 39.4 |
| | SED-20-C/2.0-2.5 | 2-2.5 | 10/8/2019 | Arsenic | **8.75** |
| | | | | Barium | 50.3 |
| | | | | Cobalt | 12.1 |
| | | | | EPH, TOTAL FRACTIONATED | 9.2 J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-21-A | SED-21-A | 0-0.5 | 2/28/2014 | Cobalt | 13.4 |
| | | | | Copper | **41.4** |
| | | | | Silver | **1.1** |
| | | | | Zinc | 664 |
| | | | | EPH, TOTAL FRACTIONATED | 121 |
| | SED-21-A/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.09*** J |
| | | | | Anthracene | **0.21** |
| | | | | Benzo(a)pyrene | **0.47** |
| | | | | Benzo(a)anthracene | **0.54** |
| | | | | Benzo(ghi)perylene | **0.33** |
| | | | | Benzo(k)fluoranthene | **0.3** |
| | | | | Chrysene | **0.58** |
| | | | | Dibenz(a,h)anthracene | **0.099** J |
| | | | | Fluoranthene | **1.4** |
| | | | | Fluorene | ***0.088*** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.25** |
| | | | | Phenanthrene | **0.84** |
| | | | | Pyrene | **1.2** |
| | | | | Total PAHs | **7.081** |
| | | | | EPH, TOTAL FRACTIONATED | 49 |
| SED-21-C | SED-21-C | 0-0.5 | 2/28/2014 | Acenaphthene | **0.0235** J |
| | | | | bis(2-Ethylhexyl)phthalate | **0.476** |
| | | | | Cobalt | 13.1 |
| | | | | Fluorene | **0.0285** J |
| | | | | Nickel | **27.1** |
| | | | | Phenanthrene | **0.316** |
| | | | | EPH, TOTAL FRACTIONATED | 52.5 |
| | SED-21-C/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.15*** |
| | | | | Anthracene | **0.42** |
| | | | | Benzo(a)pyrene | **1.1** |
| | | | | Benzo(a)anthracene | **1.1** |
| | | | | Benzo(ghi)perylene | **0.86** |
| | | | | Benzo(k)fluoranthene | **0.62** |
| | | | | bis(2-Ethylhexyl)phthalate | ***0.4*** |
| | | | | Chrysene | **1.3** |
| | | | | Dibenz(a,h)anthracene | **0.26** |
| | | | | Fluoranthene | **3.1** |
| | | | | Fluorene | ***0.19*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.75** |
| | | | | Lead | **184** |
| | | | | 2-Methylnaphthalene | **0.09** J |
| | | | | Phenanthrene | 1.9 |
| | | | | Pyrene | **2.6** |
| | | | | Total PAHs | **15.987** |
| | | | | EPH, TOTAL FRACTIONATED | 55 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-SSBG-1 | SED-SSBG-1/0.0-0.5 | 0-0.5 | 9/24/2019 | Cobalt | 11.4 |
| | | | | Lead | **52.2** |
| | | | | Zinc | **168** |
| | | | | EPH, TOTAL FRACTIONATED | 19 |
| | SED-SSBG-1/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthylene | **0.055** J |
| | | | | Anthracene | **0.11** |
| | | | | Benzo(a)anthracene | **0.29** |
| | | | | Chrysene | **0.42** |
| | | | | Cobalt | 15.9 |
| | | | | Copper | **105** |
| | | | | Fluorene | **0.066** J |
| | | | | Lead | **80.4** |
| | | | | Nickel | **41.7** |
| | | | | Pyrene | **0.74** |
| | | | | Zinc | **297** |
| | | | | EPH, TOTAL FRACTIONATED | 1200 |
| SED-SSBG-2 | SED-SSBG-2/0.0-0.5 | 0-0.5 | 9/24/2019 | Acenaphthene | **0.27** |
| | | | | Acenaphthylene | **0.049** J |
| | | | | Anthracene | **0.66** |
| | | | | Arsenic | **9.64** J |
| | | | | Benzo(a)pyrene | **1.3** |
| | | | | Benzo(a)anthracene | **1.5** |
| | | | | Benzo(b)fluoranthene | 2.1 |
| | | | | Benzo(ghi)perylene | **0.91** |
| | | | | Benzo(k)fluoranthene | **0.65** |
| | | | | Chrysene | **1.7** |
| | | | | Cobalt | 10.9 |
| | | | | Copper | **39.6** |
| | | | | Dibenz(a,h)anthracene | **0.21** |
| | | | | Fluoranthene | **4.1** |
| | | | | Fluorene | ***0.37*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.88** |
| | | | | Phenanthrene | 2.9 |
| | | | | Pyrene | 2.8 |
| | | | | Total PAHs | **20.489** |
| | | | | Zinc | **193** |
| | | | | EPH, TOTAL FRACTIONATED | 83 |
| | SED-SSBG-2/2.0-2.5 (A) | 2-2.5 | 9/24/2019 | Aluminum | 19700 |
| | | | | Barium | 71.2 |
| | | | | Cobalt | 10.8 |
| | | | | EPH, TOTAL FRACTIONATED | 47 J |
| | SED-SSBG-2/2.0-2.5(B) | 2-2.5 | 9/24/2019 | Aluminum | 21300 |
| | | | | Arsenic | **8.44** |
| | | | | Barium | 58.5 |
| | | | | Cobalt | 22.5 |
| | | | | Nickel | **31.6** |
| | | | | EPH, TOTAL FRACTIONATED | 56 J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-SSBG-3 | SED-SSBG-3/0.0-0.5 | 0-0.5 | 9/24/2019 | Acenaphthene | ***0.63*** |
| | | | | Anthracene | **1.1** |
| | | | | Benzo(a)pyrene | **1.9** |
| | | | | Benzo(a)anthracene | 2 |
| | | | | Benzo(b)fluoranthene | 2.3 |
| | | | | Benzo(ghi)perylene | **1.3** |
| | | | | Benzo(k)fluoranthene | **0.86** |
| | | | | Chrysene | **2.5** |
| | | | | Copper | **47.2** |
| | | | | Dibenz(a,h)anthracene | **0.36** |
| | | | | Fluoranthene | 5.5 |
| | | | | Fluorene | ***0.61*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.98** |
| | | | | 2-Methylnaphthalene | **0.56** |
| | | | | Naphthalene | **0.23** |
| | | | | Phenanthrene | 4.7 |
| | | | | Pyrene | 4.2 |
| | | | | Total PAHs | **29.73** |
| | | | | EPH, TOTAL FRACTIONATED | 96 |
| | SED-SSBG-3/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.063*** J |
| | | | | Acenaphthylene | **0.063** J |
| | | | | Anthracene | **0.99** |
| | | | | Benzo(a)pyrene | **1.6** |
| | | | | Benzo(a)anthracene | 1.9 |
| | | | | Benzo(b)fluoranthene | 2.1 |
| | | | | Benzo(ghi)perylene | **0.94** |
| | | | | Benzo(k)fluoranthene | **0.9** |
| | | | | Chrysene | **1.9** |
| | | | | Cobalt | 12.5 |
| | | | | Dibenz(a,h)anthracene | 0.28 |
| | | | | Fluoranthene | **4.4** |
| | | | | Fluorene | ***0.16*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.9** |
| | | | | Phenanthrene | **0.8** |
| | | | | Pyrene | 3.1 |
| | | | | Total PAHs | **20.096** |
| | | | | EPH, TOTAL FRACTIONATED | 49 |
| SED-SSBG-4 | SED-SSBG-4/0.0-0.5 | 0-0.5 | 9/24/2019 | Benzo(ghi)perylene | **0.28** |
| | | | | Cobalt | 10.8 |
| | | | | Indeno(1,2,3-cd)pyrene | **0.26** |
| | | | | EPH, TOTAL FRACTIONATED | 30 |
| | SED-SSBG-4/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.027*** J |
| | | | | Benzo(a)anthracene | **0.4** |
| | | | | Benzo(ghi)perylene | **0.33** |
| | | | | Benzo(k)fluoranthene | **0.34** |
| | | | | Chrysene | **0.52** |
| | | | | Cobalt | 13.7 |
| | | | | Copper | **59.7** |
| | | | | Dibenz(a,h)anthracene | **0.091** J |
| | | | | Fluoranthene | **1** |
| | | | | Fluorene | **0.025** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.3** |
| | | | | Lead | **159** |
| | | | | Nickel | **29** |
| | | | | Phenanthrene | **0.41** |
| | | | | Pyrene | **0.9** |
| | | | | Total PAHs | **5.394** |
| | | | | Zinc | **363** |
| | | | | EPH, TOTAL FRACTIONATED | 340 |

**EXPLANATION:**

**NJDEP Ecological Screening Criteria (ESC) For Saline Sediment**

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Acenaphthene | 0.016 | 0.5 |
| Acenaphthylene | 0.044 | 0.64 |
| Aluminum | -- | 18000 |
| Anthracene | 0.085 | 1.1 |
| Arsenic | 8.2 | 70 |
| Barium | -- | 48 |
| Benzo(a)pyrene | 0.43 | 1.6 |
| Benzo(a)anthracene | 0.261 | 1.6 |
| Benzo(b)fluoranthene | -- | 1.8 |
| Benzo(ghi)perylene | 0.17 | -- |
| Benzo(k)fluoranthene | 0.24 | -- |
| bis(2-Ethylhexyl)phthalate | 0.18216 | 2.64651 |
| Chrysene | 0.384 | 2.8 |
| Cobalt | -- | 10 |
| Copper | 34 | 270 |
| Dibenz(a,h)anthracene | 0.063 | 0.26 |
| EPH, TOTAL FRACTIONATED | -- | -- |
| Fluoranthene | 0.6 | 5.1 |
| Fluorene | 0.019 | 0.54 |
| Indeno(1,2,3-cd)pyrene | 0.2 | -- |
| Lead | 47 | 218 |
| 2-Methylnaphthalene | 0.07 | 0.67 |
| Naphthalene | 0.16 | 2.1 |
| Nickel | 21 | 52 |
| Phenanthrene | 0.24 | 1.5 |
| Pyrene | 0.665 | 2.6 |
| Silver | 1 | 3.7 |
| Total PAHs | 4 | 45 |
| Zinc | 150 | 410 |

Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

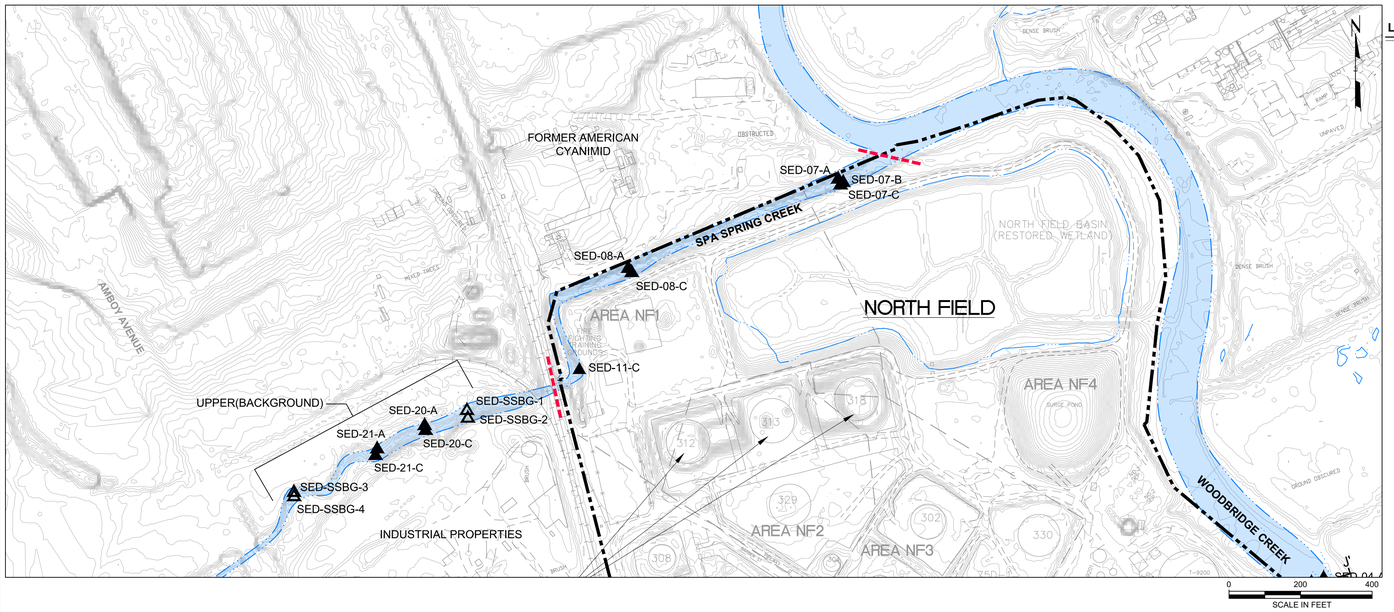
DRAFT

| | |
|---|---|
| PROJECT: | SEDIMENT INVESTIGATION REPORT<br>CHEVRON FACILITY<br>PERTH AMBOY, NEW JERSEY |
| TITLE: | SEDIMENT ANALYTICAL RESULTS<br>SPA SPRING CREEK |
| DRAWN BY: M. GIAMBATTISTA | PROJ. NO.: 326731.2020.0000 |
| CHECKED BY: W. CORDASCO | FIGURE 3 |
| APPROVED BY: R. LIPPENCOTT | |
| DATE: FEBRUARY 2020 | |

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

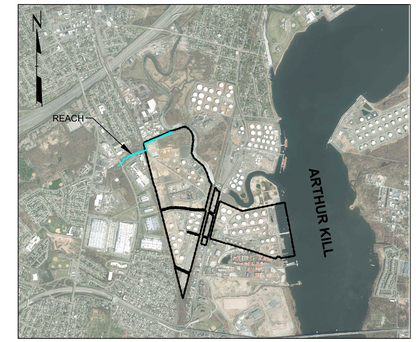
FILE NO.: Spa SpringBathymetricTransect figures_DATA.dwg

24x36 --- USER: MGiambattista --- ATTACHED XREF'S: --- ATTACHED IMAGES: J8A16; J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\Bathymetric\Final\rev. 03.20.20\Spa SpringBathymetricTransect figures_DATA.dwg --- PLOT DATE: March 26, 2020 - 2:11PM --- LAYOUT: SITE
Version: 2017-10-21




## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- △ SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- ▲ LOCATIONS SAMPLED PREVIOUSLY IN 2002 OR 2014, RE-SAMPLED IN 2019




## KEYMAP

SCALE: 1"=2500'

## NOTES:

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-20-A | SED-20-A | 0-0.5 | 2/28/2014 | Arsenic | **8.8** |
| | | | | Benzo(a)anthracene | **0.345** |
| | | | | Benzo(ghi)perylene | **0.285** |
| | | | | Chrysene | **0.521** |
| | | | | Cobalt | 12.3 |
| | | | | Dibenz(a,h)anthracene | **0.0731** |
| | | | | Fluoranthene | **0.909** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.282** |
| | | | | Phenanthrene | **0.37** |
| | | | | Pyrene | **0.813** |
| | | | | Silver | **1.2** |
| | | | | Total PAHs | **4.7667** |
| | | | | EPH, TOTAL FRACTIONATED | 83.4 |
| | SED-20-A/2.0-2.5 | 2-2.5 | 10/8/2019 | Acenaphthene | ***0.2*** |
| | | | | Anthracene | **0.39** |
| | | | | Benzo(a)pyrene | **0.81** |
| | | | | Benzo(a)anthracene | **0.79** |
| | | | | Benzo(ghi)perylene | **0.61** |
| | | | | Benzo(k)fluoranthene | **0.45** |
| | | | | Chrysene | **0.85** |
| | | | | Cobalt | 10.8 |
| | | | | Copper | **39.3** |
| | | | | Dibenz(a,h)anthracene | **0.12** |
| | | | | Fluoranthene | **2.4** |
| | | | | Fluorene | ***0.19*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.53** |
| | | | | Phenanthrene | 1.8 |
| | | | | Pyrene | **1.9** |
| | | | | Total PAHs | **12.33** |
| | | | | Zinc | **221** |
| | | | | EPH, TOTAL FRACTIONATED | 46 |
| SED-20-C | SED-20-C | 0-0.5 | 2/28/2014 | Acenaphthene | **0.235** |
| | | | | Anthracene | **0.277** |
| | | | | Arsenic | **11.3** |
| | | | | Benzo(a)pyrene | **0.465** |
| | | | | Benzo(a)anthracene | **0.475** |
| | | | | Benzo(ghi)perylene | **0.317** |
| | | | | bis(2-Ethylhexyl)phthalate | **0.277** |
| | | | | Chrysene | **0.601** |
| | | | | Cobalt | 14.5 |
| | | | | Dibenz(a,h)anthracene | **0.0816** |
| | | | | Fluoranthene | **1.24** |
| | | | | Fluorene | **0.208** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.32** |
| | | | | 2-Methylnaphthalene | **0.438** |
| | | | | Naphthalene | **0.268** |
| | | | | Nickel | **25.1** |
| | | | | Phenanthrene | **1.15** |
| | | | | Pyrene | **1.09** |
| | | | | Silver | **1.2** |
| | | | | Total PAHs | **7.9876** |
| | | | | Zinc | **219** |
| | | | | EPH, TOTAL FRACTIONATED | 39.4 |
| | SED-20-C/2.0-2.5 | 2-2.5 | 10/8/2019 | Arsenic | **8.75** |
| | | | | Barium | 50.3 |
| | | | | Cobalt | 12.1 |
| | | | | EPH, TOTAL FRACTIONATED | 9.2 J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-21-A | SED-21-A | 0-0.5 | 2/28/2014 | Cobalt | 13.4 |
| | | | | Copper | **41.4** |
| | | | | Silver | **1.1** |
| | | | | Zinc | **664** |
| | | | | EPH, TOTAL FRACTIONATED | 121 |
| | SED-21-A/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.09*** J |
| | | | | Anthracene | **0.21** |
| | | | | Benzo(a)pyrene | **0.47** |
| | | | | Benzo(a)anthracene | **0.54** |
| | | | | Benzo(ghi)perylene | **0.33** |
| | | | | Benzo(k)fluoranthene | **0.3** |
| | | | | Chrysene | **0.58** |
| | | | | Dibenz(a,h)anthracene | **0.099** J |
| | | | | Fluoranthene | **1.4** |
| | | | | Fluorene | ***0.088*** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.25** |
| | | | | Phenanthrene | **0.84** |
| | | | | Pyrene | **1.2** |
| | | | | Total PAHs | **7.081** |
| | | | | EPH, TOTAL FRACTIONATED | 49 |
| SED-21-C | SED-21-C | 0-0.5 | 2/28/2014 | Acenaphthene | **0.0235** J |
| | | | | bis(2-Ethylhexyl)phthalate | **0.476** |
| | | | | Cobalt | 13.1 |
| | | | | Fluorene | **0.0285** J |
| | | | | Nickel | **27.1** |
| | | | | Phenanthrene | **0.316** |
| | | | | EPH, TOTAL FRACTIONATED | 52.5 |
| | SED-21-C/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.15*** |
| | | | | Anthracene | **0.42** |
| | | | | Benzo(a)pyrene | **1.1** |
| | | | | Benzo(a)anthracene | **1.1** |
| | | | | Benzo(ghi)perylene | **0.86** |
| | | | | Benzo(k)fluoranthene | **0.62** |
| | | | | bis(2-Ethylhexyl)phthalate | ***0.4*** |
| | | | | Chrysene | **1.3** |
| | | | | Dibenz(a,h)anthracene | **0.26** |
| | | | | Fluoranthene | **3.1** |
| | | | | Fluorene | ***0.19*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.75** |
| | | | | Lead | **184** |
| | | | | 2-Methylnaphthalene | **0.09** J |
| | | | | Phenanthrene | 1.9 |
| | | | | Pyrene | **2.6** |
| | | | | Total PAHs | **15.987** |
| | | | | EPH, TOTAL FRACTIONATED | 55 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-SSBG-1 | SED-SSBG-1/0.0-0.5 | 0-0.5 | 9/24/2019 | Cobalt | 11.4 |
| | | | | Lead | **52.2** |
| | | | | Zinc | **168** |
| | | | | EPH, TOTAL FRACTIONATED | 19 |
| | SED-SSBG-1/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthylene | **0.055** J |
| | | | | Anthracene | **0.11** |
| | | | | Benzo(a)anthracene | **0.29** |
| | | | | Chrysene | **0.42** |
| | | | | Cobalt | 15.9 |
| | | | | Copper | **105** |
| | | | | Fluorene | **0.066** J |
| | | | | Lead | **80.4** |
| | | | | Nickel | **41.7** |
| | | | | Pyrene | **0.74** |
| | | | | Zinc | **297** |
| | | | | EPH, TOTAL FRACTIONATED | 1200 |
| SED-SSBG-2 | SED-SSBG-2/0.0-0.5 | 0-0.5 | 9/24/2019 | Acenaphthene | ***0.27*** |
| | | | | Acenaphthylene | **0.049** J |
| | | | | Anthracene | **0.66** |
| | | | | Arsenic | **9.64** J |
| | | | | Benzo(a)pyrene | **1.3** |
| | | | | Benzo(a)anthracene | **1.5** |
| | | | | Benzo(b)fluoranthene | 2.1 |
| | | | | Benzo(ghi)perylene | **0.91** |
| | | | | Benzo(k)fluoranthene | **0.65** |
| | | | | Chrysene | **1.7** |
| | | | | Cobalt | 10.9 |
| | | | | Copper | **39.6** |
| | | | | Dibenz(a,h)anthracene | **0.21** |
| | | | | Fluoranthene | **4.1** |
| | | | | Fluorene | ***0.37*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.88** |
| | | | | Phenanthrene | 2.9 |
| | | | | Pyrene | 2.8 |
| | | | | Total PAHs | **20.489** |
| | | | | Zinc | **193** |
| | | | | EPH, TOTAL FRACTIONATED | 83 |
| | SED-SSBG-2/2.0-2.5 (A) | 2-2.5 | 9/24/2019 | Aluminum | 19700 |
| | | | | Barium | 71.2 |
| | | | | Cobalt | 10.8 |
| | | | | EPH, TOTAL FRACTIONATED | 4.7 J |
| | SED-SSBG-2/2.0-2.5(B) | 2-2.5 | 9/24/2019 | Aluminum | 21300 |
| | | | | Arsenic | **8.44** |
| | | | | Barium | 58.5 |
| | | | | Cobalt | 22.5 |
| | | | | Nickel | **31.6** |
| | | | | EPH, TOTAL FRACTIONATED | 5.6 J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-SSBG-3 | SED-SSBG-3/0.0-0.5 | 0-0.5 | 9/24/2019 | Acenaphthene | ***0.63*** |
| | | | | Anthracene | **1.1** |
| | | | | Benzo(a)pyrene | 1.9 |
| | | | | Benzo(a)anthracene | 2 |
| | | | | Benzo(b)fluoranthene | 2.3 |
| | | | | Benzo(ghi)perylene | **1.3** |
| | | | | Benzo(k)fluoranthene | **0.86** |
| | | | | Chrysene | **2.5** |
| | | | | Copper | **47.2** |
| | | | | Dibenz(a,h)anthracene | 0.36 |
| | | | | Fluoranthene | 5.5 |
| | | | | Fluorene | ***0.61*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.98** |
| | | | | 2-Methylnaphthalene | **0.56** |
| | | | | Naphthalene | **0.23** |
| | | | | Phenanthrene | 4.7 |
| | | | | Pyrene | 4.2 |
| | | | | Total PAHs | **29.73** |
| | | | | EPH, TOTAL FRACTIONATED | 96 |
| | SED-SSBG-3/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | ***0.063*** J |
| | | | | Acenaphthylene | **0.063** J |
| | | | | Anthracene | **0.99** |
| | | | | Benzo(a)pyrene | **1.6** |
| | | | | Benzo(a)anthracene | 1.9 |
| | | | | Benzo(b)fluoranthene | 2.1 |
| | | | | Benzo(ghi)perylene | **0.94** |
| | | | | Benzo(k)fluoranthene | **0.9** |
| | | | | Chrysene | **1.9** |
| | | | | Cobalt | 12.5 |
| | | | | Dibenz(a,h)anthracene | 0.28 |
| | | | | Fluoranthene | **4.4** |
| | | | | Fluorene | ***0.16*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.9** |
| | | | | Phenanthrene | **0.8** |
| | | | | Pyrene | 3.1 |
| | | | | Total PAHs | **20.096** |
| | | | | EPH, TOTAL FRACTIONATED | 49 |
| SED-SSBG-4 | SED-SSBG-4/0.0-0.5 | 0-0.5 | 9/24/2019 | Benzo(ghi)perylene | **0.28** |
| | | | | Cobalt | 10.6 |
| | | | | Indeno(1,2,3-cd)pyrene | **0.26** |
| | | | | EPH, TOTAL FRACTIONATED | 30 |
| | SED-SSBG-4/2.0-2.5 | 2-2.5 | 9/24/2019 | Acenaphthene | **0.027** J |
| | | | | Benzo(a)anthracene | **0.4** |
| | | | | Benzo(ghi)perylene | **0.33** |
| | | | | Benzo(k)fluoranthene | **0.34** |
| | | | | Chrysene | **0.52** |
| | | | | Cobalt | 13.7 |
| | | | | Copper | **59.7** |
| | | | | Dibenz(a,h)anthracene | **0.091** J |
| | | | | Fluoranthene | **1** |
| | | | | Fluorene | **0.025** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.3** |
| | | | | Lead | **159** |
| | | | | Nickel | **29** |
| | | | | Phenanthrene | **0.41** |
| | | | | Pyrene | **0.9** |
| | | | | Total PAHs | **5.394** |
| | | | | Zinc | **363** |
| | | | | EPH, TOTAL FRACTIONATED | 340 |

**EXPLANATION:**

**NJDEP Ecological Screening Criteria (ESC) For Saline Sediment**

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Acenaphthene | 0.016 | 0.5 |
| Acenaphthylene | 0.044 | 0.64 |
| Aluminum | -- | 18000 |
| Anthracene | 0.085 | 1.1 |
| Arsenic | 8.2 | 70 |
| Barium | -- | 48 |
| Benzo(a)pyrene | 0.43 | 1.6 |
| Benzo(a)anthracene | 0.261 | 1.6 |
| Benzo(b)fluoranthene | -- | 1.8 |
| Benzo(ghi)perylene | 0.17 | -- |
| Benzo(k)fluoranthene | 0.24 | -- |
| bis(2-Ethylhexyl)phthalate | 0.18216 | 2.64651 |
| Chrysene | 0.384 | 2.8 |
| Cobalt | -- | 10 |
| Copper | 34 | 270 |
| Dibenz(a,h)anthracene | 0.063 | 0.26 |
| EPH, TOTAL FRACTIONATED | -- | -- |
| Fluoranthene | 0.6 | 5.1 |
| Fluorene | 0.019 | 0.54 |
| Indeno(1,2,3-cd)pyrene | 0.2 | -- |
| Lead | 47 | 218 |
| 2-Methylnaphthalene | 0.07 | 0.67 |
| Naphthalene | 0.16 | 2.1 |
| Nickel | 21 | 52 |
| Phenanthrene | 0.24 | 1.5 |
| Pyrene | 0.665 | 2.6 |
| Silver | 1 | 3.7 |
| Total PAHs | 4 | 45 |
| Zinc | 150 | 410 |

Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

DRAFT

PROJECT: SEDIMENT INVESTIGATION REPORT
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE: SEDIMENT ANALYTICAL RESULTS
SPA SPRING CREEK - BACKGROUND

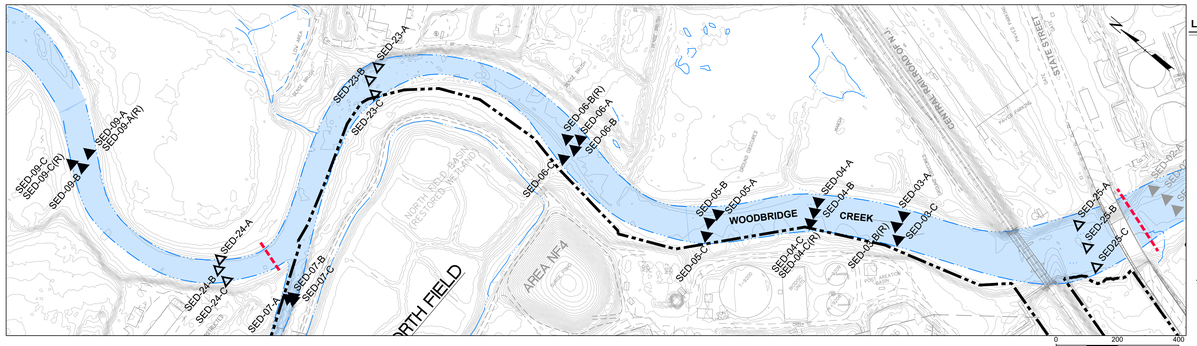
| | | | |
|---|---|---|---|
| DRAWN BY: | M. GIAMBATTISTA | PROJ. NO.: | 326731.2020.0000 |
| CHECKED BY: | W. CORDASCO | | FIGURE 4 |
| APPROVED BY: | R. LIPPENCOTT | | |
| DATE: | FEBRUARY 2020 | | |

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

FILE NO.: Spa SpringBathymetricTransect figures_DATA.dwg

24x36 --- USER: MGiambattista --- ATTACHED XREFS: --- ATTACHED IMAGES: J8A14; J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\Bathymetric\Final\rev. 03.20.20\Spa SpringBathymetricTransect figures_DATA.dwg --- PLOT DATE: March 26, 2020 - 2:20PM --- LAYOUT: BACKGROUND - FIG 4

Version: 2017-10-31

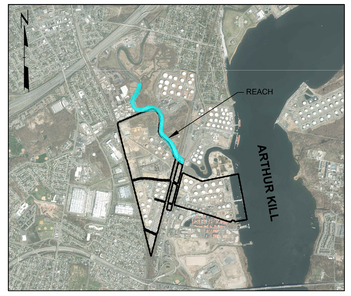



## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- △ SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- ▲ LOCATIONS SAMPLED PREVIOUSLY IN 2002 OR 2014, RE-SAMPLED IN 2019

## NOTES:

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACCESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).




## KEYMAP

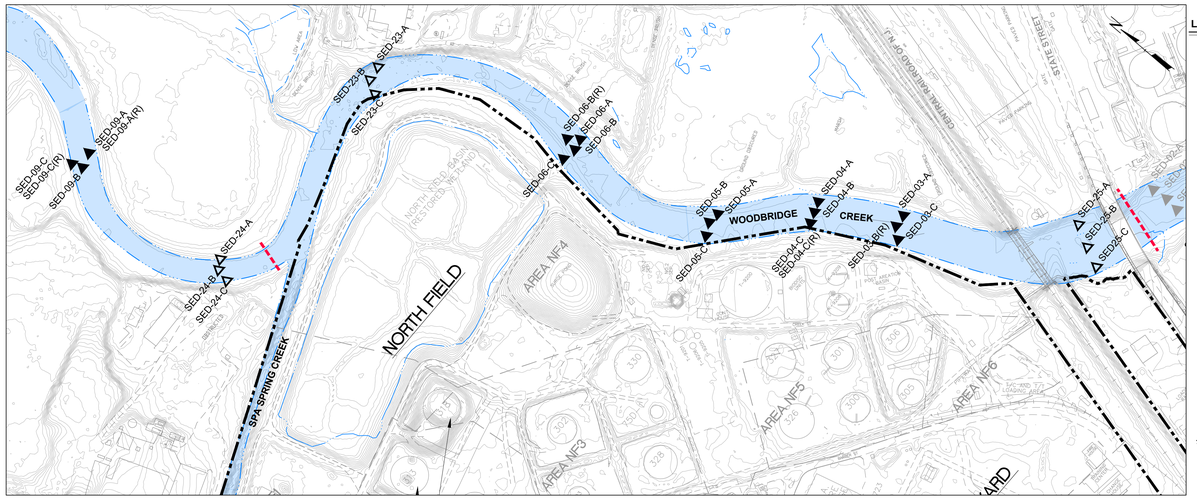
SCALE: 1"=2500'

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-03-A | SED-03-A/0.0-0.5 | 0-0.5 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 2200 |
| | SED-03-A/0.5-1.0 | 0.5-1 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 12000 |
| | SED-03-A/6-6 | 0-0.5 | 12/19/2002 | Anthracene | 0.90 |
| | | | | Benzo(a)anthracene | 0.65 |
| | | | | Benzo(g)perylene | 0.26 |
| | | | | Chrysene | 1.2 |
| | | | | Fluoranthene | 1.1 |
| | | | | Fluorene | 1.2 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.23 |
| | | | | 2-Methylnaphthalene | 3.3 |
| | | | | Naphthalene | 1.1 |
| | | | | Phenanthrene | 5.3 |
| | | | | Pyrene | 2 |
| | | | | Total PAHs | 17.90 |
| | SED-03-A/6.0-6.5 | 6-6.5 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 11000 |
| SED-03-B | SED-03-B/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.26 |
| | | | | Acenaphthylene | 0.13 |
| | | | | Anthracene | 0.95 |
| | | | | Benzo(a)pyrene | 3.3 |
| | | | | Benzo(a)anthracene | 2.3 |
| | | | | Benzo(b)fluoranthene | 3.5 |
| | | | | Benzo(g)perylene | 2.1 |
| | | | | Benzo(k)fluoranthene | 1.3 |
| | | | | bis(2-Ethylhexyl)phthalate | 7.7 |
| | | | | Chrysene | 3.5 |
| | | | | Dibenzo(a,h)anthracene | 0.59 |
| | | | | Fluoranthene | 4.0 |
| | | | | Fluorene | 0.25 |
| | | | | Indeno(1,2,3-cd)pyrene | 1.9 |
| | | | | 2-Methylnaphthalene | 0.093 |
| | | | | Phenanthrene | 2.5 |
| | | | | Pyrene | 5 |
| | | | | Total PAHs | 34.559 |
| | SED-03-B/(R) | 1.5-2 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 7360 |
| | | 4.5-5 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 2430 |
| | SED-03-B/(R)/0.0-0.5 | 0-0.5 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 820 |
| | SED-03-B/(R)/0.5-1.0 | 0.5-1 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 700 |
| SED-03-B/(R) | SED-03-B/(R)/1.5-2.0 | 1.5-2 | 9/30/2019 | Acenaphthene | 0.24 |
| | | | | Anthracene | 0.59 |
| | | | | Benzo(a)pyrene | 0.74 |
| | | | | Benzo(a)anthracene | 0.99 |
| | | | | Benzo(g)perylene | 0.6 |
| | | | | Benzo(k)fluoranthene | 0.46 |
| | | | | bis(2-Ethylhexyl)phthalate | 11 |
| | | | | Chrysene | 1 |
| | | | | Dibenzo(a,h)anthracene | 0.14 |
| | | | | Fluoranthene | 2.4 |
| | | | | Fluorene | 0.26 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.56 |
| | | | | 2-Methylnaphthalene | 0.16 J |
| | | | | Phenanthrene | 0.95 |
| | | | | Pyrene | 2.1 |
| | | | | Total PAHs | 12.31 |
| | SED-03-B/(R)/4.5-5.0 | 4.5-5 | 9/30/2019 | Acenaphthene | 0.1 |
| | | | | Acenaphthylene | 0.073 J |
| | | | | Anthracene | 0.2 |
| | | | | Benzo(a)anthracene | 0.3 |
| | | | | Benzo(g)perylene | 0.3 |
| | | | | Benzo(k)fluoranthene | 1.3 |
| | | | | Dibenzo(a,h)anthracene | 0.060 J |
| | | | | Fluorene | 0.17 |
| | | | | 2-Methylnaphthalene | 0.38 |
| | | | | Phenanthrene | 0.94 |
| | | | | Total PAHs | 4.533 |
| SED-03-C | SED-03-C/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 7.9 |
| | | | | Acenaphthylene | 5.8 |
| | | | | Anthracene | 13 |
| | | | | Benzo(a)pyrene | 9.5 |
| | | | | Benzo(a)anthracene | 3.9 |
| | | | | Benzo(b)fluoranthene | 5.3 |
| | | | | Benzo(g)perylene | 14 |
| | | | | Benzo(k)fluoranthene | 1.1 |
| | | | | bis(2-Ethylhexyl)phthalate | 12 |
| | | | | Chrysene | 7.8 |
| | | | | Dibenzo(a,h)anthracene | 3.1 |
| | | | | Fluoranthene | 4.2 |
| | | | | Fluorene | 3.7 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.6 |
| | | | | 2-Methylnaphthalene | 7.5 |
| | | | | Naphthalene | 3.4 |
| | | | | Phenanthrene | 11 |
| | | | | Pyrene | 8.8 |
| | | | | Total PAHs | 90.8 |
| | SED-03-C/12-18 | 1-1.5 | 12/19/2002 | Acenaphthene | 2.5 |
| | | | | Acenaphthylene | 1.2 |
| | | | | Anthracene | 3.4 |
| | | | | Benzo(a)pyrene | 1.1 |
| | | | | Benzo(a)anthracene | 1.4 |
| | | | | Benzo(g)perylene | 0.94 |
| | | | | Benzo(k)fluoranthene | 0.46 |
| | | | | bis(2-Ethylhexyl)phthalate | 8 J |
| | | | | Chrysene | 2.5 |
| | | | | Dibenzo(a,h)anthracene | 0.22 |
| | | | | Fluoranthene | 3.7 |
| | | | | Fluorene | 5.8 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.69 |
| | | | | 2-Methylnaphthalene | 39 |
| | | | | Naphthalene | 10 |
| | | | | Phenanthrene | 10 |
| | | | | Pyrene | 8.1 |
| | | | | Total PAHs | 87.71 |
| | SED-03-C/30-36 | 2.5-3 | 12/19/2002 | Acenaphthene | 0.46 |
| | | | | Acenaphthylene | 0.33 |
| | | | | Anthracene | 0.32 |
| | | | | Benzo(a)anthracene | 0.4 |
| | | | | Benzo(g)perylene | 0.25 |
| | | | | Chrysene | 0.93 |
| | | | | Fluoranthene | 1 |
| | | | | Fluorene | 0.99 |
| | | | | 2-Methylnaphthalene | 5.8 |
| | | | | Naphthalene | 3.4 |
| | | | | Phenanthrene | 3.6 |
| | | | | Pyrene | 1.8 |
| | | | | Total PAHs | 22.108 |
| SED-03-C(R) | SED-03-C(R) | 1.5-2 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 40200 |
| | | 4-4.5 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 12000 |
| | SED-03-C(R)/0.0-0.5 | 0-0.5 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 490 |
| | SED-03-C(R)/0.5-1.0 | 0.5-1 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 5400 |
| | SED-03-C(R)/1.0-1.5 | 1-1.5 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 16000 |
| | SED-03-C(R)/1.5-2.0 | 1.5-2 | 9/30/2019 | Anthracene | 1.3 |
| | | | | Benzo(a)pyrene | 0.87 |
| | | | | Benzo(a)anthracene | 1 |
| | | | | Benzo(g)perylene | 0.77 |
| | | | | Benzo(k)fluoranthene | 0.26 |
| | | | | bis(2-Ethylhexyl)phthalate | 6.3 |
| | | | | Chrysene | 2.1 |
| | | | | Fluoranthene | 1.7 |
| | | | | Fluorene | 5.4 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.39 |
| | | | | 2-Methylnaphthalene | 19 |
| | | | | Naphthalene | 3.9 |
| | | | | Phenanthrene | 7.4 |
| | | | | Pyrene | 3.4 |
| | | | | Total PAHs | 45.32 |
| | SED-03-C(R)/2.5-3.0 | 2.5-3 | 9/30/2019 | EPH, TOTAL FRACTIONATED | 4300 |
| | SED-03-C(R)/5.0-5.5 | 5-5.5 | 9/30/2019 | Acenaphthylene | 0.31 |
| | | | | Anthracene | 0.23 |
| | | | | Fluorene | 0.54 |
| | | | | 2-Methylnaphthalene | 6 |
| | | | | Naphthalene | 1.8 |
| | | | | Phenanthrene | 0.92 |
| | | | | Total PAHs | 8.96 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-04-A | SED-04-A/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.038 J |
| | | | | Acenaphthylene | 0.063 J |
| | | | | Anthracene | 0.2 |
| | | | | Benzo(a)pyrene | 1.1 |
| | | | | Benzo(a)anthracene | 0.72 |
| | | | | Benzo(g)perylene | 1 |
| | | | | Benzo(k)fluoranthene | 0.44 |
| | | | | bis(2-Ethylhexyl)phthalate | 2.3 |
| | | | | Chrysene | 1 |
| | | | | Dibenzo(a,h)anthracene | 0.2 |
| | | | | Fluoranthene | 1.2 |
| | | | | Fluorene | 0.092 J |
| | | | | Indeno(1,2,3-cd)pyrene | 0.76 |
| | | | | Phenanthrene | 0.6 |
| | | | | Pyrene | 1.6 |
| | | | | Total PAHs | 10.490 |
| | SED-04-A/39-45 | 3.25-3.75 | 12/19/2002 | Acenaphthene | 0.04 |
| | | | | Acenaphthylene | 0.29 |
| | | | | Anthracene | 0.97 |
| | | | | Benzo(a)pyrene | 2 |
| | | | | Benzo(a)anthracene | 2 |
| | | | | Benzo(g)perylene | 2.4 |
| | | | | Benzo(k)fluoranthene | 0.46 |
| | | | | bis(2-Ethylhexyl)phthalate | 5.2 J |
| | | | | Chrysene | 2.8 |
| | | | | Dibenzo(a,h)anthracene | 0.49 |
| | | | | Fluoranthene | 2.5 |
| | | | | Fluorene | 1.3 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.96 |
| | | | | 2-Methylnaphthalene | 1.4 |
| | | | | Naphthalene | 0.42 |
| | | | | Phenanthrene | 4.5 |
| | | | | Pyrene | 6.1 |
| | | | | Total PAHs | 30.92 |
| | SED-04-A/0.0-0.5 | 0-0.5 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 900 |
| | SED-04-A/0.5-1.0 | 0.5-1 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 2400 |
| | SED-04-A/3.25-3.75 | 3.25-3.75 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 14000 |
| SED-04-B | SED-04-B/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.092 |
| | | | | Anthracene | 0.28 |
| | | | | Benzo(a)pyrene | 0.6 |
| | | | | Benzo(a)anthracene | 0.81 |
| | | | | Benzo(g)perylene | 0.5 |
| | | | | bis(2-Ethylhexyl)phthalate | 0.85 |
| | | | | Chrysene | 0.88 |
| | | | | Dibenzo(a,h)anthracene | 0.11 |
| | | | | Fluoranthene | 1.1 |
| | | | | Fluorene | 0.092 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.41 |
| | | | | Phenanthrene | 1 |
| | | | | Pyrene | 1.4 |
| | | | | Total PAHs | 7.796 |
| | SED-04-B/0.0-0.5 | 0-0.5 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 400 |
| | SED-04-B/0.5-1.0 | 0.5-1 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 1400 |
| | SED-04-B/2.0-2.5(A) | 2-2.5 | 10/1/2019 | bis(2-Ethylhexyl)phthalate | 0.26 |
| | | | | Fluorene | 0.048 |
| | | | | 2-Methylnaphthalene | 0.092 |
| | | | | EPH, TOTAL FRACTIONATED | 1500 |
| | SED-04-B/2.0-2.5(B) | 2-2.5 | 10/1/2019 | Benzo(g)perylene | 0.2 |
| | | | | 2-Methylnaphthalene | 0.14 J |
| | | | | EPH, TOTAL FRACTIONATED | 720 |
| SED-04-C(R) | SED-04-C(R) | 1.5-2 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 1640 |
| | SED-04-C(R)/0.0-0.5 | 0-0.5 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 33000 |
| | SED-04-C(R)/0.5-1.0 | 0.5-1 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 24000 |
| | SED-04-C(R)/1.5-2.0 | 1.5-2 | 10/1/2019 | Anthracene | 0.79 |
| | | | | Benzo(a)anthracene | 0.31 |
| | | | | Chrysene | 0.61 |
| | | | | Fluoranthene | 0.64 |
| | | | | Fluorene | 0.78 |
| | | | | 2-Methylnaphthalene | 2.3 |
| | | | | Naphthalene | 0.6 |
| | | | | Phenanthrene | 3.5 |
| | | | | Pyrene | 1.6 |
| | | | | Total PAHs | 11.68 |
| | SED-04-C(R)/2.0-2.5 | 2-2.5 | 10/1/2019 | Acenaphthylene | 0.07 |
| | | | | Anthracene | 2.5 |
| | | | | Benzo(a)pyrene | 0.76 |
| | | | | Benzo(a)anthracene | 1 |
| | | | | Benzo(g)perylene | 0.93 |
| | | | | Chrysene | 1.8 |
| | | | | Fluoranthene | 1.7 |
| | | | | Fluorene | 2.6 |
| | | | | 2-Methylnaphthalene | 12 |
| | | | | Naphthalene | 1.6 |
| | | | | Phenanthrene | 11 |
| | | | | Pyrene | 4.6 |
| | | | | Total PAHs | 41.76 |
| SED-05-A | SED-05-A/0-6 | 0-0.5 | 12/19/2002 | EPH, TOTAL FRACTIONATED | 4900 |
| | | | | Acenaphthene | 0.046 J |
| | | | | Acenaphthylene | 0.088 |
| | | | | Anthracene | 0.19 |
| | | | | Benzo(a)pyrene | 1.3 |
| | | | | Benzo(a)anthracene | 0.93 |
| | | | | Benzo(g)perylene | 1.3 |
| | | | | Benzo(k)fluoranthene | 0.43 |
| | | | | bis(2-Ethylhexyl)phthalate | 2.7 J |
| | | | | Chrysene | 1.1 |
| | | | | Dibenzo(a,h)anthracene | 0.28 |
| | | | | Fluoranthene | 1.1 |
| | | | | Fluorene | 0.072 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.84 |
| | | | | Phenanthrene | 0.7 |
| | | | | Pyrene | 2.3 |
| | | | | Total PAHs | 11.616 |
| | SED-05-A/0.0-0.5 | 0-0.5 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 1400 |
| | SED-05-A/0.5-1.0 | 0.5-1 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 1900 |
| | SED-05-A/2.0-2.5 | 2-2.5 | 10/1/2019 | Acenaphthene | 0.078 |
| | | | | Anthracene | 0.32 |
| | | | | Benzo(a)pyrene | 0.99 |
| | | | | Benzo(a)anthracene | 1.1 |
| | | | | Benzo(g)perylene | 0.79 |
| | | | | Benzo(k)fluoranthene | 0.43 |
| | | | | bis(2-Ethylhexyl)phthalate | 2.6 |
| | | | | Chrysene | 1.1 |
| | | | | Dibenzo(a,h)anthracene | 0.18 |
| | | | | Fluoranthene | 1.8 |
| | | | | Fluorene | 0.07 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.84 |
| | | | | Phenanthrene | 0.83 |
| | | | | Pyrene | 1.7 |
| | | | | Total PAHs | 10.951 |
| SED-05-B | SED-05-B/0-6 | 0-0.5 | 12/19/2002 | EPH, TOTAL FRACTIONATED | 2500 |
| | | | | Benzo(g)perylene | 0.27 |
| | | | | bis(2-Ethylhexyl)phthalate | 0.81 |
| | | | | Dibenzo(a,h)anthracene | 0.064 |
| | SED-05-B/0.0-0.5 | 0-0.5 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 32 |
| | SED-05-B/0.5-1.0 | 0.5-1 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 56 |
| | SED-05-B/2.0-2.5 | 2-2.5 | 10/1/2019 | Acenaphthene | 0.18 |
| | | | | Acenaphthylene | 0.07 |
| | | | | Anthracene | 0.63 |
| | | | | Benzo(a)pyrene | 1.8 |
| | | | | Benzo(a)anthracene | 2.3 |
| | | | | Benzo(g)perylene | 1.2 |
| | | | | Benzo(k)fluoranthene | 0.72 |
| | | | | bis(2-Ethylhexyl)phthalate | 2.8 |
| | | | | Chrysene | 2.4 |
| | | | | Dibenzo(a,h)anthracene | 0.26 |
| | | | | Fluoranthene | 3.1 |
| | | | | Fluorene | 0.21 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.81 |
| | | | | 2-Methylnaphthalene | 0.13 |
| | | | | Phenanthrene | 1.6 |
| | | | | Pyrene | 3.6 |
| | | | | Total PAHs | 20.88 |
| SED-05-C | SED-05-C/0-6 | 0-0.5 | 12/19/2002 | EPH, TOTAL FRACTIONATED | 3500 |
| | | | | Acenaphthene | 0.088 |
| | | | | Acenaphthylene | 0.11 |
| | | | | Anthracene | 0.18 |
| | | | | Benzo(a)pyrene | 0.71 |
| | | | | Benzo(a)anthracene | 0.54 |
| | | | | Benzo(g)perylene | 0.88 |
| | | | | Benzo(k)fluoranthene | 0.32 |
| | | | | bis(2-Ethylhexyl)phthalate | 1.6 |
| | | | | Chrysene | 0.96 |
| | | | | Dibenzo(a,h)anthracene | 0.17 |
| | | | | Fluoranthene | 1.1 |
| | | | | Fluorene | 0.085 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.64 |
| | | | | 2-Methylnaphthalene | 0.13 |
| | | | | Pyrene | 1.4 |
| | | | | Total PAHs | 9.293 |
| | SED-05-C/0.0-0.5 | 0-0.5 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 170 |
| | SED-05-C/0.5-1.0 | 0.5-1 | 10/1/2019 | EPH, TOTAL FRACTIONATED | 5000 |
| | SED-05-C/6.0-6.5 | 6-6.5 | 10/1/2019 | Acenaphthene | 0.88 |
| | | | | Anthracene | 0.86 |
| | | | | Benzo(a)anthracene | 0.44 |
| | | | | Chrysene | 0.6 |
| | | | | Fluoranthene | 1 |
| | | | | Fluorene | 0.83 |
| | | | | 2-Methylnaphthalene | 3.3 |
| | | | | Naphthalene | 0.82 |
| | | | | Phenanthrene | 2.6 |
| | | | | Pyrene | 1.5 |
| | | | | Total PAHs | 13.823 |
| | | | | EPH, TOTAL FRACTIONATED | 4900 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-06-A | SED-06-A/0-6 | 0-0.5 | 12/19/2002 | bis(2-Ethylhexyl)phthalate | 0.69 J |
| | SED-06-A/0.0-0.5 | 0-0.5 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 2800 |
| | SED-06-A/0.5-1.0 | 0.5-1 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 3600 |
| SED-06-B | SED-06-B/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.46 |
| | | | | Acenaphthylene | 0.34 |
| | | | | Anthracene | 1 |
| | | | | Benzo(a)pyrene | 0.66 |
| | | | | Benzo(a)anthracene | 1.2 |
| | | | | Benzo(g)perylene | 0.37 |
| | | | | Benzo(k)fluoranthene | 0.29 |
| | | | | bis(2-Ethylhexyl)phthalate | 7 J |
| | | | | Chrysene | 1.4 |
| | | | | Dibenzo(a,h)anthracene | 0.1 J |
| | | | | Fluoranthene | 1.8 |
| | | | | Fluorene | 0.07 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.32 |
| | | | | 2-Methylnaphthalene | 0.29 J |
| | | | | Phenanthrene | 0.7 |
| | | | | Pyrene | 1.9 |
| | | | | Total PAHs | 8.674 |
| | SED-06-B/(R) | 4-4.5 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 3200 |
| | SED-06-B/(R)/0.0-0.5 | 0-0.5 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 10 J |
| | SED-06-B/(R)/0.5-1.0 | 0.5-1 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 13 |
| | SED-06-B/(R)/4.0-4.5 | 4-4.5 | 10/2/2019 | Anthracene | 0.1 |
| | | | | bis(2-Ethylhexyl)phthalate | 0.98 |
| | | | | Fluorene | 0.096 |
| | | | | Phenanthrene | 0.26 |
| SED-06-C | SED-06-C/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.056 |
| | | | | Acenaphthylene | 0.05 |
| | | | | Anthracene | 0.2 |
| | | | | Benzo(a)pyrene | 0.94 |
| | | | | Benzo(a)anthracene | 0.8 |
| | | | | Benzo(g)perylene | 0.94 |
| | | | | Benzo(k)fluoranthene | 0.46 |
| | | | | bis(2-Ethylhexyl)phthalate | 3.7 |
| | | | | Chrysene | 1.1 |
| | | | | Dibenzo(a,h)anthracene | 0.14 |
| | | | | Fluoranthene | 1.2 |
| | | | | Fluorene | 0.059 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.44 |
| | | | | Phenanthrene | 0.72 |
| | | | | Pyrene | 1.7 |
| | | | | Total PAHs | 9.950 |
| | SED-06-C/0.0-0.5 | 0-0.5 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 1200 |
| | SED-06-C/0.5-1.0 | 0.5-1 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 1800 |
| | SED-06-C/4.0-4.5(A) | 4-4.5 | 10/2/2019 | Acenaphthene | 0.21 |
| | | | | Anthracene | 0.61 |
| | | | | Benzo(a)pyrene | 0.99 |
| | | | | Benzo(a)anthracene | 0.95 |
| | | | | Benzo(g)perylene | 0.44 |
| | | | | bis(2-Ethylhexyl)phthalate | 1.8 |
| | | | | Chrysene | 1.2 |
| | | | | Dibenzo(a,h)anthracene | 0.13 |
| | | | | Fluoranthene | 1.3 |
| | | | | Fluorene | 0.52 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.26 |
| | | | | 2-Methylnaphthalene | 2.3 |
| | | | | Phenanthrene | 2.5 |
| | | | | Pyrene | 2 |
| | | | | Total PAHs | 13.98 |
| | SED-06-C/4.0-4.5(B) | 4-4.5 | 10/2/2019 | EPH, TOTAL FRACTIONATED | 2500 |
| | | | | Acenaphthene | 0.05 |
| | | | | Acenaphthylene | 0.31 |
| | | | | Anthracene | 0.97 |
| | | | | Benzo(a)pyrene | 0.65 |
| | | | | Benzo(a)anthracene | 1.1 |
| | | | | Benzo(g)perylene | 0.73 |
| | | | | bis(2-Ethylhexyl)phthalate | 5.4 |
| | | | | Chrysene | 1.8 |
| | | | | Dibenzo(a,h)anthracene | 0.16 J |
| | | | | Fluoranthene | 1.4 |
| | | | | Fluorene | 1.2 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.29 |
| | | | | 2-Methylnaphthalene | 6.7 |
| | | | | Phenanthrene | 4.4 |
| | | | | Pyrene | 2.3 |
| | | | | Total PAHs | 23.22 |
| | | | | EPH, TOTAL FRACTIONATED | 14000 |
| SED-09-A | SED-09-A/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.022 |
| | | | | Acenaphthylene | 0.053 |
| | | | | Anthracene | 0.29 |
| | | | | Benzo(a)pyrene | 0.56 |
| | | | | Benzo(a)anthracene | 0.69 |
| | | | | Benzo(g)perylene | 0.24 |
| | | | | bis(2-Ethylhexyl)phthalate | 4.2 |
| | | | | Chrysene | 1.1 |
| | | | | Dibenzo(a,h)anthracene | 0.07 |
| | | | | Fluoranthene | 0.71 |
| | | | | Fluorene | 0.028 |
| | | | | Pyrene | 1.9 |
| | | | | Total PAHs | 8.874 |
| SED-09-A/(R) | SED-09-A/(R) | 3-3.5 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 5110 |
| | SED-09-A/(R)/0.0-0.5 | 0-0.5 | 10/7/2019 | EPH, TOTAL FRACTIONATED | 980 |
| | SED-09-A/(R)/0.5-1.0 | 0.5-1 | 10/7/2019 | EPH, TOTAL FRACTIONATED | 2600 |
| | SED-09-A/(R)/3.0-3.5 | 3-3.5 | 10/7/2019 | Anthracene | 0.16 J |
| | | | | Fluorene | 0.2 |
| | | | | 2-Methylnaphthalene | 1.8 |
| | | | | Naphthalene | 0.24 |
| | | | | Phenanthrene | 0.56 |
| SED-09-B | SED-09-B/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.2 |
| | | | | Acenaphthylene | 0.062 |
| | | | | Anthracene | 0.67 |
| | | | | Benzo(a)pyrene | 1.7 |
| | | | | Benzo(a)anthracene | 1.8 |
| | | | | Benzo(b)fluoranthene | 2.1 |
| | | | | Benzo(g)perylene | 1 |
| | | | | Benzo(k)fluoranthene | 0.95 |
| | | | | bis(2-Ethylhexyl)phthalate | 1.4 |
| | | | | Chrysene | 2.1 |
| | | | | Dibenzo(a,h)anthracene | 0.28 |
| | | | | Fluoranthene | 3.3 |
| | | | | Fluorene | 0.22 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.99 |
| | | | | Phenanthrene | 2 |
| | | | | Pyrene | 4.6 |
| | | | | Total PAHs | 21.187 |
| | SED-09-B/0.0-0.5 | 0-0.5 | 10/7/2019 | EPH, TOTAL FRACTIONATED | 35 |
| | SED-09-B/0.5-1.0 | 0.5-1 | 10/7/2019 | EPH, TOTAL FRACTIONATED | 130 |
| SED-09-B/(R) | SED-09-B/(R)/5.0-5.5 | 5-5.5 | 10/7/2019 | Acenaphthene | 0.16 J |
| | | | | Anthracene | 0.32 |
| | | | | Benzo(a)pyrene | 0.49 |
| | | | | Benzo(a)anthracene | 0.42 |
| | | | | Benzo(g)perylene | 0.60 |
| | | | | bis(2-Ethylhexyl)phthalate | 3.6 |
| | | | | Chrysene | 0.6 |
| | | | | Dibenzo(a,h)anthracene | 0.14 J |
| | | | | Fluoranthene | 0.9 |
| | | | | Fluorene | 0.33 |
| | | | | 2-Methylnaphthalene | 0.48 J |
| | | | | Phenanthrene | 1 |
| | | | | Pyrene | 1.1 |
| | | | | Total PAHs | 7.33 |
| | | | | EPH, TOTAL FRACTIONATED | 4600 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-09-C | SED-09-C/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | 0.099 |
| | | | | Acenaphthylene | 0.093 |
| | | | | Anthracene | 0.31 |
| | | | | Benzo(a)pyrene | 1.6 |
| | | | | Benzo(a)anthracene | 1.2 |
| | | | | Benzo(b)fluoranthene | 2.3 |
| | | | | Benzo(g)perylene | 1 |
| | | | | Benzo(k)fluoranthene | 0.71 |
| | | | | Chrysene | 1.7 |
| | | | | Dibenzo(a,h)anthracene | 0.23 |
| | | | | Fluoranthene | 2.1 |
| | | | | Fluorene | 0.095 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.8 |
| | | | | 2-Methylnaphthalene | 0.98 |
| | | | | Phenanthrene | 2.8 |
| | | | | Pyrene | 3.8 |
| | | | | Total PAHs | 16.049 |
| | SED-09-C/39-39 | 2.75-3.25 | 12/19/2002 | Acenaphthene | 7.2 |
| | | | | Acenaphthylene | 0.87 |
| | | | | Anthracene | 3.1 |
| | | | | Benzo(a)pyrene | 13 |
| | | | | Benzo(a)anthracene | 6.5 |
| | | | | Benzo(b)fluoranthene | 5.8 |
| | | | | Benzo(g)perylene | 18 |
| | | | | Benzo(k)fluoranthene | 1.2 |
| | | | | bis(2-Ethylhexyl)phthalate | 37 |
| | | | | Chrysene | 13 |
| | | | | Dibenzo(a,h)anthracene | 4 |
| | | | | Fluoranthene | 5.5 |
| | | | | Fluorene | 3.8 |
| | | | | Indeno(1,2,3-cd)pyrene | 4.1 |
| | | | | 2-Methylnaphthalene | 21 |
| | | | | Naphthalene | 5.9 |
| | | | | Phenanthrene | 19 |
| | | | | Pyrene | 13 |
| | | | | Total PAHs | 145.87 |
| SED-09-C(R) | SED-09-C(R) | 4-5.5 | 3/20/2014 | EPH, TOTAL FRACTIONATED | 27700 |
| | SED-09-C(R)/0.0-0.5 | 0-0.5 | 10/16/2019 | EPH, TOTAL FRACTIONATED | 1300 |
| | SED-09-C(R)/0.5-1.0 | 0.5-1 | 10/16/2019 | EPH, TOTAL FRACTIONATED | 4200 |
| | SED-09-C(R)/2.75-3.25 | 2.75-3.25 | 10/16/2019 | EPH, TOTAL FRACTIONATED | 6900 |
| | SED-09-C(R)/4.5-5.0 | 4.5-5 | 10/16/2019 | Anthracene | 1.3 |
| | | | | Benzo(a)pyrene | 0.98 |
| | | | | Benzo(a)anthracene | 1 |
| | | | | Benzo(g)perylene | 0.8 |
| | | | | Benzo(k)fluoranthene | 0.36 |
| | | | | bis(2-Ethylhexyl)phthalate | 6.5 |
| | | | | Chrysene | 1.8 |
| | | | | Dibenzo(a,h)anthracene | 0.21 J |
| | | | | Fluoranthene | 1.5 |
| | | | | Fluorene | 7.6 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.33 J |
| | | | | 2-Methylnaphthalene | 77 |
| | | | | Naphthalene | 5 |
| | | | | Phenanthrene | 6.1 |
| | | | | Pyrene | 3.4 |
| | | | | Total PAHs | 41.3 |
| SED-23-A | SED-23-A/0.0-0.5 | 0-0.5 | 10/2/2019 | Anthracene | 0.3 |
| | | | | Benzo(a)anthracene | 0.32 |
| | | | | bis(2-Ethylhexyl)phthalate | 1.2 J |
| | | | | Chrysene | 0.4 |
| | | | | Fluoranthene | 0.71 |
| | | | | Fluorene | 0.53 |
| | | | | 2-Methylnaphthalene | 0.28 J |
| | | | | Pyrene | 1.6 |
| | | | | Total PAHs | 5.89 |
| | | | | EPH, TOTAL FRACTIONATED | 18000 |
| | SED-23-A/2.0-2.5 | 2-2.5 | 10/2/2019 | Acenaphthene | 1.2 |
| | | | | Anthracene | 0.09 |
| | | | | Benzo(a)pyrene | 0.46 |
| | | | | Benzo(a)anthracene | 0.72 |
| | | | | Benzo(g)perylene | 0.34 |
| | | | | Chrysene | 1 |
| | | | | Dibenzo(a,h)anthracene | 0.083 J |
| | | | | Fluoranthene | 1.6 |
| | | | | Fluorene | 1.5 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.33 |
| | | | | 2-Methylnaphthalene | 4.1 |
| | | | | Naphthalene | 0.38 |
| | | | | Phenanthrene | 3.6 |
| | | | | Pyrene | 2.5 |
| | | | | Total PAHs | 19.413 |
| | | | | EPH, TOTAL FRACTIONATED | 23000 |
| SED-23-B | SED-23-B/0.0-0.5 | 0-0.5 | 10/2/2019 | Benzo(a)anthracene | 0.35 |
| | | | | Benzo(g)perylene | 0.35 |
| | | | | bis(2-Ethylhexyl)phthalate | 0.47 |
| | | | | Dibenzo(a,h)anthracene | 0.071 |
| | | | | Fluoranthene | 0.68 |
| | | | | Indeno(1,2,3-cd)pyrene | 0.25 |
| | | | | Phenanthrene | 0.26 |
| | | | | Total PAHs | 4.216 |
| | | | | EPH, TOTAL FRACTIONATED | 220 |
| | SED-23-B/6

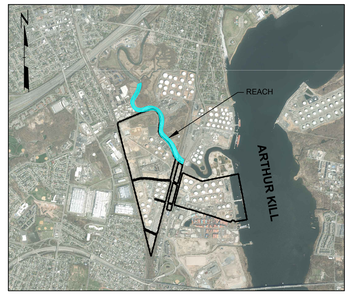



## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- △ SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- ▲ PREVIOULSY SAMPLED LOCATION REVISITED IN 2019

## NOTES:

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACCESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).




## KEYMAP

SCALE: 1"=2500'

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-03-A | SED-03-A/0-6 | 0-0.5 | 12/19/2002 | Aluminum | 21000 |
| | | | | Arsenic | **52.4** |
| | | | | Barium | 181 |
| | | | | Cadmium | 13 |
| | | | | Chromium | **128** |
| | | | | Cobalt | 51 |
| | | | | Copper | **2210** |
| | | | | Lead | **264** |
| | | | | Mercury | 3.2 |
| | | | | Nickel | **627** |
| | | | | Selenium | 88.1 |
| | | | | Silver | 4.2 J |
| | | | | Vanadium | 73.2 |
| | | | | Zinc | **743** |
| | SED-03-A/6.0-6.5 | 6-6.5 | 9/30/2019 | Aluminum | 20100 |
| | | | | Antimony | 10.4 |
| | | | | Arsenic | **117** |
| | | | | Barium | 458 |
| | | | | Cadmium | **7.38** |
| | | | | Chromium | **119** |
| | | | | Cobalt | 12.5 |
| | | | | Copper | **765** |
| | | | | Lead | **429** |
| | | | | Manganese | 342 |
| | | | | Mercury | **2.87** |
| | | | | Nickel | **53.7** |
| | | | | Selenium | 7.92 |
| | | | | Silver | **5** |
| | | | | Vanadium | 91.5 |
| | | | | Zinc | **749** |
| SED-03-B | SED-03-B/0-6 | 0-0.5 | 12/19/2002 | Arsenic | **16.8** |
| | | | | Cobalt | 18 |
| | | | | Copper | **629** |
| | | | | Lead | **166** |
| | | | | Mercury | **0.42** |
| | | | | Nickel | **125** |
| | | | | Selenium | 43.1 |
| | | | | Silver | 1.1 J |
| | | | | Zinc | **441** |
| SED-03-B(R) | SED-03-B(R)/1.5-2.0 | 1.5-2.0 | 9/30/2019 | Aluminum | 18500 |
| | | | | Arsenic | **17.8** |
| | | | | Barium | 65.4 |
| | | | | Cadmium | **2.16** |
| | | | | Cobalt | 20.9 |
| | | | | Copper | **950** |
| | | | | Lead | **167** |
| | | | | Mercury | **0.455** |
| | | | | Nickel | **163** |
| | | | | Selenium | 37 |
| | | | | Silver | **1.89** |
| | | | | Vanadium | 60.1 |
| | | | | Zinc | **313** |
| | SED-03-B(R)/4.5-5.0 | 4.5-5 | 9/30/2019 | Arsenic | **17.8** |
| | | | | Barium | 74.4 |
| | | | | Cobalt | 11.6 |
| | | | | Copper | **100** |
| | | | | Lead | **58.1** |
| | | | | Manganese | 495 |
| | | | | Mercury | **0.498** |
| | | | | Nickel | **38.1** |
| SED-03-C | SED-03-C/0-6 | 0-0.5 | 12/19/2002 | Aluminum | 19000 |
| | | | | Arsenic | **65.7** |
| | | | | Barium | 128 |
| | | | | Cadmium | **11.1** |
| | | | | Chromium | **142** |
| | | | | Cobalt | 13.2 |
| | | | | Copper | **664** |
| | | | | Lead | **381** |
| | | | | Mercury | **4.1** |
| | | | | Nickel | **96.2** |
| | | | | Selenium | 38 |
| | | | | Silver | **4.1** J |
| | | | | Vanadium | 95.5 |
| | | | | Zinc | **690** |
| | SED-03-C/1.2-1.8 | 1-1.5 | 12/19/2002 | Aluminum | 21500 |
| | | | | Arsenic | **91.7** |
| | | | | Barium | 272 |
| | | | | Cadmium | **8.2** |
| | | | | Chromium | **166** |
| | | | | Cobalt | 13.2 |
| | | | | Copper | **651** |
| | | | | Lead | **399** |
| | | | | Manganese | 277 |
| | | | | Mercury | **5.8** |
| | | | | Nickel | **53** |
| | | | | Selenium | 7.1 |
| | | | | Silver | **3.9** J |
| | | | | Vanadium | 62.5 |
| | | | | Zinc | **676** |
| | SED-03-C/30-36 | 2.5-3 | 12/19/2002 | Aluminum | 25200 |
| | | | | Arsenic | **39.2** |
| | | | | Barium | 121 |
| | | | | Cadmium | **2.6** J |
| | | | | Cobalt | 13.8 |
| | | | | Copper | **121** |
| | | | | Lead | **82.6** |
| | | | | Manganese | 363 |
| | | | | Mercury | 1.3 |
| | | | | Nickel | **36.1** |
| | | | | Selenium | 3.3 |
| | | | | Silver | **1.3** J |
| | | | | Zinc | **210** |
| SED-03-C(R) | SED-03-C(R)/1.5-2.0 | 1.5-2 | 9/30/2019 | Aluminum | 18700 |
| | | | | Arsenic | **82** |
| | | | | Barium | 216 |
| | | | | Cadmium | **11.9** |
| | | | | Chromium | **114** |
| | | | | Cobalt | 11.3 |
| | | | | Copper | **1000** |
| | | | | Lead | **318** |
| | | | | Mercury | **8.64** |
| | | | | Nickel | **92.2** |
| | | | | Selenium | 14.1 |
| | | | | Silver | **4.92** |
| | | | | Vanadium | 70.5 |
| | | | | Zinc | **783** |
| | SED-03-C(R)/6.0-6.5 | 6-6.5 | 9/30/2019 | Aluminum | 24100 |
| | | | | Arsenic | **36.5** |
| | | | | Barium | 96.7 |
| | | | | Cobalt | 12.3 |
| | | | | Copper | **106** |
| | | | | Lead | **57.2** |
| | | | | Manganese | 319 |
| | | | | Mercury | **0.752** |
| | | | | Nickel | **31.4** |
| | | | | Silver | **1.7** J |
| | | | | Zinc | **170** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-04-A | SED-04-A/0-6 | 0-0.5 | 12/19/2002 | Arsenic | **9.4** |
| | | | | Cadmium | **2** J |
| | | | | Copper | **313** |
| | | | | Lead | **113** |
| | | | | Mercury | **0.49** |
| | | | | Nickel | **64.2** |
| | | | | Selenium | 15.5 |
| | | | | Zinc | **283** |
| | SED-04-A/3.25-3.75 | 3.25-3.75 | 10/1/2019 | Arsenic | **70** |
| | | | | Barium | 208 |
| | | | | Cadmium | **5.77** |
| | | | | Chromium | **127** |
| | | | | Cobalt | 11.4 |
| | | | | Copper | **638** |
| | | | | Lead | **399** |
| | | | | Manganese | 284 |
| | | | | Mercury | **4.78** |
| | | | | Nickel | **65.2** |
| | | | | Selenium | 2.7 J |
| | | | | Silver | **3.3** |
| | | | | Zinc | **616** |
| | SED-04-A/9.25-9.75 | 9.25-9.75 | 10/1/2019 | Arsenic | **43.6** |
| | | | | Barium | 96.4 |
| | | | | Cadmium | 3 J |
| | | | | Cobalt | 23.5 |
| | | | | Copper | **322** |
| | | | | Lead | **393** |
| | | | | Mercury | **1.7** |
| | | | | Nickel | **53.4** |
| | | | | Selenium | 6.5 |
| | | | | Silver | **1.5** J |
| | | | | Zinc | **550** |
| SED-04-B | SED-04-B/0-6 | 0-0.5 | 12/19/2002 | Copper | **313** |
| | | | | Lead | **68.1** |
| | | | | Mercury | **0.18** |
| | | | | Nickel | **55.4** |
| | | | | Selenium | 12.7 |
| | | | | Zinc | **228** |
| | SED-04-B/2.0-2.5(A) | 2-2.5 | 10/1/2019 | Arsenic | **34.4** |
| | | | | Barium | 104 |
| | | | | Cadmium | **1.32** |
| | | | | Copper | **157** |
| | | | | Lead | **115** |
| | | | | Mercury | **1.28** |
| | | | | Nickel | **28.3** |
| | | | | Zinc | **222** |
| | SED-04-B/2.0-2.5(B) | 2-2.5 | 10/1/2019 | Arsenic | **28.5** |
| | | | | Barium | 68.5 |
| | | | | Cobalt | 12.6 |
| | | | | Copper | **131** |
| | | | | Lead | **61.6** |
| | | | | Manganese | 398 |
| | | | | Mercury | **0.641** |
| | | | | Nickel | **41.1** |
| | | | | Zinc | **232** |
| SED-04-C | SED-04-C/0-6 | 0-0.5 | 12/19/2002 | Aluminum | 23400 |
| | | | | Arsenic | **8.6** |
| | | | | Barium | 51.9 |
| | | | | Cadmium | **1.4** J |
| | | | | Cobalt | 10.4 J |
| | | | | Manganese | 281 |
| | | | | Nickel | **28.6** |
| | | | | Selenium | 1.7 J |
| SED-04-C(R) | SED-04-C(R)/1.5-2.0 | 1.5-2 | 10/1/2019 | Aluminum | 22300 |
| | | | | Arsenic | **39.4** |
| | | | | Barium | 300 |
| | | | | Chromium | **82.9** |
| | | | | Cobalt | 10.7 |
| | | | | Copper | **260** |
| | | | | Lead | **212** |
| | | | | Mercury | **1.18** |
| | | | | Nickel | **37.1** |
| | | | | Zinc | **269** |
| | SED-04-C(R)/2.0-2.5 | 2-2.5 | 10/1/2019 | Aluminum | 19900 |
| | | | | Arsenic | **68.2** |
| | | | | Barium | 173 |
| | | | | Cadmium | **1.26** |
| | | | | Cobalt | 10.6 |
| | | | | Copper | **403** |
| | | | | Lead | **218** |
| | | | | Manganese | 280 |
| | | | | Mercury | **2.18** |
| | | | | Nickel | **54.9** |
| | | | | Selenium | 7 J |
| | | | | Zinc | **335** |
| SED-05-A | SED-05-A/0-6 | 0-0.5 | 12/19/2002 | Arsenic | **11.7** |
| | | | | Cadmium | **1.6** J |
| | | | | Copper | **555** |
| | | | | Lead | **107** |
| | | | | Mercury | **0.19** |
| | | | | Nickel | **86.9** |
| | | | | Selenium | 3.9 |
| | | | | Zinc | **359** |
| | SED-05-A/2.0-2.5 | 2-2.5 | 10/1/2019 | Arsenic | **27.1** |
| | | | | Barium | 78.4 |
| | | | | Cadmium | **5.53** |
| | | | | Cobalt | 19.5 |
| | | | | Copper | **2450** |
| | | | | Lead | **411** |
| | | | | Mercury | **0.355** |
| | | | | Nickel | **272** |
| | | | | Selenium | 3.71 J |
| | | | | Zinc | **1550** |
| SED-05-B | SED-05-B/0-6 | 0-0.5 | 12/19/2002 | Copper | **355** |
| | | | | Lead | **47.1** |
| | | | | Nickel | **38.7** |
| | | | | Selenium | 4.4 |
| | | | | Zinc | **174** |
| | SED-05-B/2.0-2.5 | 2-2.5 | 10/1/2019 | Arsenic | **18.6** |
| | | | | Cadmium | **4.49** |
| | | | | Cobalt | 13.6 |
| | | | | Copper | **1090** |
| | | | | Lead | **149** |
| | | | | Mercury | **0.279** |
| | | | | Nickel | **184** |
| | | | | Selenium | 9.75 |
| | | | | Zinc | **1060** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-05-C | SED-05-C/0-6 | 0-0.5 | 12/19/2002 | Aluminum | 21400 |
| | | | | Arsenic | **34.4** |
| | | | | Barium | 129 |
| | | | | Cadmium | **2.8** J |
| | | | | Chromium | **97.5** |
| | | | | Cobalt | 85.9 |
| | | | | Copper | **6030** |
| | | | | Lead | **378** |
| | | | | Manganese | 322 |
| | | | | Mercury | **2** |
| | | | | Nickel | **2450** |
| | | | | Selenium | 5.2 |
| | | | | Silver | **5.4** |
| | | | | Vanadium | 66 |
| | | | | Zinc | **2970** |
| | SED-05-C/6.0-6.5 | 6-6.5 | 10/1/2019 | Arsenic | **76.1** |
| | | | | Barium | 257 |
| | | | | Cadmium | **1.64** |
| | | | | Cobalt | 10.6 |
| | | | | Copper | **455** |
| | | | | Lead | **238** |
| | | | | Manganese | 309 |
| | | | | Mercury | **1.65** |
| | | | | Nickel | **60.5** |
| | | | | Selenium | 4.52 J |
| | | | | Silver | **1.11** J |
| | | | | Zinc | **490** |
| SED-06-A | SED-06-A/0-6 | 0-0.5 | 12/19/2002 | Aluminum | 20900 |
| | | | | Arsenic | **14.6** |
| | | | | Barium | 48.3 |
| | | | | Cobalt | 12.5 |
| | | | | Copper | **47.2** |
| | | | | Manganese | 366 |
| | | | | Nickel | **42** |
| | SED-06-A/2.0-2.5 | 2-2.5 | 10/2/2019 | Aluminum | 19300 |
| | | | | Arsenic | **48.2** |
| | | | | Barium | 151 |
| | | | | Cadmium | **1.36** |
| | | | | Cobalt | 11.9 |
| | | | | Copper | **369** |
| | | | | Lead | **189** |
| | | | | Manganese | 406 |
| | | | | Mercury | **1.13** |
| | | | | Nickel | **48.9** |
| | | | | Silver | **1.9** |
| | | | | Zinc | **344** |
| SED-06-B | SED-06-B/0-6 | 0-0.5 | 12/19/2002 | Arsenic | **8.5** |
| | | | | Copper | **206** |
| | | | | Lead | **90.4** |
| | | | | Nickel | **59.8** |
| | | | | Selenium | 4.4 |
| | | | | Zinc | **323** |
| SED-06-B(R) | SED-06-B(R)/4.0-4.5 | 4-4.5 | 10/2/2019 | Arsenic | **93** |
| | | | | Barium | 221 |
| | | | | Cadmium | **5.1** |
| | | | | Chromium | **105** |
| | | | | Copper | **408** |
| | | | | Lead | **273** |
| | | | | Mercury | **3.85** |
| | | | | Nickel | **39.5** |
| | | | | Silver | **3.6** |
| | | | | Zinc | **422** |
| SED-06-C | SED-06-C/0-6 | 0-0.5 | 12/19/2002 | Arsenic | **8.5** |
| | | | | Barium | 51.2 |
| | | | | Cadmium | **1.5** J |
| | | | | Copper | **223** |
| | | | | Lead | **113** |
| | | | | Mercury | **0.47** |
| | | | | Nickel | **38.4** |
| | | | | Selenium | 9.8 |
| | | | | Zinc | **258** |
| | SED-06-C/4.0-4.5(A) | 4-4.5 | 10/2/2019 | Arsenic | **44.2** |
| | | | | Barium | 133 |
| | | | | Cadmium | **2.38** |
| | | | | Cobalt | 10.1 |
| | | | | Copper | **775** |
| | | | | Lead | **298** |
| | | | | Mercury | **1.82** |
| | | | | Nickel | **63.4** |
| | | | | Silver | **2.14** |
| | | | | Vanadium | 69.7 |
| | | | | Zinc | **336** |
| | SED-06-C/4.0-4.5(B) | 4-4.5 | 10/2/2019 | Arsenic | **61.5** |
| | | | | Barium | 124 |
| | | | | Cadmium | **5.62** |
| | | | | Chromium | **88.1** |
| | | | | Cobalt | 10.6 |
| | | | | Copper | **593** |
| | | | | Lead | **380** |
| | | | | Mercury | **1.79** |
| | | | | Nickel | **74.6** |
| | | | | Selenium | 3.16 J |
| | | | | Silver | **3.3** |
| | | | | Vanadium | 68.5 |
| | | | | Zinc | **443** |
| SED-09-A | SED-09-A/0-6 | 0-0.5 | 12/19/2002 | Aluminum | 21000 |
| | | | | Arsenic | **17.6** |
| | | | | Barium | 78.1 |
| | | | | Cadmium | **4.3** |
| | | | | Cobalt | 17.8 |
| | | | | Copper | **450** |
| | | | | Lead | **86.3** |
| | | | | Manganese | 302 |
| | | | | Mercury | **0.45** |
| | | | | Nickel | **290** |
| | | | | Selenium | 8.9 |
| | | | | Zinc | **281** |
| SED-09-A(R) | SED-09-A(R)/0.0-3.5 | 3-3.5 | 10/7/2019 | Aluminum | 26900 |
| | | | | Arsenic | **95.3** |
| | | | | Barium | 162 |
| | | | | Cadmium | **1.87** |
| | | | | Chromium | **90.9** |
| | | | | Cobalt | 15.9 |
| | | | | Copper | **264** |
| | | | | Lead | **191** |
| | | | | Manganese | 535 |
| | | | | Mercury | **2.12** |
| | | | | Nickel | **46.2** |
| | | | | Silver | **2.58** |
| | | | | Vanadium | 79.7 |
| | | | | Zinc | **283** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-09-B | SED-09-B/0-6 | 0-0.5 | 12/19/2002 | Copper | **271** |
| | | | | Lead | **65.3** |
| | | | | Mercury | **0.19** |
| | | | | Nickel | **43.9** |
| | | | | Selenium | 1.4 |
| | | | | Zinc | **218** |
| | SED-09-B/5.0-5.5 | 5-5.5 | 10/7/2019 | Arsenic | **34.3** |
| | | | | Cadmium | **7.44** |
| | | | | Copper | **222** |
| | | | | Lead | **113** |
| | | | | Mercury | **0.268** |
| | | | | Nickel | **58.5** |
| | | | | Selenium | 13.8 |
| | | | | Zinc | **313** |
| SED-09-C | SED-09-C/0-6 | 0-0.5 | 12/19/2002 | Arsenic | **22** |
| | | | | Barium | 95.2 |
| | | | | Cadmium | **4.1** J |
| | | | | Cobalt | 18.9 |
| | | | | Copper | **545** |
| | | | | Lead | **196** |
| | | | | Mercury | **1.4** |
| | | | | Nickel | **94.5** |
| | | | | Selenium | 17.8 |
| | | | | Silver | **1.8** J |
| | | | | Vanadium | 61.1 |
| | | | | Zinc | **542** |
| | SED-09-C/33-39 | 2.75-3.25 | 12/19/2002 | Aluminum | 18100 |
| | | | | Arsenic | **64.5** |
| | | | | Barium | 139 |
| | | | | Cadmium | **13** |
| | | | | Chromium | **126** |
| | | | | Cobalt | 18.3 |
| | | | | Copper | **572** |
| | | | | Lead | **399** |
| | | | | Mercury | **4** |
| | | | | Nickel | **117** |
| | | | | Selenium | 154 |
| | | | | Silver | **3.6** J |
| | | | | Vanadium | 100 |
| | | | | Zinc | **778** |
| SED-09-C(R) | SED-09-C(R)/4.5-5.0 | 4.5-5 | 10/16/2019 | Arsenic | **155** |
| | | | | Barium | 367 |
| | | | | Cadmium | **15.2** |
| | | | | Chromium | **156** |
| | | | | Cobalt | 29.2 |
| | | | | Copper | **921** |
| | | | | Lead | **1160** |
| | | | | Mercury | **8.39** |
| | | | | Nickel | **225** |
| | | | | Silver | **18.9** |
| | | | | Vanadium | 62.3 |
| | | | | Zinc | **1240** |
| SED-23-A | SED-23-A/0.0-0.5 | 0-0.5 | 10/2/2019 | Arsenic | **330** |
| | | | | Barium | 275 |
| | | | | Cadmium | **5.92** |
| | | | | Chromium | **130** |
| | | | | Cobalt | 12.3 |
| | | | | Copper | **624** |
| | | | | Lead | **522** |
| | | | | Manganese | 287 |
| | | | | Mercury | **6.13** |
| | | | | Nickel | **72.2** |
| | | | | Silver | **4.45** |
| | | | | Vanadium | 58.4 |
| | | | | Zinc | **683** |
| | SED-23-A/2.0-2.5 | 2-2.5 | 10/2/2019 | Aluminum | 19800 |
| | | | | Antimony | 26.6 |
| | | | | Arsenic | **1100** |
| | | | | Barium | 361 |
| | | | | Cadmium | **6.49** |
| | | | | Chromium | **147** |
| | | | | Cobalt | 12.1 |
| | | | | Copper | **844** |
| | | | | Lead | **539** |
| | | | | Manganese | 360 |
| | | | | Mercury | **6.32** |
| | | | | Nickel | **85** |
| | | | | Silver | **5.93** |
| | | | | Vanadium | 61.9 |
| | | | | Zinc | **771** |
| SED-23-B | SED-23-B/0.0-0.5 | 0-0.5 | 10/2/2019 | Copper | **183** |
| | | | | Lead | **124** |
| | | | | Nickel | **50.7** |
| | | | | Selenium | 5.37 |
| | | | | Zinc | **329** |
| | SED-23-B/6.5-7.0 | 6.5-7 | 10/2/2019 | Aluminum | 19400 |
| | | | | Arsenic | **228** |
| | | | | Barium | 502 |
| | | | | Cadmium | **7.56** |
| | | | | Chromium | **161** |
| | | | | Cobalt | 11.7 |
| | | | | Copper | **699** |
| | | | | Lead | **443** |
| | | | | Manganese | 362 |
| | | | | Mercury | **7.06** |
| | | | | Nickel | **45.9** |
| | | | | Silver | **5.29** |
| | | | | Vanadium | 61.5 |
| | | | | Zinc | **950** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-23-C | SED-23-C/0.0-0.5 | 0-0.5 | 10/2/2019 | Cobalt | 10.2 |
| | | | | Copper | **97.2** |
| | | | | Lead | **68.4** |
| | | | | Nickel | **27.1** |
| | | | | Selenium | 46 |
| | | | | Zinc | **229** |
| | SED-23-C/5.5-6.0 | 5.5-6 | 10/2/2019 | Arsenic | **88.7** |
| | | | | Barium | 217 |
| | | | | Cadmium | **5.16** |
| | | | | Chromium | **90.7** |
| | | | | Cobalt | 10.3 |
| | | | | Copper | **373** |
| | | | | Lead | **313** |
| | | | | Mercury | **3.24** |
| | | | | Nickel | **37.8** |
| | | | | Silver | **3.25** |
| | | | | Zinc | **488** |
| SED-24-A | SED-24-A/0.0-0.5 | 0-0.5 | 10/4/2019 | Arsenic | **18.2** |
| | | | | Barium | 61.8 |
| | | | | Cadmium | **2.36** |
| | | | | Cobalt | 14.1 |
| | | | | Copper | **548** |
| | | | | Lead | **209** |
| | | | | Mercury | **0.847** |
| | | | | Nickel | **93.4** |
| | | | | Silver | **3** |
| | | | | Zinc | **559** |
| | SED-24-A/5.5-6.0(A) | 5.5-6 | 10/4/2019 | Arsenic | **101** |
| | | | | Barium | 288 |
| | | | | Cadmium | **9.32** |
| | | | | Chromium | **121** |
| | | | | Cobalt | 17.1 |
| | | | | Copper | **851** |
| | | | | Lead | **732** |
| | | | | Mercury | **4.77** |
| | | | | Nickel | **160** |
| | | | | Selenium | 5.53 J |
| | | | | Silver | **7.62** |
| | | | | Vanadium | 58.1 |
| | | | | Zinc | **1520** |
| | SED-24-A/5.5-6.0(B) | 5.5-6 | 10/4/2019 | Arsenic | **66.8** |
| | | | | Barium | 173 |
| | | | | Cadmium | **8.43** |
| | | | | Chromium | **81.6** |
| | | | | Cobalt | 16 |
| | | | | Copper | **539** |
| | | | | Lead | **526** |
| | | | | Mercury | **5.3** |
| | | | | Nickel | **132** |
| | | | | Selenium | 4.64 J |
| | | | | Silver | **5.8** |
| | | | | Zinc | **1010** |
| SED-24-B | SED-24-B/0.0-0.5 | 0-0.5 | 10/4/2019 | Copper | **97** |
| | | | | Lead | **49.3** |
| | | | | Nickel | **27.4** |
| | | | | Zinc | **321** |
| | SED-24-B/2.0-2.5 | 2-2.5 | 10/4/2019 | Copper | **259** |
| | | | | Lead | **54.7** |
| | | | | Nickel | **41.1** |
| | | | | Selenium | 11.1 |
| | | | | Silver | **1.06** |
| | | | | Zinc | **399** |
| SED-24-C | SED-24-C/0.0-0.5 | 0-0.5 | 10/4/2019 | Aluminum | 18600 |
| | | | | Arsenic | **61.8** |
| | | | | Barium | 210 |
| | | | | Cadmium | **6.77** |
| | | | | Chromium | **103** |
| | | | | Cobalt | 13 |
| | | | | Copper | **562** |
| | | | | Lead | **409** |
| | | | | Manganese | 272 |
| | | | | Mercury | **3.87** |
| | | | | Nickel | **94** |
| | | | | Selenium | 12.4 |
| | | | | Silver | **4.97** |
| | | | | Vanadium | 73.3 |
| | | | | Zinc | **588** |
| | SED-24-C/2.0-2.5 | 2-2.5 | 10/4/2019 | Arsenic | **33.6** |
| | | | | Barium | 129 |
| | | | | Cadmium | **2.22** |
| | | | | Cobalt | 10.6 |
| | | | | Copper | **218** |
| | | | | Lead | **181** |
| | | | | Manganese | 327 |
| | | | | Mercury | **1.41** |
| | | | | Nickel | **43** |
| | | | | Silver | **3.07** |
| | | | | Zinc | **260** |
| SED-25-A | SED-25-A/0.0-0.5 | 0-0.5 | 10/25/2019 | Arsenic | **16.4** |
| | | | | Barium | 56.1 |
| | | | | Copper | **262** |
| | | | | Lead | **114** |
| | | | | Mercury | **1.25** |
| | | | | Nickel | **38.6** |
| | | | | Selenium | 3.52 J |
| | | | | Silver | **1.18** J |
| | | | | Zinc | **243** |
| SED-25-B | SED-25-B/0.0-0.5 | 0-0.5 | 10/24/2019 | Copper | **160** |
| | | | | Lead | **52.7** |
| | | | | Nickel | **29.4** |
| SED-25-C | SED-25-C/0.0-0.5 | 0-0.5 | 10/24/2019 | Arsenic | **18.1** |
| | | | | Barium | 78.4 |
| | | | | Cadmium | **2.31** |
| | | | | Cobalt | 11.4 |
| | | | | Copper | **364** |
| | | | | Lead | **128** |
| | | | | Mercury | **1.06** |
| | | | | Nickel | **54.3** |
| | | | | Silver | **2.62** |
| | | | | Zinc | **315** |

**EXPLANATION:**

**NJDEP Ecological Screening Criteria (ESC) for Saline Sediment**

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Aluminum | -- | 18000 |
| Antimony | -- | 9.3 |
| Arsenic | 8.2 | 70 |
| Barium | -- | 48 |
| Cadmium | 1.2 | 9.6 |
| Chromium | 81 | 370 |
| Cobalt | -- | 10 |
| Copper | 34 | 270 |
| Lead | 47 | 218 |
| Manganese | -- | 260 |
| Mercury | 0.15 | 0.71 |
| Nickel | 21 | 52 |
| Selenium | -- | 1 |
| Silver | 1 | 3.7 |
| Vanadium | -- | 57 |
| Zinc | 150 | 410 |

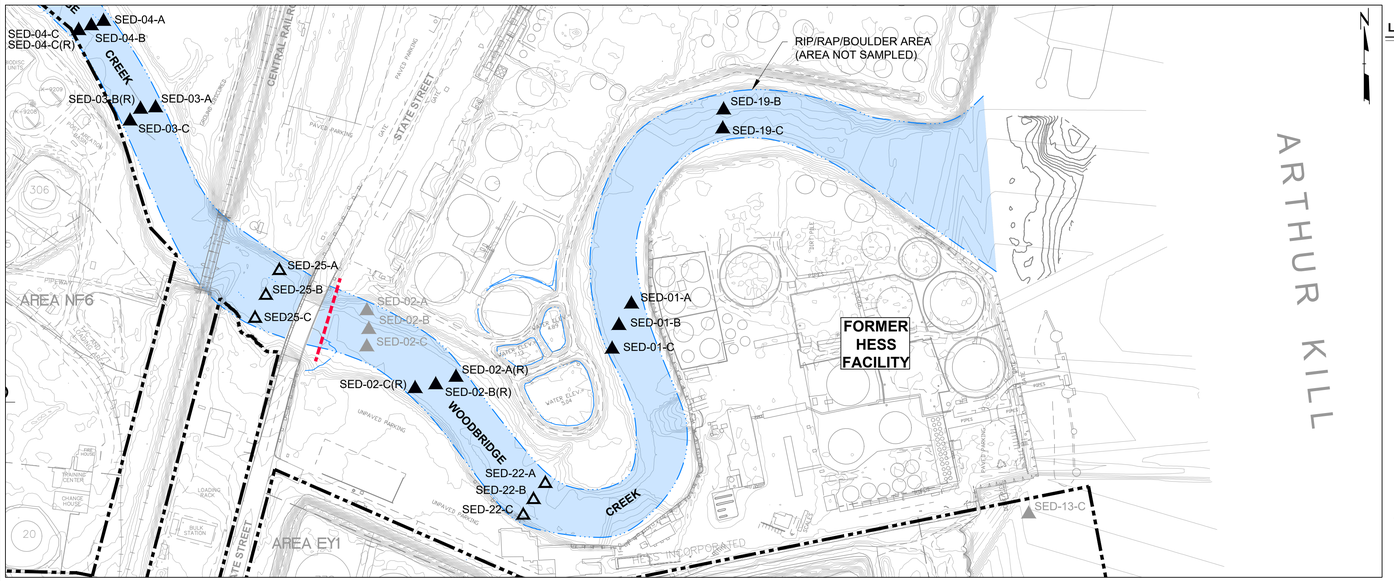
Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

DRAFT

| | |
|---|---|
| PROJECT: | SEDIMENT INVESTIGATION REPORT<br>CHEVRON FACILITY<br>PERTH AMBOY, NEW JERSEY |
| TITLE: | SEDIMENT ANALYTICAL RESULTS - METALS<br>WOODBRIDGE CREEK - UPPER REACH |
| DRAWN BY: M. GIAMBATTISTA | PROJ. NO.: 326731.2020.0000 |
| CHECKED BY: W. CORDASCO | FIGURE 7 |
| APPROVED BY: R. LIPPENCOTT | |
| DATE: FEBRUARY 2020 | |
| TRC | 41 Spring Street<br>Suite 102<br>New Providence, NJ 07974<br>Phone: 908.988.1700 |
| FILE NO.: | BathymetricTransect figures_DATA.dwg |

30x42 -- USER: MGiambattista -- ATTACHED XREFS: -- ATTACHED IMAGES: JB414, JB413, JB414, JB415, JBC1, JBC2, JBC3, JBC5, JBC6, JBC7
DRAWING NAME: M:\Cad Files\WORK\680\2019\Bathymetric\Final\rev. 03.20.20\ BathymetricTransect figures_DATA.dwg -- PLOT DATE: March 26, 2020 - 12:10PM -- LAYOUT: UPPER METALS-FIG 7

Version: 2017-10-21

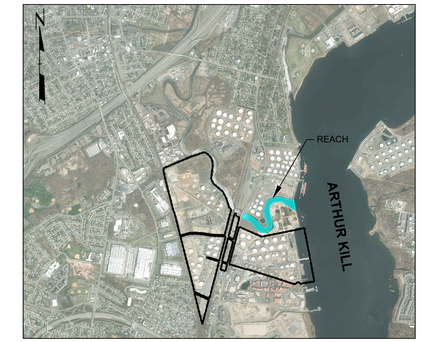



PLAN VIEW

0 200 400
SCALE IN FEET

**LEGEND**

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- △ SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- ▲ LOCATIONS SAMPLED PREVIOUSLY 2002 OR 2014, RE-SAMPLED IN 2019
- ▲ SEDIMENT SAMPLE LOCATIONS 2002 (NOT SUBSEQUENTLY SAMPLED)




**KEYMAP**
**SCALE: 1"=2500'**

**NOTES:**

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACCESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).
3. SED-02-A,B,C NOT RE-SAMPLED DUE TO UTILITY PROXIMITY.

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-01-A | SED-01-A/6-12 | 0.5-1 | 12/20/2002 | 1,2,4-Trichlorobenzene | 0.21 J |
| SED-02-A(R) | SED-02-A(R)/6.0-6.5 | 6-6.5 | 9/27/2019 | Xylenes (total) | **1.56** |
| SED-02-C(R) | SED-02-C(R)/2.0-2.5 | 2-2.5 | 9/27/2019 | Xylenes (total) | **5** |
| SED-19-B | SED-19-B | 6-6.5 | 3/21/2014 | Benzene | **0.437** |
| | | | | 1,2-Dichlorobenzene | 0.0781 J |
| | | | | 1,4-Dichlorobenzene | 0.391 J |
| | | | | Xylenes (total) | **4.66** |
| SED-19-C | SED-19-C | 7.5-8 | 3/21/2014 | 1,4-Dichlorobenzene | 0.971 J |
| | | | | Ethylbenzene | **2.27** |
| | | | | Xylenes (total) | **9.67** |
| SED-22-B | SED-22-B/0.5-1.0 | 0.5-1 | 9/25/2019 | Xylenes (total) | **0.29** |
| | SED-22-B/9.0-9.5 | 9-9.5 | 9/25/2019 | Xylenes (total) | **1.48** |
| SED-22-C | SED-22-C/0.5-1.0 | 0.5-1 | 9/26/2019 | 1,4-Dichlorobenzene | 0.37 J |
| | | | | Xylenes (total) | **0.71** |
| | SED-22-C/4.5-5.0 | 4.5-5 | 9/26/2019 | Xylenes (total) | **2.8** |

**EXPLANATION:**

**NJDEP Ecological Screening Criteria (ESC) For Saline Sediment**

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Benzene | 0.34 | -- |
| 1,2-Dichlorobenzene | -- | 0.013 |
| 1,4-Dichlorobenzene | -- | 0.11 |
| Ethylbenzene | 1.4 | -- |
| 1,2,4-Trichlorobenzene | -- | 0.0048 |
| Xylenes (total) | 0.12 | -- |

Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

DRAFT

PROJECT: SEDIMENT INVESTIGATION REPORT
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

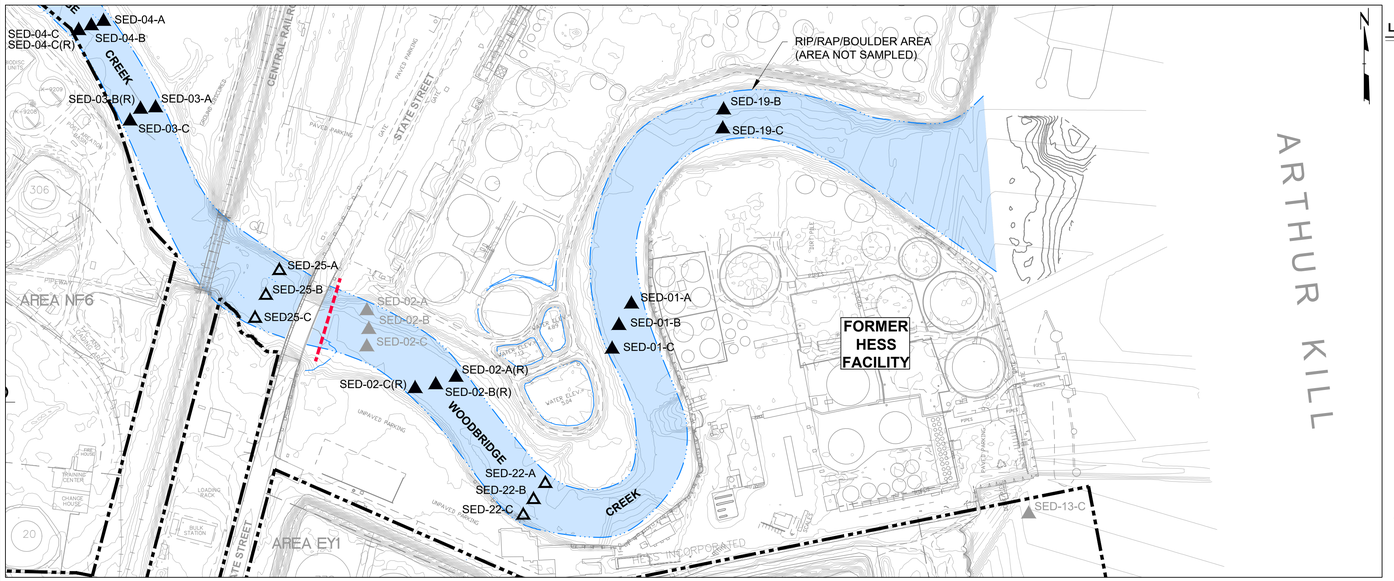
TITLE: SEDIMENT ANALYTICAL RESULTS - VOC
WOODBRIDGE CREEK - LOWER REACH

| | | | |
|---|---|---|---|
| DRAWN BY: | M. GIAMBATTISTA | PROJ. NO.: | 326731.2020.0000 |
| CHECKED BY: | W. CORDASCO | | FIGURE 8 |
| APPROVED BY: | R. LIPPENCOTT | | |
| DATE: | FEBRUARY 2020 | | |

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

FILE NO.: BathymetricTransect figures_DATA.dwg

24x36 --- USER: MGiambattista --- ATTACHED XREFS: --- ATTACHED IMAGES: J8A14; J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\Bathymetric\Final\rev. 03.20.20\BathymetricTransect figures_DATA.dwg --- PLOT DATE: March 27, 2020 - 12:40PM -- LAYOUT: LOW VOC
Version: 2017-10-21

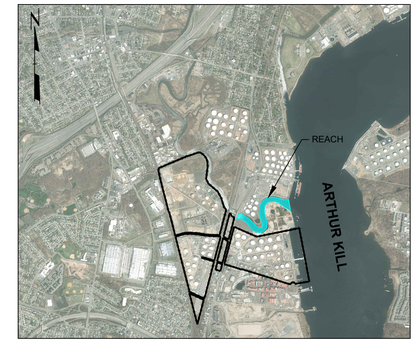



PLAN VIEW

0 200 400
SCALE IN FEET

## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- LOCATIONS SAMPLED PREVIOUSLY 2002 OR 2014, RE-SAMPLED IN 2019
- SEDIMENT SAMPLE LOCATIONS 2002 (NOT SUBSEQUENTLY SAMPLED)




## KEYMAP

SCALE: 1"=2500'

## NOTES:

1. TOP OF BANK ELEVATION ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).
3. SED-02-A,B,C NOT RE-SAMPLED DUE TO UTILITY PROXIMITY.

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-01-A | SED-01-A/0.0-0.5 | 0-0.5 | 12/20/2002 | Acenaphthylene | **0.062** |
| | | | | Anthracene | **0.086** |
| | | | | Benzo(a)anthracene | **0.31** |
| | | | | Benzo(ghi)perylene | **0.42** |
| | | | | bis(2-Ethylhexyl)phthalate | ***6.5*** |
| | | | | Dibenz(a,h)anthracene | **0.096** |
| | | | | Fluoranthene | **0.64** |
| | | | | Fluorene | **0.022** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.36** |
| | | | | Pyrene | **0.72** |
| | | | | Total PAHs | **4.296** |
| | SED-01-A/0.0-0.5 | 0-0.5 | 9/23/2019 | EPH, TOTAL FRACTIONATED | 23 |
| | SED-01-A/2.0-2.5 | 2-2.5 | 9/23/2019 | EPH, TOTAL FRACTIONATED | 8.7 J |
| SED-01-B | SED-01-B/0-6 | 0-0.5 | 12/20/2002 | Acenaphthene | **0.077** |
| | | | | Acenaphthylene | **0.059** |
| | | | | Anthracene | **0.2** |
| | | | | Benzo(a)pyrene | **0.86** |
| | | | | Benzo(a)anthracene | **0.61** |
| | | | | Benzo(ghi)perylene | **0.87** |
| | | | | Benzo(k)fluoranthene | **0.36** |
| | | | | bis(2-Ethylhexyl)phthalate | ***3.2*** |
| | | | | Chrysene | **0.91** |
| | | | | Dibenz(a,h)anthracene | **0.21** |
| | | | | Fluoranthene | **1** |
| | | | | Fluorene | **0.069** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.64** |
| | | | | Phenanthrene | **0.61** |
| | | | | Pyrene | **1.3** |
| | | | | Total PAHs | **8.856** |
| | SED-01-B/0.0-0.5 | 0-0.5 | 9/25/2019 | EPH, TOTAL FRACTIONATED | 940 |
| | SED-01-B/0.5-1.0 | 0.5-1 | 9/25/2019 | EPH, TOTAL FRACTIONATED | 1500 |
| | SED-01-B/2.0-2.5 | 2-2.5 | 9/25/2019 | Anthracene | **0.47** |
| | | | | Benzo(a)pyrene | **0.69** |
| | | | | Benzo(a)anthracene | **0.83** |
| | | | | Benzo(ghi)perylene | **0.64** |
| | | | | Benzo(k)fluoranthene | **0.43** |
| | | | | bis(2-Ethylhexyl)phthalate | ***8.6*** |
| | | | | Chrysene | **1.2** |
| | | | | Dibenz(a,h)anthracene | ***0.18*** |
| | | | | Fluoranthene | **2** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.4** |
| | | | | 2-Methylnaphthalene | **0.082** J |
| | | | | Phenanthrene | **0.35** |
| | | | | Pyrene | **2** |
| | | | | Total PAHs | **10.222** |
| | | | | EPH, TOTAL FRACTIONATED | 1900 |
| SED-01-C | SED-01-C/0-6 | 0-0.5 | 12/20/2002 | Acenaphthene | **0.084** |
| | | | | Acenaphthylene | **0.17** |
| | | | | Anthracene | **0.5** |
| | | | | Benzo(a)anthracene | **0.59** |
| | | | | Benzo(ghi)perylene | **0.2** |
| | | | | Chrysene | **1.2** |
| | | | | Fluoranthene | **1.3** |
| | | | | Fluorene | **0.1** |
| | | | | Phenanthrene | **0.29** |
| | | | | Pyrene | **2.6** |
| | | | | Total PAHs | **8.002** |
| | SED-01-C/0.0-0.5 | 0-0.5 | 9/23/2019 | EPH, TOTAL FRACTIONATED | 1400 |
| | SED-01-C/0.5-1.0 | 0.5-1 | 9/23/2019 | EPH, TOTAL FRACTIONATED | 8100 |
| SED-02-A | SED-02-A/0-6 | 0-0.5 | 12/20/2002 | Acenaphthene | ***0.034*** J |
| | | | | Acenaphthylene | **0.11** |
| | | | | Anthracene | **0.24** |
| | | | | Benzo(a)pyrene | **0.78** |
| | | | | Benzo(a)anthracene | **0.55** |
| | | | | Benzo(ghi)perylene | **0.76** |
| | | | | Benzo(k)fluoranthene | **0.4** |
| | | | | bis(2-Ethylhexyl)phthalate | ***4.3*** |
| | | | | Butyl benzyl phthalate | 0.25 J |
| | | | | Chrysene | **0.83** |
| | | | | Dibenz(a,h)anthracene | **0.17** |
| | | | | Fluoranthene | **1.3** |
| | | | | Fluorene | **0.049** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.55** |
| | | | | Phenanthrene | **0.33** |
| | | | | Pyrene | **1.6** |
| | | | | Total PAHs | **9.102** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-02-A(R) | SED-02-A(R) | 6-6.5 | 3/21/2014 | EPH, TOTAL FRACTIONATED | 59300 |
| | SED-02-A(R)/0.0-0.5 | 0-0.5 | 9/27/2019 | Benzo(a)pyrene | **0.45** |
| | | | | Benzo(a)anthracene | **0.36** |
| | | | | Benzo(ghi)perylene | **0.39** |
| | | | | bis(2-Ethylhexyl)phthalate | ***0.56*** J |
| | | | | Dibenz(a,h)anthracene | **0.072** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.28** |
| | | | | Total PAHs | **4.044** |
| | SED-02-A(R)/0.5-1.0 | 0.5-1 | 9/27/2019 | EPH, TOTAL FRACTIONATED | 350 |
| | | | | EPH, TOTAL FRACTIONATED | 26 |
| | SED-02-A(R)/6.0-6.5 | 6-6.5 | 9/27/2019 | Acenaphthene | ***0.81*** |
| | | | | Anthracene | 1.3 |
| | | | | Benzo(a)pyrene | **0.51** |
| | | | | Benzo(a)anthracene | **0.89** |
| | | | | Benzo(ghi)perylene | **0.3** |
| | | | | Chrysene | **1** |
| | | | | Dibenz(a,h)anthracene | ***0.098*** J |
| | | | | Fluoranthene | **1.6** |
| | | | | Fluorene | ***1.3*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.25** |
| | | | | 2-Methylnaphthalene | **3.5** |
| | | | | Naphthalene | **0.72** |
| | | | | Phenanthrene | **4.2** |
| | | | | Pyrene | **2.2** |
| | | | | Total PAHs | **19.558** |
| SED-02-B | SED-02-B/0-6 | 0-0.5 | 12/20/2002 | Acenaphthene | **0.45** |
| | | | | Acenaphthylene | **0.046** J |
| | | | | Anthracene | 1.3 |
| | | | | Benzo(a)pyrene | 2.2 |
| | | | | Benzo(a)anthracene | 2.1 |
| | | | | Benzo(b)fluoranthene | 2.6 |
| | | | | Benzo(ghi)perylene | **1.6** |
| | | | | Benzo(k)fluoranthene | **0.99** |
| | | | | bis(2-Ethylhexyl)phthalate | **2.1** |
| | | | | Chrysene | **2.3** |
| | | | | Dibenz(a,h)anthracene | 0.34 |
| | | | | Fluoranthene | **4.8** |
| | | | | Fluorene | **0.5** |
| | | | | Indeno(1,2,3-cd)pyrene | **1.4** |
| | | | | 2-Methylnaphthalene | **0.15** |
| | | | | Naphthalene | **0.19** |
| | | | | Phenanthrene | 4.9 |
| | | | | Pyrene | 5.1 |
| | | | | Total PAHs | **30.966** |
| | SED-02-B/0-6(D) | 0-0.5 | 12/20/2002 | Acenaphthene | **0.068** |
| | | | | Acenaphthylene | **0.057** J |
| | | | | Anthracene | **0.47** |
| | | | | Benzo(a)pyrene | **0.97** |
| | | | | Benzo(a)anthracene | **1** |
| | | | | Benzo(ghi)perylene | **0.64** |
| | | | | Benzo(k)fluoranthene | **0.48** |
| | | | | bis(2-Ethylhexyl)phthalate | **1** |
| | | | | Chrysene | **1.4** |
| | | | | Dibenz(a,h)anthracene | **0.17** |
| | | | | Fluoranthene | **2.2** |
| | | | | Fluorene | **0.14** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.55** |
| | | | | Phenanthrene | 1.7 |
| | | | | Pyrene | **2.3** |
| | | | | Total PAHs | **13.477** |
| SED-02-B(R) | SED-02-B(R) | 3.5-4 | 3/21/2014 | EPH, TOTAL FRACTIONATED | 12100 |
| | SED-02-B(R)/0.0-0.5(A) | 0-0.5 | 9/27/2019 | Anthracene | **0.096** J |
| | | | | Benzo(a)pyrene | **0.44** |
| | | | | Benzo(a)anthracene | **0.37** |
| | | | | Benzo(ghi)perylene | **0.48** |
| | | | | bis(2-Ethylhexyl)phthalate | ***0.82*** J |
| | | | | Dibenz(a,h)anthracene | **0.08** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.27** |
| | | | | Pyrene | **0.79** |
| | | | | Total PAHs | **4.561** |
| | | | | EPH, TOTAL FRACTIONATED | 780 |
| | SED-02-B(R)/0.0-0.5(B) | 0-0.5 | 9/27/2019 | Anthracene | **0.11** J |
| | | | | Benzo(a)pyrene | **0.68** |
| | | | | Benzo(a)anthracene | **0.48** |
| | | | | Benzo(ghi)perylene | **0.93** |
| | | | | Benzo(k)fluoranthene | **0.26** |
| | | | | bis(2-Ethylhexyl)phthalate | ***1.9*** |
| | | | | Chrysene | **0.86** |
| | | | | Dibenz(a,h)anthracene | **0.16** |
| | | | | Fluoranthene | **0.82** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.37** |
| | | | | Phenanthrene | **0.26** |
| | | | | Pyrene | **1.1** |
| | | | | Total PAHs | **6.464** |
| | | | | EPH, TOTAL FRACTIONATED | 1200 |
| | SED-02-B(R)/0.5-1.0 | 0.5-1 | 9/27/2019 | EPH, TOTAL FRACTIONATED | 2100 |
| | SED-02-B(R)/3.5-4.0 | 3.5-4 | 9/27/2019 | Acenaphthene | ***0.045*** J |
| | | | | Fluorene | ***0.093*** J |
| | | | | 2-Methylnaphthalene | **0.3** J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-02-C | SED-02-C/0-6 | 0-0.5 | 12/20/2002 | Acenaphthene | **0.037** J |
| | | | | Acenaphthylene | **0.11** |
| | | | | Anthracene | **0.22** |
| | | | | Benzo(a)pyrene | **1.4** |
| | | | | Benzo(a)anthracene | **0.65** |
| | | | | Benzo(ghi)perylene | **1.5** |
| | | | | Benzo(k)fluoranthene | **0.48** |
| | | | | bis(2-Ethylhexyl)phthalate | 20 |
| | | | | Chrysene | **1.4** |
| | | | | Dibenz(a,h)anthracene | 0.37 |
| | | | | Fluoranthene | **0.94** |
| | | | | Fluorene | **0.037** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.75** |
| | | | | Pyrene | 3.3 |
| | | | | Total PAHs | **13.021** |
| SED-02-C(R) | SED-02-C(R)/0.0-0.5 | 0-0.5 | 9/27/2019 | bis(2-Ethylhexyl)phthalate | **2.3** |
| | | | | EPH, TOTAL FRACTIONATED | 1100 |
| | SED-02-C(R)/0.5-1.0 | 0.5-1 | 9/27/2019 | EPH, TOTAL FRACTIONATED | 7000 |
| | SED-02-C(R)/2.0-2.5 | 2-2.5 | 9/27/2019 | Acenaphthene | ***0.77*** |
| | | | | Acenaphthylene | **0.61** |
| | | | | Anthracene | **2** |
| | | | | Benzo(a)pyrene | **0.47** |
| | | | | Benzo(a)anthracene | **0.75** |
| | | | | Benzo(ghi)perylene | **0.37** |
| | | | | Benzo(k)fluoranthene | **0.29** |
| | | | | Chrysene | **1.8** |
| | | | | Dibenz(a,h)anthracene | **0.09** J |
| | | | | Fluoranthene | **1.9** |
| | | | | Fluorene | ***0.82*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.24** |
| | | | | 2-Methylnaphthalene | ***0.82*** |
| | | | | Naphthalene | **0.63** |
| | | | | Phenanthrene | 4.2 |
| | | | | Pyrene | 3.6 |
| | | | | Total PAHs | **20.06** |
| | | | | EPH, TOTAL FRACTIONATED | 12000 |
| SED-19-B | SED-19-B | 6-6.5 | 3/21/2014 | Anthracene | 3.55 |
| | | | | Aroclor 1248 | **2.57** |
| | | | | Aroclor 1254 | **4.01** |
| | | | | Benzo(a)pyrene | 10.6 |
| | | | | Benzo(a)anthracene | 7.03 |
| | | | | Benzo(b)fluoranthene | 6.94 |
| | | | | Benzo(ghi)perylene | **12.8** |
| | | | | Benzo(k)fluoranthene | **0.882** |
| | | | | bis(2-Ethylhexyl)phthalate | 7.01 |
| | | | | Chrysene | 11.7 |
| | | | | 4,4'-DDD | ***1.83*** |
| | | | | 4,4'-DDE | ***0.302*** |
| | | | | DDT (Total) | 2.132 |
| | | | | Dibenz(a,h)anthracene | 2.92 |
| | | | | Fluoranthene | 6.83 |
| | | | | Heptachlor epoxide | **0.0427** |
| | | | | Indeno(1,2,3-cd)pyrene | **2.89** |
| | | | | 2-Methylnaphthalene | ***14.5*** |
| | | | | Naphthalene | 3.12 |
| | | | | Phenanthrene | 19.2 |
| | | | | Pyrene | 13.1 |
| | | | | Total PAHs | **115.862** |
| | | | | Total PCB (Aroclors) | 6.58 |
| | | | | EPH, TOTAL FRACTIONATED | 16000 |
| SED-19-B | SED-19-B/0.0-0.5 | 0-0.5 | 9/20/2019 | Anthracene | **0.67** J |
| | | | | Benzo(a)pyrene | 2.2 |
| | | | | Benzo(a)anthracene | 1.9 |
| | | | | Benzo(b)fluoranthene | 2.0 |
| | | | | Benzo(ghi)perylene | **1.8** |
| | | | | bis(2-Ethylhexyl)phthalate | ***6.4*** J |
| | | | | Chrysene | **2.8** |
| | | | | Fluoranthene | **3.1** |
| | | | | Indeno(1,2,3-cd)pyrene | **1.2** |
| | | | | Phenanthrene | **0.97** J |
| | | | | Pyrene | 3.7 |
| | | | | Total PAHs | **20.84** |
| | | | | EPH, TOTAL FRACTIONATED | 3300 |
| | SED-19-B/0.5-1.0 | 0.5-1 | 9/20/2019 | EPH, TOTAL FRACTIONATED | 2900 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-19-C | SED-19-C | 7.5-8 | 3/21/2014 | Acenaphthene | ***1.26*** |
| | | | | Anthracene | ***3.16*** |
| | | | | Aroclor 1248 | **3.96** |
| | | | | Aroclor 1254 | **2.91** |
| | | | | Benzo(a)pyrene | 6.24 |
| | | | | Benzo(a)anthracene | **4.63** |
| | | | | Benzo(b)fluoranthene | 3.91 |
| | | | | Benzo(ghi)perylene | **5.08** |
| | | | | Benzo(k)fluoranthene | **0.853** |
| | | | | bis(2-Ethylhexyl)phthalate | 22.5 |
| | | | | Chlordane (alpha and gamma) | **0.0191** |
| | | | | Chrysene | 6.96 |
| | | | | 4,4'-DDD | 0.0558 |
| | | | | 4,4'-DDE | 0.104 |
| | | | | DDT (Total) | 0.1598 |
| | | | | Dibenz(a,h)anthracene | ***1.67*** |
| | | | | Fluoranthene | **5.1** |
| | | | | Fluorene | ***2.57*** |
| | | | | Heptachlor | 0.0103 |
| | | | | Indeno(1,2,3-cd)pyrene | **1.79** |
| | | | | 2-Methylnaphthalene | ***14.9*** |
| | | | | Naphthalene | ***4.06*** |
| | | | | Phenanthrene | 12.6 |
| | | | | Pyrene | 12 |
| | | | | Total PAHs | **86.783** |
| | | | | Total PCB (Aroclors) | 6.87 |
| | | | | EPH, TOTAL FRACTIONATED | 8170 |
| | SED-19-C/0.0-0.5 | 0-0.5 | 9/20/2019 | Benzo(a)anthracene | **0.75** J |
| | | | | Chrysene | **0.8** J |
| | | | | Fluoranthene | **1.1** J |
| | | | | Pyrene | **1.4** |
| | | | | Total PAHs | **4.98** |
| | | | | EPH, TOTAL FRACTIONATED | 2600 |
| | SED-19-C/0.5-1.0 | 0.5-1 | 9/20/2019 | EPH, TOTAL FRACTIONATED | 2700 |
| SED-22-A | SED-22-A/0.0-0.5 | 0-0.5 | 9/25/2019 | EPH, TOTAL FRACTIONATED | 69 |
| | SED-22-A/2.0-2.5 | 2-2.5 | 9/25/2019 | Naphthalene | **0.47** |
| SED-22-B | SED-22-B/0.0-0.5 | 0-0.5 | 9/25/2019 | Anthracene | **0.72** |
| | | | | Benzo(a)pyrene | **0.96** |
| | | | | Benzo(a)anthracene | **1.4** |
| | | | | Benzo(ghi)perylene | **0.89** |
| | | | | Benzo(k)fluoranthene | **0.45** |
| | | | | bis(2-Ethylhexyl)phthalate | ***48*** |
| | | | | Chrysene | **1.9** |
| | | | | Dibenz(a,h)anthracene | ***0.15*** J |
| | | | | Fluoranthene | **2.5** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.55** |
| | | | | 2-Methylnaphthalene | **0.32** J |
| | | | | Naphthalene | **0.19** J |
| | | | | Phenanthrene | **0.41** |
| | | | | Pyrene | 3.6 |
| | | | | Total PAHs | **15.54** |
| | | | | EPH, TOTAL FRACTIONATED | 920 |
| | SED-22-B/9.0-9.5 | 9-9.5 | 9/25/2019 | Anthracene | **0.41** |
| | | | | Benzo(a)anthracene | **0.49** |
| | | | | Benzo(ghi)perylene | **0.22** |
| | | | | Chrysene | **0.82** |
| | | | | Fluoranthene | **1.1** |
| | | | | Fluorene | ***0.67*** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.23** |
| | | | | 2-Methylnaphthalene | 2.1 |
| | | | | Naphthalene | **0.53** |
| | | | | Phenanthrene | 1.8 |
| | | | | Pyrene | **1.5** |
| | | | | Total PAHs | **10.92** |
| | | | | EPH, TOTAL FRACTIONATED | 12000 |
| SED-22-C | SED-22-C/0.0-0.5 | 0-0.5 | 9/26/2019 | bis(2-Ethylhexyl)phthalate | 3.9 |
| | | | | EPH, TOTAL FRACTIONATED | 5300 |
| | SED-22-C/4.5-5.0 | 4.5-5 | 9/26/2019 | Anthracene | **0.48** |
| | | | | Benzo(a)anthracene | **0.31** |
| | | | | Benzo(ghi)perylene | **0.2** |
| | | | | bis(2-Ethylhexyl)phthalate | **1.7** |
| | | | | Chrysene | **0.46** |
| | | | | Fluoranthene | **0.87** |
| | | | | Fluorene | 0.76 |
| | | | | 2-Methylnaphthalene | 2.4 |
| | | | | Naphthalene | **0.49** |
| | | | | Phenanthrene | 1.7 |
| | | | | Pyrene | **0.88** |
| | | | | Total PAHs | **9.364** |
| | | | | EPH, TOTAL FRACTIONATED | 24000 |

## EXPLANATION:

NJDEP Ecological Screening Criteria (ESC) For Saline Sediment

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Acenaphthene | 0.016 | 0.5 |
| Acenaphthylene | 0.044 | 0.64 |
| Anthracene | 0.085 | 1.1 |
| Aroclor 1248 | 0.03 | -- |
| Aroclor 1254 | 0.06 | -- |
| Benzo(a)pyrene | 0.43 | 1.6 |
| Benzo(a)anthracene | 0.261 | 1.6 |
| Benzo(b)fluoranthene | -- | 1.8 |
| Benzo(ghi)perylene | 0.17 | -- |
| Benzo(k)fluoranthene | 0.24 | -- |
| bis(2-Ethylhexyl)phthalate | 0.18216 | 2.64651 |
| Butyl benzyl phthalate | -- | 0.063 |
| Chlordane (alpha and gamma) | 0.007 | -- |
| Chrysene | 0.384 | 2.8 |
| 4,4'-DDD | 0.002 | 0.02 |
| 4,4'-DDE | 0.0022 | 0.027 |
| DDT (Total) | 0.0016 | 0.046 |
| Dibenz(a,h)anthracene | 0.063 | 0.26 |
| EPH, TOTAL FRACTIONATED | -- | -- |
| Fluoranthene | 0.6 | 5.1 |
| Fluorene | 0.019 | 0.54 |
| Heptachlor | -- | 0.0003 |
| Heptachlor epoxide | 0.005 | -- |
| Indeno(1,2,3-cd)pyrene | 0.2 | -- |
| 2-Methylnaphthalene | 0.07 | 0.67 |
| Naphthalene | 0.16 | 2.1 |
| Phenanthrene | 0.24 | 1.5 |
| Pyrene | 0.665 | 2.6 |
| Total PAHs | 4 | 45 |
| Total PCB (Aroclors) | 0.023 | 0.18 |

Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

DRAFT

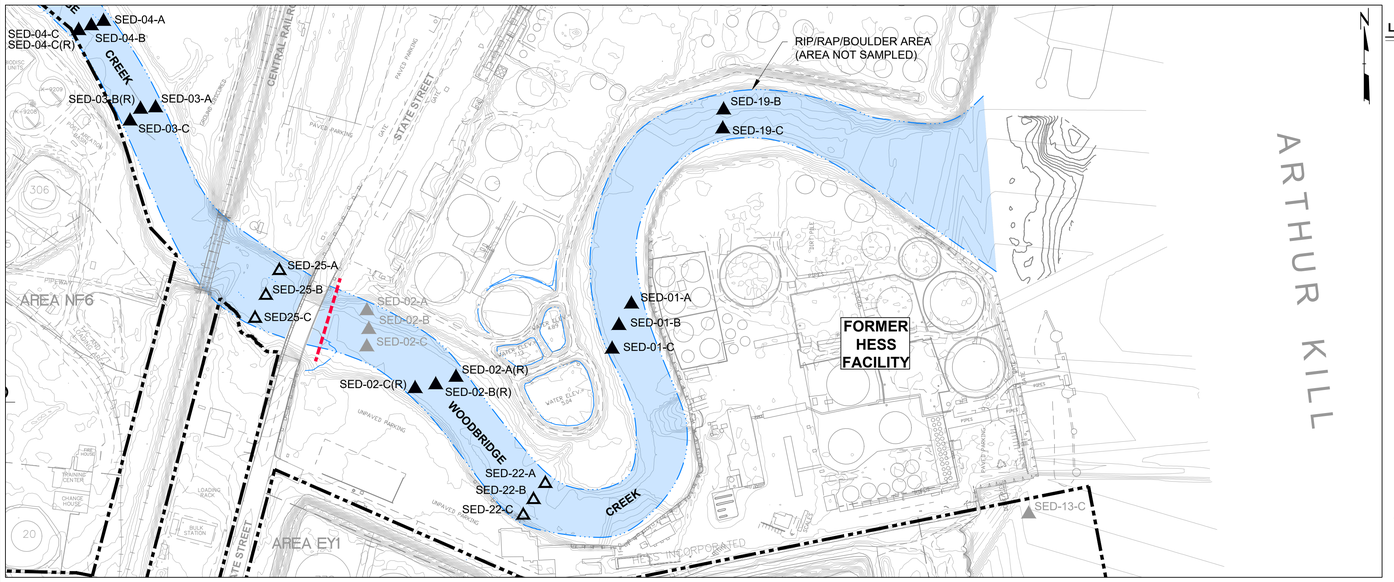
| | |
|---|---|
| PROJECT: | SEDIMENT INVESTIGATION REPORT<br>CHEVRON FACILITY<br>PERTH AMBOY, NEW JERSEY |
| TITLE: | SEDIMENT ANALYTICAL RESULTS - SVOCs/EPH<br>WOODBRIDGE CREEK - LOWER REACH |
| DRAWN BY: | M. GIAMBATTISTA |
| CHECKED BY: | W. CORDASCO |
| APPROVED BY: | R. LIPPENCOTT |
| DATE: | FEBRUARY 2020 |
| PROJ. NO.: | 326731.2020.0000 |

FIGURE 9

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

FILE NO.: BathymetricTransect figures_DATA.dwg

24x36 -- USER: MGiambattista -- ATTACHED XREFS: -- ATTACHED IMAGES: J8A14; J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\Bathymetric\Finalfrev. 03.20.20\ BathymetricTransect figures_DATA.dwg -- PLOT DATE: March 27, 2020 - 1:13PM -- LAYOUT: LOW SVOC
Version: 2017-10-21

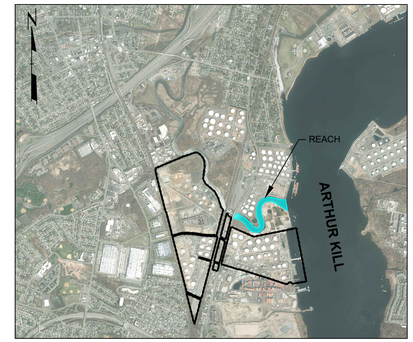



PLAN VIEW

0 200 400
SCALE IN FEET

## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- CREEK REACH BOUNDARY (WOODBRIDGE CREEK, SPA SPRING CREEK)
- SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- LOCATIONS SAMPLED PREVIOUSLY 2002 OR 2014, RE-SAMPLED IN 2019
- SEDIMENT SAMPLE LOCATIONS 2002 (NOT SUBSEQUENTLY SAMPLED)




## KEYMAP

SCALE: 1"=2500'

## NOTES:

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACCESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).
3. SED-02-A,B,C NOT RE-SAMPLED DUE TO UTILITY PROXIMITY.

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-01-A | SED-01-A/0-6 | 0-0.5 | 12/20/2002 | Aluminum | 20900 |
| | | | | Arsenic | **32.1** |
| | | | | Barium | 123 |
| | | | | Cadmium | **3.7** J |
| | | | | Chromium | **121** |
| | | | | Cobalt | 20 |
| | | | | Copper | **755** |
| | | | | Lead | **264** |
| | | | | Manganese | 368 |
| | | | | Mercury | **3.4** |
| | | | | Nickel | **104** |
| | | | | Selenium | 6.3 |
| | | | | Silver | **4.9** J |
| | | | | Vanadium | 64.6 |
| | | | | Zinc | **488** |
| | SED-01-A/2.0-2.5 | 2-2.5 | 9/23/2019 | Aluminum | 31400 |
| | | | | Arsenic | **23.4** |
| | | | | Barium | 78.9 |
| | | | | Cobalt | 13.5 |
| | | | | Copper | **39.8** |
| | | | | Manganese | 669 |
| | | | | Nickel | **38.1** |
| | | | | Vanadium | 73.1 |
| SED-01-B | SED-01-B/0-6 | 0-0.5 | 12/20/2002 | Arsenic | **17.3** |
| | | | | Barium | 66.9 |
| | | | | Cadmium | **1.8** J |
| | | | | Copper | **424** |
| | | | | Lead | **142** |
| | | | | Mercury | **1.3** |
| | | | | Nickel | **54.7** |
| | | | | Selenium | 6.7 |
| | | | | Silver | **1.5** J |
| | | | | Zinc | **289** |
| | SED-01-B/2.0-2.5 | 2-2.5 | 9/25/2019 | Arsenic | **26.4** |
| | | | | Barium | 106 |
| | | | | Cadmium | **3.53** |
| | | | | Chromium | **89.8** |
| | | | | Cobalt | 27.2 |
| | | | | Copper | **2280** |
| | | | | Lead | **402** |
| | | | | Mercury | **2.97** |
| | | | | Nickel | **159** |
| | | | | Selenium | 10.1 |
| | | | | Silver | **2.84** |
| | | | | Vanadium | 62.6 |
| | | | | Zinc | **763** |
| SED-01-C | SED-01-C/0-6 | 0-0.5 | 12/20/2002 | Aluminum | 30400 |
| | | | | Arsenic | **63** |
| | | | | Barium | 137 |
| | | | | Cadmium | 2.7 J |
| | | | | Cobalt | 14.6 |
| | | | | Copper | **210** |
| | | | | Lead | **137** |
| | | | | Manganese | 429 |
| | | | | Mercury | **0.97** J |
| | | | | Nickel | **45** |
| | | | | Selenium | 4.3 |
| | | | | Silver | **1.3** J |
| | | | | Vanadium | 67.1 |
| | | | | Zinc | **218** |
| | SED-01-C/2.0-2.5 | 2-2.5 | 9/23/2019 | Aluminum | 29900 |
| | | | | Arsenic | **20.8** |
| | | | | Barium | 73.4 |
| | | | | Cobalt | 13.1 |
| | | | | Copper | **47.7** |
| | | | | Manganese | 408 |
| | | | | Mercury | **0.163** J |
| | | | | Nickel | **31.3** |
| | | | | Vanadium | 62.1 |
| SED-02-A | SED-02-A/0-6 | 0-0.5 | 12/20/2002 | Aluminum | 19200 |
| | | | | Arsenic | **23.1** |
| | | | | Barium | 108 |
| | | | | Cadmium | **3.7** J |
| | | | | Chromium | **94.7** |
| | | | | Cobalt | 15 |
| | | | | Copper | **564** |
| | | | | Lead | **227** |
| | | | | Manganese | 306 |
| | | | | Mercury | **2.4** |
| | | | | Nickel | **81.3** |
| | | | | Selenium | 5.6 |
| | | | | Silver | **3.7** J |
| | | | | Vanadium | 61.9 |
| | | | | Zinc | **483** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-02-A(R) | SED-02-A(R)/0.0-0.5 | 0-0.5 | 9/27/2019 | Copper | **227** |
| | | | | Lead | **129** |
| | | | | Mercury | **0.315** |
| | | | | Nickel | **48.2** |
| | | | | Selenium | 22.6 |
| | | | | Silver | **1.09** J |
| | SED-02-A(R)/6.0-6.5 | 6-6.5 | 9/27/2019 | Aluminum | 21200 |
| | | | | Antimony | 12.5 |
| | | | | Arsenic | **101** |
| | | | | Barium | 313 |
| | | | | Cadmium | **2.02** |
| | | | | Chromium | **87.1** |
| | | | | Cobalt | 11.5 |
| | | | | Copper | **660** |
| | | | | Lead | **301** |
| | | | | Manganese | 387 |
| | | | | Mercury | **2.58** |
| | | | | Nickel | **70.7** |
| | | | | Selenium | 13.4 |
| | | | | Silver | **2.14** |
| | | | | Zinc | **453** |
| SED-02-B | SED-02-B/0-6 | 0-0.5 | 12/20/2002 | Arsenic | **9.9** |
| | | | | Copper | **213** |
| | | | | Lead | **54** |
| | | | | Mercury | **0.28** |
| | | | | Nickel | **30.7** |
| | | | | Selenium | 2.1 |
| | | | | Zinc | **164** |
| | SED-02-B/0-6(D) | 0-0.5 | 12/20/2002 | Arsenic | **10.9** |
| | | | | Barium | 97.4 |
| | | | | Copper | **172** |
| | | | | Lead | **50.9** |
| | | | | Mercury | **0.36** |
| | | | | Nickel | **29.2** |
| | | | | Selenium | 2.2 |
| SED-02-B(R) | SED-02-B(R)/0.0-0.5(A) | 0-0.5 | 9/27/2019 | Arsenic | **11.8** |
| | | | | Copper | **266** |
| | | | | Lead | **92.6** |
| | | | | Mercury | **0.508** |
| | | | | Nickel | **45.4** |
| | | | | Selenium | 2.6 J |
| | | | | Silver | **1.5** |
| | | | | Zinc | **216** |
| | SED-02-B(R)/0.0-0.5(B) | 0-0.5 | 9/27/2019 | Arsenic | **12.7** |
| | | | | Copper | **288** |
| | | | | Lead | **121** |
| | | | | Mercury | **0.501** |
| | | | | Nickel | **55.1** |
| | | | | Selenium | 7.93 |
| | | | | Zinc | **245** |
| | SED-02-B(R)/3.5-4.0 | 3.5-4 | 9/27/2019 | Arsenic | **43.2** |
| | | | | Barium | 133 |
| | | | | Cobalt | 13.6 |
| | | | | Copper | **129** |
| | | | | Lead | **82.4** |
| | | | | Manganese | 556 |
| | | | | Mercury | 1.1 |
| | | | | Nickel | **37** |
| | | | | Zinc | **172** |
| SED-02-C | SED-02-C/0-6 | 0-0.5 | 12/20/2002 | Aluminum | 19500 |
| | | | | Arsenic | **54.4** |
| | | | | Barium | 200 |
| | | | | Cadmium | **9.5** |
| | | | | Chromium | **119** |
| | | | | Cobalt | 17.1 |
| | | | | Copper | **763** |
| | | | | Lead | **291** |
| | | | | Mercury | **4.3** |
| | | | | Nickel | **143** |
| | | | | Selenium | 25.1 |
| | | | | Silver | **4.1** |
| | | | | Vanadium | 87.9 |
| | | | | Zinc | **535** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-02-C(R) | SED-02-C(R)/0.0-0.5 | 0-0.5 | 9/27/2019 | Aluminum | 18700 |
| | | | | Arsenic | **24.9** |
| | | | | Barium | 110 |
| | | | | Cadmium | **3.51** |
| | | | | Chromium | **90.7** |
| | | | | Cobalt | 26.9 |
| | | | | Copper | **1780** |
| | | | | Manganese | 267 |
| | | | | Mercury | **1.92** |
| | | | | Nickel | **297** |
| | | | | Selenium | 3.69 J |
| | | | | Silver | **5.71** |
| | | | | Zinc | **696** |
| | SED-02-C(R)/2.0-2.5 | 2-2.5 | 9/27/2019 | Aluminum | 23800 |
| | | | | Antimony | 16.7 |
| | | | | Arsenic | **141** |
| | | | | Barium | 381 |
| | | | | Cadmium | **4.76** |
| | | | | Chromium | **116** |
| | | | | Cobalt | 10.8 |
| | | | | Copper | **753** |
| | | | | Lead | **426** |
| | | | | Mercury | **5.59** |
| | | | | Nickel | **48** |
| | | | | Selenium | 8.45 J |
| | | | | Silver | **5.84** |
| | | | | Vanadium | 63.3 |
| | | | | Zinc | **669** |
| SED-19-B | SED-19-B | 6-6.5 | 3/21/2014 | Antimony | 9.5 |
| | | | | Arsenic | **47.6** |
| | | | | Barium | 161 |
| | | | | Cadmium | **5.6** |
| | | | | Cobalt | 11 |
| | | | | Copper | **447** |
| | | | | Lead | **817** |
| | | | | Mercury | **1.7** |
| | | | | Nickel | **91.7** |
| | | | | Selenium | 18.4 |
| | | | | Silver | **1.1** |
| | | | | Vanadium | 59.8 |
| | | | | Zinc | **476** |
| | SED-19-B/0.0-0.5 | 0-0.5 | 9/20/2019 | Arsenic | **23.9** |
| | | | | Barium | 92.5 |
| | | | | Cadmium | **3.24** |
| | | | | Cobalt | 15.7 |
| | | | | Copper | **689** |
| | | | | Lead | **249** |
| | | | | Mercury | **1.96** |
| | | | | Nickel | **128** |
| | | | | Selenium | 11.4 |
| | | | | Silver | **1.56** J |
| | | | | Zinc | **553** |
| SED-19-C | SED-19-C | 7.5-8 | 3/21/2014 | Arsenic | **62.3** |
| | | | | Barium | 213 |
| | | | | Cadmium | **10** |
| | | | | Chromium | **99.1** |
| | | | | Copper | **337** |
| | | | | Lead | **166** |
| | | | | Mercury | **7.1** |
| | | | | Nickel | **53.1** |
| | | | | Selenium | 27.2 |
| | | | | Silver | **2** |
| | | | | Vanadium | 59.3 |
| | | | | Zinc | **375** |
| | SED-19-C/0.0-0.5 | 0-0.5 | 9/20/2019 | Arsenic | **24.2** |
| | | | | Barium | 107 |
| | | | | Cadmium | **4.74** |
| | | | | Chromium | **105** |
| | | | | Cobalt | 16 |
| | | | | Copper | **1090** |
| | | | | Lead | **251** |
| | | | | Mercury | **2.47** |
| | | | | Nickel | **130** |
| | | | | Selenium | 6.55 J |
| | | | | Silver | **4.49** |
| | | | | Vanadium | 60.7 |
| | | | | Zinc | **633** |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-22-A | SED-22-A/0.0-0.5 | 0-0.5 | 9/25/2019 | Aluminum | 35600 |
| | | | | Arsenic | **49.5** |
| | | | | Barium | 87.8 |
| | | | | Cobalt | 13.2 |
| | | | | Copper | **126** |
| | | | | Lead | **84** |
| | | | | Manganese | 394 |
| | | | | Mercury | **0.267** J |
| | | | | Nickel | **40.8** |
| | | | | Selenium | 8.81 |
| | | | | Vanadium | 64.1 |
| | | | | Zinc | **167** |
| | SED-22-A/2.0-2.5 | 2-2.5 | 9/25/2019 | Aluminum | 23600 |
| | | | | Arsenic | **17.3** |
| | | | | Barium | 59.5 |
| | | | | Cobalt | 12 |
| | | | | Manganese | 374 |
| | | | | Nickel | **26.3** |
| | | | | Selenium | 6.23 J |
| | | | | Vanadium | 58.9 |
| SED-22-B | SED-22-B/0.0-0.5 | 0-0.5 | 9/25/2019 | Aluminum | 23300 |
| | | | | Arsenic | **61.2** |
| | | | | Barium | 220 |
| | | | | Cadmium | **11.8** |
| | | | | Chromium | **178** |
| | | | | Cobalt | 33.2 |
| | | | | Copper | **2130** |
| | | | | Lead | **242** |
| | | | | Mercury | **7.5** |
| | | | | Nickel | **567** |
| | | | | Selenium | 139 |
| | | | | Silver | **4.73** |
| | | | | Vanadium | 62.1 |
| | | | | Zinc | **630** |
| | SED-22-B/9.0-9.5 | 9-9.5 | 9/25/2019 | Aluminum | 22000 |
| | | | | Antimony | 16.1 |
| | | | | Arsenic | **217** |
| | | | | Barium | 407 |
| | | | | Cadmium | **5.04** |
| | | | | Chromium | **230** |
| | | | | Cobalt | 11.8 |
| | | | | Copper | **616** |
| | | | | Lead | **481** |
| | | | | Manganese | 299 |
| | | | | Mercury | **8.62** |
| | | | | Nickel | **42** |
| | | | | Selenium | 18.8 |
| | | | | Silver | **7.04** |
| | | | | Vanadium | 87 |
| | | | | Zinc | **630** |
| SED-22-C | SED-22-C/0.0-0.5 | 0-0.5 | 9/26/2019 | Aluminum | 31300 |
| | | | | Arsenic | **56.7** |
| | | | | Barium | 173 |
| | | | | Cadmium | **4.82** |
| | | | | Chromium | **108** |
| | | | | Cobalt | 33.4 |
| | | | | Copper | **1200** |
| | | | | Lead | **269** |
| | | | | Manganese | 342 |
| | | | | Mercury | **7.1** |
| | | | | Nickel | **142** |
| | | | | Selenium | 31.6 |
| | | | | Silver | **5.08** |
| | | | | Vanadium | 92.7 |
| | | | | Zinc | **629** |
| | SED-22-C/4.5-5.0 | 4.5-5 | 9/26/2019 | Aluminum | 24700 |
| | | | | Arsenic | **150** |
| | | | | Barium | 299 |
| | | | | Cadmium | **5.47** |
| | | | | Chromium | **193** |
| | | | | Cobalt | 12.4 |
| | | | | Copper | **563** |
| | | | | Lead | **483** |
| | | | | Manganese | 374 |
| | | | | Mercury | **5.56** |
| | | | | Nickel | **48.8** |
| | | | | Selenium | 8.94 J |
| | | | | Silver | **5.63** |
| | | | | Vanadium | 73.3 |
| | | | | Zinc | **562** |

**EXPLANATION:**

**NJDEP Ecological Screening Criteria (ESC) For Saline Sediment**

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Aluminum | -- | 18000 |
| Antimony | -- | 9.3 |
| Arsenic | 8.2 | 70 |
| Barium | -- | 48 |
| Cadmium | 1.2 | 9.6 |
| Chromium | 81 | 370 |
| Cobalt | -- | 10 |
| Copper | 34 | 270 |
| Lead | 47 | 218 |
| Manganese | -- | 260 |
| Mercury | 0.15 | 0.71 |
| Nickel | 21 | 52 |
| Selenium | -- | 1 |
| Silver | 1 | 3.7 |
| Vanadium | -- | 57 |
| Zinc | 150 | 410 |

Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

DRAFT

PROJECT: SEDIMENT INVESTIGATION REPORT
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

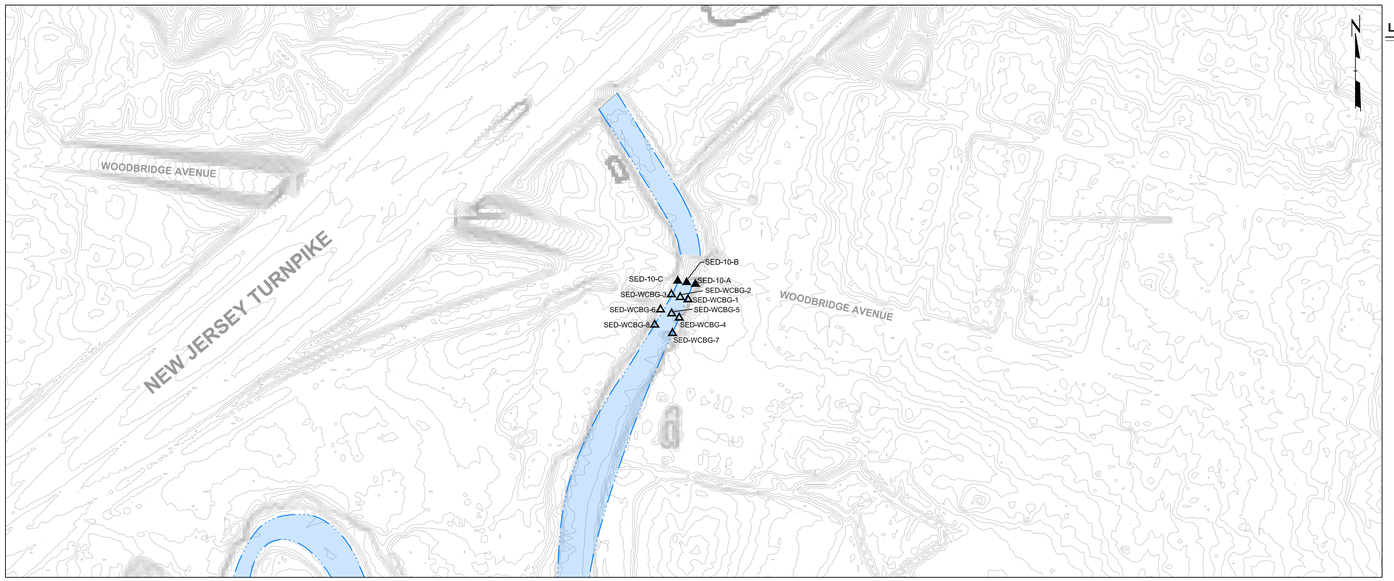
TITLE: SEDIMENT ANALYTICAL RESULTS - METALS
WOODBRIDGE CREEK - LOWER REACH

| | | | |
|---|---|---|---|
| DRAWN BY: | M. GIAMBATTISTA | PROJ NO.: | 326731.2020.0000 |
| CHECKED BY: | W. CORDASCO | | FIGURE 10 |
| APPROVED BY: | R. LIPPENCOTT | | |
| DATE: | FEBRUARY 2020 | | |

TRC
41 Spring Street
Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

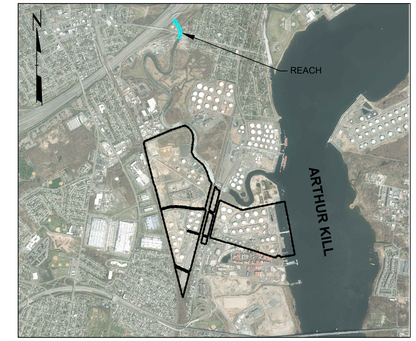
FILE NO.: BathymetricTransect figures_DATA.dwg

24x36 -- USER: MGiambattista -- ATTACHED XREF'S: -- ATTACHED IMAGES: J8A14; J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\Bathymetric\Final\rev. 03.20.20\BathymetricTransect figures_DATA.dwg -- PLOT DATE: March 26, 2020 - 11:12PM -- LAYOUT: LOW METALS
Version: 2017-10-21




## LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- WATER FEATURE BOUNDARY (APPROXIMATE)
- △ SEDIMENT SAMPLE LOCATION SAMPLED IN 2019 (ADDED PER SUPPLEMENTARY FIELD SAMPLING AND ANALYSIS WORKPLAN [2019])
- ▲ LOCATIONS SAMPLED PREVIOUSLY 2002 OR 2014, RE-SAMPLED IN 2019




## KEYMAP

SCALE: 1"=2500'

## NOTES:

1. TOP OF BANK ELEVATIONS ARE APPROXIMATE BASED ON EXISTING ESRI AERIAL IMAGERY ACESSED 9/18/2019.
2. TOPOGRAPHY DERIVED FROM NJDEP DEM RASTER PROJECTION (GIS) (DATED - 2017).

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-10-A | SED-10-A/0-6 | 0-0.5 | 12/19/2002 | bis(2-Ethylhexyl)phthalate | **0.46** |
| | | | | Copper | **69.6** |
| | | | | Lead | **52.5** |
| | | | | Nickel | **33.7** |
| | | | | Zinc | **457** |
| | SED-10-A/0.0-0.5 | 0-0.5 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 2900 |
| | SED-10-A/0.5-1.0 | 0.5-1 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 260 |
| | SED-10-A/2.0-2.5 | 2-2.5 | 10/15/2019 | Barium | 79.7 |
| | | | | bis(2-Ethylhexyl)phthalate | **0.23** |
| | | | | EPH, TOTAL FRACTIONATED | 3.5 J |
| SED-10-B | SED-10-B/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | **0.052** |
| | | | | Anthracene | **0.19** |
| | | | | Benzo(a)pyrene | **0.65** |
| | | | | Benzo(a)anthracene | **0.63** |
| | | | | Benzo(ghi)perylene | **0.21** |
| | | | | Benzo(k)fluoranthene | **0.34** |
| | | | | bis(2-Ethylhexyl)phthalate | **1** J |
| | | | | Chrysene | **1** |
| | | | | Copper | **47.3** |
| | | | | Dibenz(a,h)anthracene | **0.073** |
| | | | | Fluoranthene | **1.1** |
| | | | | Fluorene | **0.074** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.22** |
| | | | | 2-Methylnaphthalene | **0.22** |
| | | | | Naphthalene | **0.22** |
| | | | | Nickel | **31.2** |
| | | | | Phenanthrene | **0.77** |
| | | | | Pyrene | **1.4** |
| | | | | Total PAHs | **8.276** |
| | | | | Vanadium | 75.2 |
| | | | | Zinc | **184** |
| | SED-10-B/2.0-2.5 | 2-2.5 | 10/15/2019 | Barium | 147 |
| | | | | Butyl benzyl phthalate | 0.42 |
| | | | | Cobalt | 11.9 |
| | | | | Copper | **99.6** |
| | | | | Lead | **111** |
| | | | | Nickel | **30.3** |
| | | | | Zinc | **936** |
| SED-10-C | SED-10-C/0-6 | 0-0.5 | 12/19/2002 | Acenaphthene | **0.017** |
| | | | | bis(2-Ethylhexyl)phthalate | **5.2** |
| | | | | Copper | **85.7** |
| | | | | Lead | **110** |
| | | | | Nickel | **28.8** |
| | | | | Zinc | **448** |
| | SED-10-C/0.0-0.5 | 0-0.5 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 35 |
| | SED-10-C/0.5-1.0 | 0.5-1 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 120 |
| | SED-10-C/2.0-2.5 | 2-2.5 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 4.7 J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-WCBG-1 | SED-WCBG-1/0.0-0.5 | 0-0.5 | 10/15/2019 | Acenaphthene | **0.56** |
| | | | | Acenaphthylene | **0.51** |
| | | | | Anthracene | **5.1** |
| | | | | Barium | 52.3 |
| | | | | Benzo(a)pyrene | **14** |
| | | | | Benzo(a)anthracene | **16** |
| | | | | Benzo(b)fluoranthene | 18 |
| | | | | Benzo(ghi)perylene | **8.5** |
| | | | | Benzo(k)fluoranthene | **6.3** |
| | | | | Chrysene | **14** |
| | | | | Cobalt | 11.7 |
| | | | | Copper | **76.9** |
| | | | | Dibenz(a,h)anthracene | **2** |
| | | | | Fluoranthene | **32** |
| | | | | Fluorene | **1.4** |
| | | | | Indeno(1,2,3-cd)pyrene | **6.6** |
| | | | | Lead | **66.1** |
| | | | | Manganese | 269 |
| | | | | Nickel | **21.6** |
| | | | | Phenanthrene | **8.2** |
| | | | | Pyrene | **23** |
| | | | | Silver | **1.14** J |
| | | | | Total PAHs | **156.356** |
| | | | | Zinc | **210** |
| | SED-WCBG-1/0.5-1.0 | 0.5-1 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 3400 |
| | SED-WCBG-1/0.5-1.0 | 0.5-1 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 1000 |
| | SED-WCBG-1/2.0-2.5 | 2-2.5 | 10/15/2019 | Aluminum | 18300 |
| | | | | Barium | 72.8 |
| | | | | Benzo(a)pyrene | **0.63** |
| | | | | Benzo(a)anthracene | **0.4** |
| | | | | Benzo(ghi)perylene | **0.52** |
| | | | | Chrysene | **0.68** |
| | | | | Cobalt | 10.6 |
| | | | | Dibenz(a,h)anthracene | **0.085** |
| | | | | Manganese | 422 |
| | | | | Mercury | **0.193** J |
| | | | | Nickel | **21.6** |
| | | | | Silver | **1.04** J |
| | | | | EPH, TOTAL FRACTIONATED | 280 |
| SED-WCBG-2 | SED-WCBG-2/0.0-0.5 | 0-0.5 | 10/18/2019 | Manganese | 275 |
| | SED-WCBG-2/2.0-2.5 | 2-2.5 | 10/18/2019 | Barium | 72.2 |
| | | | | EPH, TOTAL FRACTIONATED | 4.4 J |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-WCBG-3 | SED-WCBG-3/0.0-0.5 | 0-0.5 | 10/15/2019 | Anthracene | **0.12** J |
| | | | | Arsenic | **24.8** |
| | | | | Barium | 56.2 |
| | | | | Benzo(a)pyrene | **0.9** |
| | | | | Benzo(a)anthracene | **0.65** |
| | | | | Benzo(ghi)perylene | **0.74** |
| | | | | Benzo(k)fluoranthene | **0.54** |
| | | | | bis(2-Ethylhexyl)phthalate | **4.1** |
| | | | | Cadmium | **1.33** |
| | | | | Chrysene | **0.55** |
| | | | | Cobalt | 45 |
| | | | | Copper | **2090** |
| | | | | Dibenz(a,h)anthracene | **0.15** |
| | | | | Fluoranthene | **1.5** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.62** |
| | | | | Lead | **328** |
| | | | | Mercury | **0.9** |
| | | | | Nickel | **194** |
| | | | | Pyrene | **1.8** |
| | | | | Silver | **2.93** |
| | | | | Total PAHs | **9.088** |
| | | | | Zinc | **1400** |
| | | | | EPH, TOTAL FRACTIONATED | 1400 |
| | SED-WCBG-3/0.5-1.0(A) | 0.5-1 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 890 |
| | SED-WCBG-3/0.5-1.0(B) | 0.5-1 | 10/15/2019 | EPH, TOTAL FRACTIONATED | 1000 |
| | SED-WCBG-3/2.5-3.0 | 2.5-3 | 10/15/2019 | Acenaphthene | **0.24** |
| | | | | Aluminum | 20900 |
| | | | | Anthracene | **1.5** |
| | | | | Arsenic | **40.5** |
| | | | | Barium | 111 |
| | | | | Benzo(a)pyrene | **1.7** |
| | | | | Benzo(a)anthracene | **2.4** |
| | | | | Benzo(b)fluoranthene | 9 |
| | | | | Benzo(ghi)perylene | **1.1** |
| | | | | Benzo(k)fluoranthene | **0.82** |
| | | | | bis(2-Ethylhexyl)phthalate | **2.7** |
| | | | | Cadmium | **9.98** |
| | | | | Chrysene | **2.1** |
| | | | | Cobalt | 18 |
| | | | | Copper | **440** |
| | | | | Dibenz(a,h)anthracene | **0.28** |
| | | | | Fluoranthene | **4.9** |
| | | | | Fluorene | **0.19** J |
| | | | | Indeno(1,2,3-cd)pyrene | **0.81** |
| | | | | Lead | **272** |
| | | | | Mercury | **0.626** |
| | | | | Nickel | **151** |
| | | | | Phenanthrene | **0.44** |
| | | | | Pyrene | **3.7** |
| | | | | Selenium | 8.13 J |
| | | | | Silver | **2.22** J |
| | | | | Total PAHs | **22.239** |
| | | | | Vanadium | 78.6 |
| | | | | Zinc | **447** |
| | | | | EPH, TOTAL FRACTIONATED | 1600 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-WCBG-4 | SED-WCBG-4/0.0-0.5 | 0-0.5 | 10/16/2019 | Arsenic | **10** |
| | | | | Cadmium | **1.41** |
| | | | | Cobalt | 17.4 |
| | | | | Copper | **144** |
| | | | | Lead | **164** |
| | | | | Nickel | **45.7** |
| | | | | Zinc | **544** |
| | | | | EPH, TOTAL FRACTIONATED | 16 |
| | SED-WCBG-4/0.5-1.0 | 0.5-1 | 10/16/2019 | EPH, TOTAL FRACTIONATED | 34 |
| | SED-WCBG-4/1.0-1.5 | 1-1.5 | 10/16/2019 | Arsenic | **9.72** J |
| | | | | Copper | **66.7** |
| | | | | Lead | **71.7** |
| | | | | Nickel | **27.6** |
| | | | | Zinc | **171** |
| | | | | EPH, TOTAL FRACTIONATED | 230 |
| SED-WCBG-5 | SED-WCBG-5/0.0-0.5 | 0-0.5 | 10/18/2019 | Arsenic | **14.2** |
| | | | | Cobalt | 10.3 |
| | | | | Copper | **62.9** |
| | | | | Nickel | **29.5** |
| | | | | Zinc | **239** |
| | | | | EPH, TOTAL FRACTIONATED | 23 |
| | SED-WCBG-5/0.5-1.0 | 0.5-1 | 10/18/2019 | EPH, TOTAL FRACTIONATED | 8.6 J |
| | SED-WCBG-5/2.0-2.5(A) | 2-2.5 | 10/18/2019 | Barium | 65.9 |
| | | | | Copper | **83.2** |
| | | | | Lead | **49.4** |
| | | | | Manganese | 1060 |
| | | | | Zinc | **698** |
| | | | | EPH, TOTAL FRACTIONATED | 3.8 J |
| | SED-WCBG-5/2.0-2.5(B) | 2-2.5 | 10/18/2019 | Manganese | 454 |
| SED-WCBG-6 | SED-WCBG-6/0.0-0.5 | 0-0.5 | 10/16/2019 | Anthracene | **0.2** J |
| | | | | Arsenic | **30.4** |
| | | | | Barium | 101 |
| | | | | Benzo(a)pyrene | **1** |
| | | | | Benzo(a)anthracene | **1** |
| | | | | Benzo(ghi)perylene | **1.2** |
| | | | | Benzo(k)fluoranthene | **0.34** |
| | | | | bis(2-Ethylhexyl)phthalate | **4.1** |
| | | | | Cadmium | **4.55** |
| | | | | Chrysene | **0.71** |
| | | | | Copper | **340** |
| | | | | Dibenz(a,h)anthracene | **0.28** |
| | | | | Fluoranthene | **0.82** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.45** |
| | | | | Lead | **209** |
| | | | | Mercury | **1.19** |
| | | | | Nickel | **55.1** |
| | | | | Phenanthrene | **0.44** |
| | | | | Pyrene | **1.9** |
| | | | | Silver | **1.2** J |
| | | | | Total PAHs | **9.54** |
| | | | | Vanadium | 66.4 |
| | | | | Zinc | **394** |
| | | | | EPH, TOTAL FRACTIONATED | 2000 |
| | SED-WCBG-6/0.5-1.0 | 0.5-1 | 10/16/2019 | EPH, TOTAL FRACTIONATED | 2400 |
| | SED-WCBG-6/2.0-2.5 | 2-2.5 | 10/16/2019 | Anthracene | **0.18** J |
| | | | | Arsenic | **14.2** |
| | | | | Benzo(a)anthracene | **0.45** J |
| | | | | Cadmium | **1.34** |
| | | | | Chrysene | **0.61** |
| | | | | Copper | **43.6** |
| | | | | Fluoranthene | **1** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.26** J |
| | | | | Lead | **64.4** |
| | | | | Mercury | **0.216** |
| | | | | Pyrene | **1** |
| | | | | Total PAHs | **4.69** |
| | | | | EPH, TOTAL FRACTIONATED | 1400 |

| Location ID | Field ID | Depth | Date | Parameter | Concentration (mg/kg) |
|---|---|---|---|---|---|
| SED-WCBG-7 | SED-WCBG-7/0.0-0.5 | 0-0.5 | 10/16/2019 | Mercury | **0.236** |
| | | | | EPH, TOTAL FRACTIONATED | 5.9 J |
| | SED-WCBG-7/0.5-1.0(B) | 0.5-1 | 10/16/2019 | EPH, TOTAL FRACTIONATED | 6.7 J |
| SED-WCBG-8 | SED-WCBG-8/0.0-0.5 | 0-0.5 | 10/18/2019 | Arsenic | **18.4** |
| | | | | Benzo(a)anthracene | **0.32** |
| | | | | Benzo(ghi)perylene | **0.4** |
| | | | | bis(2-Ethylhexyl)phthalate | **1.1** |
| | | | | Cadmium | **2.32** |
| | | | | Cobalt | 12.7 |
| | | | | Copper | **81.3** |
| | | | | Dibenz(a,h)anthracene | **0.094** |
| | | | | Lead | **116** |
| | | | | Mercury | **0.812** |
| | | | | Nickel | **46.1** |
| | | | | Selenium | 2.07 J |
| | | | | Zinc | **316** |
| | | | | EPH, TOTAL FRACTIONATED | 1900 |
| | SED-WCBG-8/0.5-1.0 | 0.5-1 | 10/18/2019 | EPH, TOTAL FRACTIONATED | 1100 |
| | SED-WCBG-8/2.0-2.5 | 2-2.5 | 10/18/2019 | Acenaphthene | **0.043** |
| | | | | Anthracene | **0.11** |
| | | | | Arsenic | **12.6** |
| | | | | Benzo(a)anthracene | **0.43** |
| | | | | Benzo(ghi)perylene | **0.27** |
| | | | | bis(2-Ethylhexyl)phthalate | **0.23** J |
| | | | | Chrysene | **0.41** |
| | | | | Copper | **40.6** |
| | | | | Dibenz(a,h)anthracene | **0.068** |
| | | | | Fluoranthene | **0.68** |
| | | | | Fluorene | **0.078** |
| | | | | Indeno(1,2,3-cd)pyrene | **0.21** |
| | | | | Lead | **52.4** |
| | | | | Phenanthrene | **0.56** |
| | | | | Pyrene | **0.86** |
| | | | | Total PAHs | **4.84** |
| | | | | EPH, TOTAL FRACTIONATED | 160 |

**EXPLANATION:**

**NJDEP Ecological Screening Criteria (ESC) For Saline Sediment**

| Parameter | ESC ER-L | ESC ER-M |
|---|---|---|
| Acenaphthene | 0.016 | 0.5 |
| Acenaphthylene | 0.044 | 0.64 |
| Aluminum | -- | 18000 |
| Anthracene | 0.085 | 1.1 |
| Arsenic | 8.2 | 70 |
| Barium | -- | 48 |
| Benzo(a)pyrene | 0.43 | 1.6 |
| Benzo(a)anthracene | 0.261 | 1.6 |
| Benzo(b)fluoranthene | -- | 1.8 |
| Benzo(ghi)perylene | 0.17 | -- |
| Benzo(k)fluoranthene | 0.24 | -- |
| bis(2-Ethylhexyl)phthalate | 0.18216 | 2.64651 |
| Butyl benzyl phthalate | -- | 0.063 |
| Cadmium | 1.2 | 9.6 |
| Chrysene | 0.384 | 2.8 |
| Cobalt | -- | 10 |
| Copper | 34 | 270 |
| Dibenz(a,h)anthracene | 0.063 | 0.26 |
| EPH, TOTAL FRACTIONATED | -- | -- |
| Fluoranthene | 0.6 | 5.1 |
| Fluorene | 0.019 | 0.54 |
| Indeno(1,2,3-cd)pyrene | 0.2 | -- |
| Lead | 47 | 218 |
| Manganese | -- | 260 |
| Mercury | 0.15 | 0.71 |
| 2-Methylnaphthalene | 0.07 | 0.67 |
| Naphthalene | 0.16 | 2.1 |
| Nickel | 21 | 52 |
| Phenanthrene | 0.24 | 1.5 |
| Pyrene | 0.665 | 2.6 |
| Selenium | -- | 1 |
| Silver | 1 | 3.7 |
| Total PAHs | 4 | 45 |
| Vanadium | -- | 57 |
| Zinc | 150 | 410 |

Note:
ESC = NJDEP Ecological Screening Criteria, March 2009
ESC ER-L = Saline Water Sediment Effects Range Low (per NJDEP ESC)
ESC ER-M = Saline Water Sediment Effects Range Medium (per NJDEP ESC)
Bold indicates concentrations above the ESC ER-L
Underline indicates concentrations above the ESC ER-M
J = Estimated value below sample reporting limit
Values in italics indicate MDL above applicable criterion.
All concentrations are in milligrams per kilogram (mg/kg).
Only constituents with concentrations above the referenced standard or criteria are presented.

DRAFT

PROJECT:
SEDIMENT INVESTIGATION REPORT
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:
SEDIMENT ANALYTICAL RESULTS
WOODBRIDGE CREEK - BACKGROUND

| | | | |
|---|---|---|---|
| DRAWN BY: | M. GIAMBATTISTA | PROJ NO.: | 326731.2020.0000 |
| CHECKED BY: | W. CORDASCO | | FIGURE 11 |
| APPROVED BY: | R. LIPPENCOTT | | |
| DATE: | FEBRUARY 2020 | | |

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24x36 -- USER: MGiambattista -- ATTACHED XREFS: -- ATTACHED IMAGES: J8A14; J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
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