# Table 1a
## Constituents of Concern for Groundwater
## AOI 10 Site Characterization/Remedial Investigation Report
## Sunoco Philadelphia Refinery
## Philadelphia, Pennsylvania

| METALS | CAS No. |
|---|---|
| Lead (dissolved) | 7439-92-1 |

| VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| 1,2-Dichloroethane | 107-06-2 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| 1,3,5-Trimethylbenzene | 108-67-8 |
| Benzene | 71-43-2 |
| Cumene | 98-82-8 |
| Ethylbenzene | 100-41-4 |
| Ethylene dibromide | 106-93-4 |
| Methyl tertiary butyl ether | 1634-04-4 |
| Toluene | 108-88-3 |
| Xylenes (total) | 1330-20-7 |

| SEMI-VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| Chrysene | 218-01-9 |
| Fluorene | 86-73-7 |
| Naphthalene | 91-20-3 |
| Phenanthrene | 85-01-8 |
| Pyrene | 129-00-0 |

Notes:
1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select groundwater samples to be collected within the CAMU were analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

# Table 1b
## Constituents of Concern for Soil
## AOI 10 Site Characterization/Remedial Investigation Report
## Sunoco Philadelphia Refinery
## Philadelphia, Pennsylvania

| METALS | CAS No. |
|---|---|
| Lead (total) | 7439-92-1 |

| VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| 1,2-Dichloroethane | 107-06-2 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| 1,3,5-Trimethylbenzene | 108-67-8 |
| Benzene | 71-43-2 |
| Cumene | 98-82-8 |
| Ethylbenzene | 100-41-4 |
| Ethylene dibromide | 106-93-4 |
| Methyl tertiary butyl ether | 1634-04-4 |
| Toluene | 108-88-3 |
| Xylenes (total) | 1330-20-7 |

| SEMI-VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| Anthracene | 120-12-7 |
| Benzo(a)anthracene | 56-55-3 |
| Benzo (g,h,i) perylene | 191-24-2 |
| Benzo(a)pyrene | 50-32-8 |
| Benzo(b)fluoranthene | 205-99-2 |
| Chrysene | 218-01-9 |
| Fluorene | 86-73-7 |
| Naphthalene | 91-20-3 |
| Phenanthrene | 85-01-8 |
| Pyrene | 129-00-0 |

Notes:

1. Constituents are from Pennsylvania Corrective Action Process (CAP) Regulation Amendments effective December 1, 2001; provided in Chapter VI, Section E (pgs. 29-30) of PADEP Document, *Closure Requirements for Underground Storage Tank Systems,* effective April 1, 1998 and the March 18, 2008 revised PADEP Petroleum Short List.
2. Select soil samples collected within and around the CAMU were analyzed for full TCL VOCs, TCL SVOCs, and TAL metals.

**Table 1c**
**Constituents of Concern for Surface Water**
**AOI 10 Site Characterization/Remedial Investigation Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| 1,2-Dichloroethane | 107-06-2 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| 1,3,5-Trimethylbenzene | 108-67-8 |
| Benzene | 71-43-2 |
| Cumene | 98-82-8 |
| Ethylbenzene | 100-41-4 |
| Ethylene dibromide | 106-93-4 |
| Methyl tertiary butyl ether | 1634-04-4 |
| Toluene | 108-88-3 |
| Xylenes (total) | 1330-20-7 |

| SEMI-VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| Chrysene | 218-01-9 |
| Fluorene | 86-73-7 |
| Naphthalene | 91-20-3 |
| Phenanthrene | 85-01-8 |
| Pyrene | 129-00-0 |

| TOTAL AND DISSOLVED TAL METALS | CAS No. |
|---|---|
| Aluminum | 7429-90-5 |
| Antimony | 7440-36-0 |
| Arsenic | 7440-38-2 |
| Barium | 7440-39-3 |
| Beryllium | 7440-41-7 |
| Cadmium | 7440-43-9 |
| Calcium | 7440-70-2 |
| Chromium | 7440-47-3 |
| Cobalt | 7440-48-4 |
| Copper | 7440-50-8 |
| Iron | 7439-89-6 |
| Lead (total) | 7439-92-1 |
| Magnesium | 7439-95-4 |
| Manganese | 7439-96-5 |
| Mercury | 7439-97-6 |
| Nickel | 7440-02-0 |
| Potassium | 9/7/7440 |
| Selenium | 7782-49-2 |
| Silver | 7440-22-4 |
| Sodium | 7440-23-5 |
| Thallium | 7440-28-0 |
| Vanadium | 7440-62-2 |
| Zinc | 7440-66-6 |
| **Additional Analysis** | |
| Hardness | |

## Table 1d
## Constituents of Concern for Sediment Samples
## AOI 10 Site Characterization/Remedial Investigation Report
## Sunoco Philadelphia Refinery
## Philadelphia, Pennsylvania

| VOLATILE ORGANIC COMPOUNDS | CAS No. |
|---|---|
| 1,2-Dichloroethane | 107-06-2 |
| 1,2,4-Trimethylbenzene | 95-63-6 |
| 1,3,5-Trimethylbenzene | 108-67-8 |
| Benzene | 71-43-2 |
| Cumene | 98-82-8 |
| Ethylbenzene | 100-41-4 |
| Ethylene dibromide | 106-93-4 |
| Methyl tertiary butyl ether | 1634-04-4 |
| Toluene | 108-88-3 |
| Xylenes (total) | 1330-20-7 |
| **Additional Volatile Compounds To Be Analyzed** | |
| 1,2-Dichlorobenzene | 95-50-1 |
| 1,3-Dichlorobenzene | 541-73-1 |
| 1,4-Dichlorobenzene | 106-46-7 |
| 1-Methylnaphthalene | 90-12-0 |

| SEMI-VOLATILE ORGANIC COMPOUNDS (via SIMS Method) | CAS No. |
|---|---|
| Anthracene | 120-12-7 |
| Benzo(a)anthracene | 56-55-3 |
| Benzo (g,h,i) perylene | 191-24-2 |
| Benzo(a)pyrene | 50-32-8 |
| Benzo(b)fluoranthene | 205-99-2 |
| Chrysene | 218-01-9 |
| Fluorene | 86-73-7 |
| Naphthalene | 91-20-3 |
| Phenanthrene | 85-01-8 |
| Pyrene | 129-00-0 |
| **Additional Semi-Volatile Compounds To Be Analyzed** | |
| Phenol | 108-95-2 |
| 2,4-Dimethylphenol | 105-67-9 |
| 2,4-Dinitrophenol | 51-28-5 |
| 2-Methylphenol | 95-48-7 |
| 6-Methyl Chrysene | 1705-85-7 |
| 2-Nitrophenol | 88-75-5 |
| Benzenethiol | 108-98-5 |
| Dibenz(a,h)acridine | 224-53-3 |
| Benzo(k)fluoranthene | 207-08-9 |
| Benzyl Butyl Phthalate | 85-68-7 |
| bis(2-Ethylhexyl) phthalate | 117-81-7 |
| Dibenzo(a,h)anthracene | 53-70-3 |
| Diethyl Phthalate | 84-66-2 |
| Dimethyl Phthalate | 131-11-3 |
| Di-n-butyl phthalate | 84-74-2 |
| Di-n-octyl phthalate | 117-84-0 |
| Fluoranthene | 206-44-0 |

Notes:

1. Additional compounds to be analyzed obtained from a modified analyte list from the 1992 RCRA RFI.

## Table 1d (continued)
## Constituents of Concern for Sediment Samples
## AOI 10 Work Plan for Site Characterization
## Sunoco Philadelphia Refinery
## Philadelphia, Pennsylvania

| TAL METALS | CAS No. |
|---|---|
| Aluminum | 7429-90-5 |
| Antimony | 7440-36-0 |
| Arsenic | 7440-38-2 |
| Barium | 7440-39-3 |
| Beryllium | 7440-41-7 |
| Cadmium | 7440-43-9 |
| Calcium | 7440-70-2 |
| Chromium | 7440-47-3 |
| Cobalt | 7440-48-4 |
| Copper | 7440-50-8 |
| Iron | 7439-89-6 |
| Lead (total) | 7439-92-1 |
| Magnesium | 7439-95-4 |
| Manganese | 7439-96-5 |
| Mercury | 7439-97-6 |
| Nickel | 7440-02-0 |
| Potassium | 9/7/7440 |
| Selenium | 7782-49-2 |
| Silver | 7440-22-4 |
| Sodium | 7440-23-5 |
| Thallium | 7440-28-0 |
| Vanadium | 7440-62-2 |
| Zinc | 7440-66-6 |
| **Additional Analysis** | |
| Total Organic Carbon | |
| Particle Grain Size | |

Notes:

1. Additional compounds to be analyzed obtained from a modified analyte list from the 1992 RCRA RFI.

# Table 2
# Existing Well Summary
# AOI 10
# Sunoco Philadelphia Refinery
# Philadelphia, Pennsylvania

| Well ID | Former Well ID[1] | Northing | Easting | Well Type | Well Classification[2] | Soil Boring Log Available (Y/N) | Construction Detail Available (Y/N) | Date of Well Completion | Well Construction Details[3] | | | | | | | | References |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Well Completion Depth (ft. bgs) | Well Diameter (in) | Top of Inner Casing Elevation[4] (ft. msl) (NAVD88) | Ground Surface Elevation (ft.) (NAVD88) | Top of Screen Elevation (ft) (NAVD88) | Bottom of Screen Elevation (ft) (NAVD88) | Depth to Screen (ft. bgs) | Screen Length (ft.) | |
| W-1 | W-17 | 223593.677 | 2682761.638 | Monitoring Well | Shallow | Y | Y | 8/9/88 | 17 | 2 | 9.60 | 7.69 | 5.69 | -9.31 | 2 | 15 | |
| W-1D | | 223583.998 | 2682756.483 | Monitoring Well | Intermediate | Y | Y | 4/6/11 | 76.5 | 4 | 10.73 | 7.87 | -58.63 | -68.63 | 66.5 | 10 | Aquaterra, 2011 |
| W-2 | W-16 | 223350.051 | 2681822.333 | Monitoring Well | Shallow | Y | N | 8/7/85 | 21.5 | -- | 19.45 | 17.27 | -- | -- | -- | -- | Sun, 1993 |
| W-3[5] | W-1 | 222926.249 | 2682400.535 | Monitoring Well | Shallow | Y | N | 6/21/85 | 14.6 | -- | 9.47 | -- | -- | -- | 2 | 8 | Sun, 1993 |
| W-4[5] | W-2 | 223120.547 | 2682104.698 | Monitoring Well | Shallow | Y | Y | 6/21/85 | 10 | -- | 6.51 | -- | -- | -- | 2 | 8 | Sun, 1993 |
| W-5 | MW-12, B-12 | 223047.410 | 2681651.163 | Monitoring Well | Shallow | Y | Y | 2/19/92 | 13 | 4 | 7.73 | 6.00 | 3.00 | -7.00 | 3 | 10 | ENSR, 1992 |
| W-6 | W-5 | 222623.498 | 2682398.660 | Monitoring Well | Shallow | Y | N | 6/21/85 | 10 | -- | 7.49 | 4.83 | 2.83 | -5.17 | 2 | 8 | Sun, 1993 |
| W-7[5] | W-4 | 222671.404 | 2681958.304 | Monitoring Well | Shallow | Y | N | 6/21/55 | 10 | -- | 8.55 | -- | -- | -- | 2 | 8 | Sun, 1993 |
| W-8 | MW-14, B-14 | 222548.523 | 2681883.523 | Monitoring Well | Shallow | Y | Y | 2/24/92 | 13 | 4 | 8.44 | 7.22 | 4.22 | -5.78 | 3 | 10 | ENSR, 1992 |
| W-9 | MW-20, B-20 | 222542.814 | 2681893.171 | Monitoring Well | Intermediate | Y | Y | 3/12/92 | 79 | 2 | 9.29 | 6.96 | 4.96 | -3.04 | 2 | 8 | ENSR, 1992 |
| W-10 | W-8 | 222348.449 | 2681974.151 | Monitoring Well | Shallow | Y | N | 6/24/85 | 10 | -- | 7.72 | 4.74 | 2.74 | -5.27 | 2 | 8 | Sun, 1993 |
| W-11 | W-7 | 222285.800 | 2682276.399 | Monitoring Well | Shallow | Y | N | 6/21/85 | 10 | -- | 8.06 | 5.80 | 5.80 | -4.20 | 0 | 10 | Sun, 1993 |
| W-12 | MW-16, B-16 | 221939.059 | 2682078.235 | Monitoring Well | Shallow | Y | Y | 2/25/92 | 13 | 4 | 7.10 | 5.08 | 2.08 | -4.92 | 3 | 7 | ENSR, 1992 |
| W-13 | MW-21, B-21 | 221929.280 | 2682064.602 | Monitoring Well | Intermediate | Y | Y | 3/12/92 | 74 | 4 | 6.65 | 5.16 | -51.84 | -61.84 | 57 | 10 | ENSR, 1992 |
| W-14 | MW-13, B-13 | 222310.042 | 2681746.563 | Monitoring Well | Shallow | Y | Y | 2/19/92 | 10 | 4 | 7.26 | 5.44 | 2.44 | -4.56 | 3 | 7 | ENSR, 1992 |
| W-15 | W-6 | 222774.758 | 2681623.753 | Monitoring Well | Shallow | Y | N | 6/21/85 | 10 | -- | 8.78 | 7.30 | 7.30 | -2.70 | 0 | 10 | Sun, 1993 |
| W-16 | MW-15, B-15 | 221794.793 | 2681794.482 | Monitoring Well | Shallow | Y | Y | 2/24/92 | 12 | 4 | 6.64 | 5.50 | 2.50 | -4.50 | 3 | 7 | ENSR, 1992 |
| W-17 | W-10 | 221776.820 | 2681731.049 | Monitoring Well | Shallow | Y | N | 8/9/88 | 10 | 2 | 7.22 | 5.07 | 3.07 | -4.93 | 2 | 8 | Sun, 1993 |
| W-18 | W-12 | 221944.014 | 2681223.198 | Monitoring Well | Shallow | Y | N | 8/10/88 | 15 | 2 | 8.12 | 5.92 | 4.92 | -9.08 | 1 | 14 | Sun, 1993 |
| W-19 | MW-27, B-27 | 222405.114 | 2680982.432 | Monitoring Well | Intermediate | Y | Y | 3/25/92 | 83 | 2 | 10.06 | 8.17 | -61.83 | -71.83 | 70 | 10 | ENSR, 1992 |
| W-20 | MW-17, B-17 | 222415.212 | 2680986.732 | Monitoring Well | Shallow | Y | Y | 2/25/92 | 12 | 4 | 10.11 | 8.84 | 5.84 | -1.16 | 3 | 7 | ENSR, 1992 |
| W-21[5] | W-13 | 222238.813 | 2680879.938 | Monitoring Well | Shallow | Y | N | 6/21/85 | 10 | -- | 7.64 | -- | -- | -- | 2 | 8 | Sun, 1993 |
| W-22 | W-14 | 222466.056 | 2680429.390 | Monitoring Well | Shallow | Y | N | 6/21/85 | 8 | 2 | 6.44 | 6.00 | 6.00 | -2.00 | 0 | 8 | Sun, 1993 |
| W-23 | W-15 | 222588.626 | 2680081.211 | Monitoring Well | Shallow | Y | N | 6/21/85 | 10 | 2 | 7.55 | 5.21 | -4.79 | -14.79 | 10 | 10 | Sun, 1993 |
| W-24 | W-18 | 222584.494 | 2679927.148 | Monitoring Well | Shallow | Y | Y | 8/10/88 | 15 | 2 | 5.47 | 3.73 | 2.73 | -11.27 | 1 | 14 | Sun, 1993 |
| W-25 | MW-18, B-18 | 222643.035 | 2679601.016 | Monitoring Well | Shallow | Y | Y | 3/2/92 | 17 | 4 | 10.15 | 8.03 | 3.03 | -6.97 | 5 | 10 | ENSR, 1992 |
| W-26 | MW-19, B-19 | 222651.426 | 2679591.709 | Monitoring Well | Intermediate | Y | Y | 3/4/92 | 37 | 4 | 9.98 | 8.35 | -9.65 | -14.65 | 18 | 5 | ENSR, 1992 |
| W-27 | W-19 | 222625.973 | 2679107.331 | Monitoring Well | Shallow | Y | Y | 8/10/88 | 20 | 2 | 10.86 | 9.17 | 4.17 | -10.83 | 5 | 15 | Sun, 1993 |
| W-28 | | 222857.370 | 2682420.037 | Monitoring Well | Shallow | Y | Y | 4/18/11 | 14 | 4 | 8.61 | 5.79 | 1.79 | -8.21 | 4 | 10 | Aquaterra, 2011 |
| W-29 | | 223225.260 | 2682148.792 | Monitoring Well | Shallow | Y | Y | 4/18/11 | 14 | 4 | 11.82 | 9.09 | 5.09 | -4.91 | 4 | 10 | Aquaterra, 2011 |
| W-30 | | 222660.796 | 2681982.993 | Monitoring Well | Shallow | Y | Y | 4/15/11 | 13 | 4 | 8.65 | 6.58 | 3.58 | -6.42 | 3 | 10 | Aquaterra, 2011 |
| W-31 | | 222012.680 | 2681807.660 | Monitoring Well | Shallow | Y | Y | 4/15/11 | 15 | 4 | 8.27 | 5.43 | 2.43 | -9.57 | 3 | 12 | Aquaterra, 2011 |
| W-32 | | 222061.938 | 2681224.314 | Monitoring Well | Shallow | Y | Y | 4/18/11 | 13 | 4 | 14.83 | 11.96 | 8.96 | -1.04 | 3 | 10 | Aquaterra, 2011 |
| W-32D | | 222055.387 | 2681222.072 | Monitoring Well | Intermediate | Y | Y | 4/8/11 | 53 | 4 | 14.70 | 11.50 | -31.50 | -84.50 | 43 | 53 | Aquaterra, 2011 |
| W-33 | | 222385.134 | 2680145.426 | Monitoring Well | Shallow | Y | Y | 4/20/11 | 16 | 4 | 17.07 | 13.36 | 7.36 | -2.64 | 6 | 10 | Aquaterra, 2011 |
| W-34 | | 222425.094 | 2680918.947 | Monitoring Well | Shallow | Y | Y | 4/20/11 | 15 | 4 | 14.14 | 10.78 | 6.78 | -3.22 | 4 | 10 | Aquaterra, 2011 |
| PH-31 | -- | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | USGS, 1989 |

**NOTES:**

-- Data could not be located or determined based on available reports

Abandoned/destroyed wells.

AOI - Area of Interest

ft. - feet

bgs - below ground surface

in. - inches

msl - elevation relative to mean sea level

NA - Data not available

1. Former well IDs were derived from handwritten notes on the logs themselves or the referenced report.
2. Well classification based on the formation that the well is screened in. Wells screened within the Middle Clay or the Farrington Sand are classified as deep wells.
   Well classification for wells screened above the Lower/Middle Clay are based on the following: screened in Fill/Alluvium - Shallow, screened in Trenton Gravel - Intermediate, screened in Fill/Alluvium & Trenton Gravel - Shallow/Intermediate
3. Well construction details were taken directly from well boring logs provided by Handex, Stantec, Aquaterra or collected from available historic reports.
4. Wells were surveyed by Langan in July 2010 and May 2011.
5. Wells could not be located.
6. Well is damaged.

# Table 3
# Summary of Groundwater and LNAPL Elevations
# May 2011
# AOI 10
# Sunoco Philadelphia Refinery
# Philadelphia, Pennsylvania

| Monitoring Point ID | Northing | Easting | Well Type | Well Classification[1] | Specific Gravity (g/cc) Used for GW Correction | | Well Completion Depth (ft bgs) | Depth to Product (ft btic) | Depth to GW[4] (ft btic) | Apparent LNAPL Thickness (ft) | LNAPL Elevation (ft amsl) | GW Elevation (ft amsl) | Corrected GW Elevation (ft amsl) | TIC Elevation (ft amsl) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | S.G.[2] | Source[3] | | | | | | | | | |
| W-1 | 223593.677 | 2682761.638 | Monitoring Well | Shallow | | | 17.0 | - | 6.21 | - | - | 3.39 | **3.39** | 9.60 | |
| W-1D | 223583.998 | 2682756.483 | Monitoring Well | Intermediate | | | 76.5 | - | 9.19 | - | - | 1.54 | **1.54** | 10.73 | |
| W-2 | 223350.051 | 2681822.333 | Monitoring Well | Shallow | | | 21.5 | - | 15.16 | - | - | 4.29 | **4.29** | 19.45 | |
| W-5 | 223047.410 | 2681651.163 | Monitoring Well | Shallow | | | 13.0 | - | 3.11 | - | - | 4.62 | **4.62** | 7.73 | |
| W-6 | 222623.498 | 2682398.660 | Monitoring Well | Shallow | | | 10.0 | - | 2.52 | - | - | 4.97 | **4.97** | 7.49 | |
| W-8 | 222548.523 | 2681883.523 | Monitoring Well | Shallow | 0.9515 | W-8 | 13.0 | -[5] | - | **0.59** | NA | NA | **NA** | 8.44 | Product sample collected on 4/27/11 |
| W-9 | 222542.814 | 2681893.171 | Monitoring Well | Intermediate | | | 79.0 | - | 9.39 | - | - | -0.10 | **-0.10** | 9.29 | |
| W-11 | 222285.800 | 2682276.399 | Monitoring Well | Shallow | | | 10.0 | - | 3.69 | - | - | 4.37 | **4.37** | 8.06 | |
| W-12 | 221939.059 | 2682078.235 | Monitoring Well | Shallow | | | 13.0 | - | 2.97 | - | - | 4.13 | **4.13** | 7.10 | |
| W-13 | 221929.280 | 2682064.602 | Monitoring Well | Intermediate | | | 74.0 | - | 7.57 | - | - | -0.92 | **-0.92** | 6.65 | |
| W-14 | 222310.042 | 2681746.563 | Monitoring Well | Shallow | 0.9478 | W-14 | 10.0 | 2.01 | 2.12 | **0.11** | 5.25 | 5.14 | **5.25** | 7.26 | Product sample collected on 4/27/11 |
| W-15 | 222774.758 | 2681623.753 | Monitoring Well | Shallow | | | 10.0 | - | 2.15 | - | - | 6.63 | **6.63** | 8.78 | |
| W-16 | 221794.793 | 2681794.482 | Monitoring Well | Shallow | | | 12.0 | - | 2.42 | - | - | 4.22 | **4.22** | 6.64 | |
| W-17 | 221776.820 | 2681731.049 | Monitoring Well | Shallow | | | 10.0 | - | 2.89 | - | - | 4.33 | **4.33** | 7.22 | |
| W-18 | 221944.014 | 2681223.198 | Monitoring Well | Shallow | 0.9478 | W-14 | 15.0 | -[5] | - | **0.01** | NA | NA | **NA** | 8.12 | Product sample collected on 4/27/11 |
| W-19 | 222405.114 | 2680982.432 | Monitoring Well | Intermediate | | | 83.0 | - | 10.87 | - | - | -0.81 | **-0.81** | 10.06 | |
| W-20 | 222415.212 | 2680986.732 | Monitoring Well | Shallow | | | 12.0 | - | 4.75 | - | - | 5.36 | **5.36** | 10.11 | |
| W-22 | 222466.056 | 2680429.390 | Monitoring Well | Shallow | | | 8.0 | - | 0.99 | - | - | 5.45 | **5.45** | 6.44 | |
| W-23 | 222588.626 | 2680081.211 | Monitoring Well | Shallow | | | 10.0 | - | 2.10 | - | - | 5.45 | **5.45** | 7.55 | |
| W-25 | 222643.035 | 2679601.016 | Monitoring Well | Shallow | | | 17.0 | - | 5.71 | - | - | 4.44 | **4.44** | 10.15 | |
| W-26 | 222651.426 | 2679591.709 | Monitoring Well | Intermediate | | | 37.0 | - | 11.68 | - | - | -1.70 | **-1.70** | 9.98 | |
| W-27 | 222625.973 | 2679107.331 | Monitoring Well | Shallow | | | 20.0 | - | 6.18 | - | - | 4.68 | **4.68** | 10.86 | |
| W-28 | 222857.370 | 2682420.037 | Monitoring Well | Shallow | | | 14.0 | - | 3.22 | - | - | 5.39 | **5.39** | 8.61 | |
| W-29 | 223225.260 | 2682148.792 | Monitoring Well | Shallow | | | 14.0 | - | 7.36 | - | - | 4.46 | **4.46** | 11.82 | |
| W-30 | 222660.796 | 2681982.993 | Monitoring Well | Shallow | | | 13.0 | - | 3.40 | - | - | 5.25 | **5.25** | 8.65 | |
| W-31 | 222012.680 | 2681807.660 | Monitoring Well | Shallow | | | 15.0 | - | 3.13 | - | - | 5.14 | **5.14** | 8.27 | |
| W-32 | 222061.938 | 2681224.314 | Monitoring Well | Shallow | | | 13.0 | - | 9.09 | - | - | 5.74 | **5.74** | 14.83 | |
| W-32D | 222055.387 | 2681222.072 | Monitoring Well | Intermediate | | | 53.0 | - | 11.43 | - | - | 3.27 | **3.27** | 14.70 | |
| W-33 | 222385.134 | 2680145.426 | Monitoring Well | Shallow | | | 16.0 | - | 11.35 | - | - | 5.72 | **5.72** | 17.07 | |
| W-34 | 222425.094 | 2680918.947 | Monitoring Well | Shallow | | | 15.0 | - | 8.27 | - | - | 5.87 | **5.87** | 14.14 | |

Notes:
1. Well type was chosen based on the formation the well screens. Wells screened within the Middle Clay or the Farrington Sand were classified as deep wells. Based on their total depth, wells screened above the Middle Clay are classified as either a shallow and/or intermediate well.
2. Specific Gravity (S.G.) values were determined from LNAPL samples collected by Aquaterra/Stantek as part of CCR and/or SCR/RIR.
3. For wells with no direct LNAPL density measurements, the density value in the nearest well with LNAPL data was used.
4. Depth to water and depth to LNAPL provided by Aquaterra. All wells gauged on 4/26 & 4/27/11 unless otherwise noted.
5. LNAPL thickness values obtained from June 2010 gauging event. Product in well was too viscous to collect accurate product thickness in April 2011.

g/cc = grams per cubic centimeter
LNAPL = Light Non-Aqueous Phase Liquid
ft amsl = Feet Above Mean Sea Level
GW = Groundwater
NA = Not Applicable
NM = Not Measured
NP = No Product
ft btic = Feet Below Top of Inner Casing

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-36 | | | | BH-10-37 | | | | BH-10-38 | | | | BH-10-39 | | | | BH-10-40 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-36_0-2' | | | | BH-10-37_0-2' | | | | BH-10-38_0-2' | | | | BH-10-39_0-2' | | | | BH-10-40_0-2' | | | |
| | | | | | | Sample Date | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 0.4 | J | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | **0.16** | 121.6 | ND | U | 0.0009 | 0.79 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.008 | | 0.0006 | 0.91 | 0.008 | | 0.0006 | 0.93 | ND | U | 9E-04 | 1.52 | 0.12 | J | 0.08 | 121.6 | 0.003 | J | 0.0005 | 0.79 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 0.18 | J | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 0.24 | J | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 2.5 | | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 0.0006 | 0.91 | ND | U | 0.0006 | 0.93 | ND | U | 9E-04 | 1.52 | ND | U | 0.08 | 121.6 | ND | U | 0.0005 | 0.79 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.009 | | 0.001 | 0.91 | 0.005 | J | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | 0.001 | J | 0.0009 | 0.79 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | 0.46 | J | 0.2 | 5 | 1.9 | | 0.21 | 5 | ND | U | 0.2 | 5 | 12 | | 2.2 | 5 | 4.7 | | 0.19 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 1.8 | | 0.2 | 5 | 6.5 | | 0.21 | 5 | ND | U | 0.2 | 5 | 22 | | 2.2 | 5 | 11 | | 0.19 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 1.8 | | 0.2 | 5 | 6.5 | | 0.21 | 5 | ND | U | 0.2 | 5 | **16** | | 2.2 | 5 | 9.2 | | 0.19 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 2.4 | | 0.2 | 5 | 9.3 | | 0.21 | 5 | ND | U | 0.2 | 5 | 25 | | 2.2 | 5 | 12 | | 0.19 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 1.3 | | 0.2 | 5 | 3.9 | | 0.21 | 5 | ND | U | 0.2 | 5 | 9.9 | J | 2.2 | 5 | 4.8 | | 0.19 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 2.2 | | 0.2 | 5 | 6.2 | | 0.21 | 5 | ND | U | 0.2 | 5 | 23 | | 2.2 | 5 | 10 | | 0.19 | 5 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 0.2 | 5 | 0.83 | J | 0.21 | 5 | ND | U | 0.2 | 5 | 7 | J | 2.2 | 5 | 1.3 | | 0.19 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 0.39 | J | 0.2 | 5 | 1.1 | | 0.21 | 5 | ND | U | 0.2 | 5 | ND | U | 2.2 | 5 | 0.51 | J | 0.19 | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 1.9 | | 0.2 | 5 | 8.6 | | 0.21 | 5 | 0.24 | J | 0.2 | 5 | 50 | | 2.2 | 5 | 18 | | 0.19 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 3.1 | | 0.2 | 5 | 10 | | 0.21 | 5 | ND | U | 0.2 | 5 | 51 | | 2.2 | 5 | 20 | | 0.19 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 390 | | 0.0627 | 10 | 540 | | 0.132 | 20 | 11.6 | | 0.012 | 2 | 415 | | 0.068 | 10 | 65.1 | | 0.0121 | 2 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 18.7 | | 0.5 | 1 | 21.8 | | 0.5 | 1 | 16.9 | | 0.5 | 1 | 23.9 | | 0.5 | 1 | 15 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-41 | | | | BH-10-42 | | | | BH-10-47 | | | | BH-10-49 | | | | BH-10-50 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-41_0-2' | | | | BH-10-42_0-2' | | | | BH-10-47_0-2' | | | | BH-10-49_0-2' | | | | BH-10-50_0-2' | | | |
| | | | | | | Sample Date | 4/5/2011 | | | | 4/19/2011 | | | | 4/19/2011 | | | | 4/19/2011 | | | | 4/19/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | 0.014 | | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | 0.007 | J | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.008 | J | 8E-04 | 1.05 | 0.002 | J | 7E-04 | 1.1 | 0.003 | J | 5E-04 | 0.82 | 0.007 | | 7E-04 | 0.93 | 0.003 | J | 5E-04 | 0.8 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.012 | | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | 0.002 | J | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 1.1 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.93 | ND | U | 9E-04 | 0.8 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 8E-04 | 1.05 | ND | U | 7E-04 | 1.1 | ND | U | 5E-04 | 0.82 | ND | U | 7E-04 | 0.93 | ND | U | 5E-04 | 0.8 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.01 | | 0.002 | 1.05 | 0.001 | J | 0.001 | 1.1 | 0.002 | J | 0.001 | 0.82 | 0.003 | J | 0.001 | 0.93 | 0.001 | J | 9E-04 | 0.8 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 1.2 | 5 | 1.2 | | 0.2 | 1 | 0.25 | | 0.04 | 1 | 0.057 | J | 0.047 | 1 | 1.4 | | 0.037 | 1 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | ND | U | 1.2 | 5 | 1.4 | | 0.2 | 1 | 0.67 | | 0.04 | 1 | 0.12 | J | 0.047 | 1 | 1.9 | | 0.037 | 1 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | ND | U | 1.2 | 5 | 1.3 | | 0.2 | 1 | 0.82 | | 0.04 | 1 | 0.14 | J | 0.047 | 1 | 1.3 | | 0.037 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | ND | U | 1.2 | 5 | 1.5 | | 0.2 | 1 | 0.83 | | 0.04 | 1 | 0.094 | J | 0.047 | 1 | 1.5 | | 0.037 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | ND | U | 1.2 | 5 | 2.2 | | 0.2 | 1 | 0.77 | | 0.04 | 1 | 0.15 | J | 0.047 | 1 | 0.78 | | 0.037 | 1 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | ND | U | 1.2 | 5 | 2.6 | | 0.2 | 1 | 0.73 | | 0.04 | 1 | 0.18 | J | 0.047 | 1 | 1.7 | | 0.037 | 1 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 1.2 | 5 | 0.32 | J | 0.2 | 1 | 0.05 | J | 0.04 | 1 | ND | U | 0.047 | 1 | 0.64 | | 0.037 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | ND | U | 1.2 | 5 | 2.8 | | 0.2 | 1 | 0.29 | | 0.04 | 1 | 0.11 | J | 0.047 | 1 | 0.74 | | 0.037 | 1 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | ND | U | 1.2 | 5 | 2.9 | | 0.2 | 1 | 0.54 | | 0.04 | 1 | 0.15 | J | 0.047 | 1 | 4.7 | | 0.37 | 10 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | ND | U | 1.2 | 5 | 2.5 | | 0.2 | 1 | 0.81 | | 0.04 | 1 | 0.14 | J | 0.047 | 1 | 3.3 | | 0.037 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 186 | | 0.039 | 5 | 249 | | 0.06 | 10 | 233 | | 0.062 | 10 | 340 | | 0.072 | 10 | 84.7 | | 0.029 | 5 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 34 | | 0.5 | 1 | 15.3 | | 0.5 | 1 | 17.1 | | 0.5 | 1 | 29.5 | | 0.5 | 1 | 11.8 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-53 | | | | BH-10-54 | | | | BH-10-59 | | | | BH-10-60 | | | | BH-10-61 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-53_0-2' | | | | BH-10-54_0-2' | | | | BH-10-59_0-2' | | | | BH-10-60_0-2' | | | | BH-10-61_0-2' | | | |
| | | | | | | Sample Date | 4/22/2011 | | | | 4/22/2011 | | | | 4/22/2011 | | | | 4/22/2011 | | | | 4/22/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | ND | U | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | 0.002 | J | 0.001 | 0.98 | 0.005 | J | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.98 | ND | U | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.98 | ND | U | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | ND | U | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.98 | 0.004 | J | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.018 | | 9E-04 | 0.98 | 0.005 | J | 5E-04 | 0.82 | 0.012 | | 6E-04 | 0.98 | 0.02 | | 8E-04 | 1.26 | 0.002 | J | 5E-04 | 0.8 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.002 | J | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | 0.003 | J | 0.001 | 0.98 | 0.005 | J | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | ND | U | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.98 | ND | U | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.002 | 0.98 | ND | U | 0.001 | 0.82 | ND | U | 0.001 | 0.98 | ND | U | 0.002 | 1.26 | ND | U | 0.001 | 0.8 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 9E-04 | 0.98 | ND | U | 5E-04 | 0.82 | ND | U | 6E-04 | 0.98 | ND | U | 8E-04 | 1.26 | ND | U | 5E-04 | 0.8 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.01 | | 0.002 | 0.98 | 0.007 | | 0.001 | 0.82 | 0.006 | | 0.001 | 0.98 | 0.011 | | 0.002 | 1.26 | 0.001 | J | 0.001 | 0.8 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | 0.28 | J | 0.063 | 1 | 0.83 | | 0.041 | 1 | 1.3 | J | 0.41 | 10 | ND | U | 4 | 10 | 0.29 | | 0.04 | 1 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 0.53 | | 0.063 | 1 | 2.4 | | 0.041 | 1 | 2.1 | | 0.41 | 10 | ND | U | 4 | 10 | 0.65 | | 0.04 | 1 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 0.39 | | 0.063 | 1 | 2.5 | | 0.041 | 1 | 1.6 | J | 0.41 | 10 | 10 | J | 4 | 10 | 0.58 | | 0.04 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 0.48 | | 0.063 | 1 | 3.2 | | 0.041 | 1 | 2.1 | | 0.41 | 10 | 4.9 | J | 4 | 10 | 0.7 | | 0.04 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 0.2 | J | 0.063 | 1 | 1.7 | | 0.041 | 1 | 1.2 | J | 0.41 | 10 | 11 | J | 4 | 10 | 0.34 | | 0.04 | 1 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 0.47 | | 0.063 | 1 | 2.6 | | 0.041 | 1 | 2.3 | | 0.41 | 10 | 9.7 | J | 4 | 10 | 0.57 | | 0.04 | 1 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | 0.12 | J | 0.063 | 1 | 0.21 | | 0.041 | 1 | 0.73 | J | 0.41 | 10 | ND | U | 4 | 10 | 0.047 | J | 0.04 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 0.088 | J | 0.063 | 1 | 0.87 | | 0.041 | 1 | ND | U | 0.41 | 10 | ND | U | 4 | 10 | 0.067 | J | 0.04 | 1 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 0.9 | | 0.063 | 1 | 2.8 | | 0.041 | 1 | 4.1 | | 0.41 | 10 | ND | U | 4 | 10 | 1.1 | | 0.04 | 1 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 0.86 | | 0.063 | 1 | 4.4 | | 0.041 | 1 | 3.9 | | 0.41 | 10 | 7.1 | J | 4 | 10 | 1 | | 0.04 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | **3310** | | 0.491 | 50 | 186 | | 0.033 | 5 | 401 | | 0.061 | 10 | 777 | | 0.122 | 20 | 118 | | 0.03 | 5 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 48.1 | | 0.5 | 1 | 20 | | 0.5 | 1 | 18.3 | | 0.5 | 1 | 17.3 | | 0.5 | 1 | 17.3 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-62 | | | | BH-10-66 | | | | BH-10-67 | | | | BH-10-71 | | | | BH-10-72 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-62_0-2' | | | | BH-10-66_0-2' | | | | BH-10-67_0-2' | | | | BH-10-71_0-2' | | | | BH-10-72_0-2' | | | |
| | | | | | | Sample Date | 4/22/2011 | | | | 4/21/2011 | | | | 4/21/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | 0.004 | J | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | 0.16 | | 0.002 | 1.08 | 0.011 | | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | ND | U | 0.002 | 1.08 | ND | U | 0.001 | 0.95 | ND | U | **0.12** | 79.72 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | 0.003 | J | 0.002 | 1.08 | ND | U | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | 0.002 | J | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | 0.029 | | 0.002 | 1.08 | 0.005 | J | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.051 | | 0.001 | 1.07 | 0.004 | J | 5E-04 | 0.79 | 0.11 | | 0.001 | 1.08 | 0.019 | | 6E-04 | 0.95 | ND | U | 0.062 | 79.72 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.006 | J | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | 0.3 | | 0.002 | 1.08 | 0.016 | | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | 0.023 | | 0.002 | 1.08 | 0.002 | J | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.79 | 0.005 | J | 0.002 | 1.08 | ND | U | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 0.001 | 1.07 | ND | U | 5E-04 | 0.79 | ND | U | 0.001 | 1.08 | ND | U | 6E-04 | 0.95 | ND | U | 0.062 | 79.72 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.024 | | 0.002 | 1.07 | 0.002 | J | 0.001 | 0.79 | 0.22 | | 0.002 | 1.08 | 0.014 | | 0.001 | 0.95 | ND | U | 0.12 | 79.72 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | 0.73 | J | 0.62 | 10 | ND | U | 0.04 | 1 | 0.33 | | 0.062 | 1 | ND | U | 0.21 | 5 | 5.8 | J | 2.6 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 1.6 | J | 0.62 | 10 | 0.07 | J | 0.04 | 1 | 0.62 | | 0.062 | 1 | 0.32 | J | 0.21 | 5 | 15 | | 2.6 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 2.4 | J | 0.62 | 10 | 0.065 | J | 0.04 | 1 | 0.57 | | 0.062 | 1 | 0.51 | J | 0.21 | 5 | **49** | | 2.6 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 2.8 | J | 0.62 | 10 | 0.069 | J | 0.04 | 1 | 0.7 | | 0.062 | 1 | 0.35 | J | 0.21 | 5 | 31 | | 2.6 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 3.4 | | 0.62 | 10 | 0.085 | J | 0.04 | 1 | 0.39 | | 0.062 | 1 | 1.1 | | 0.21 | 5 | 47 | | 2.6 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 1.8 | J | 0.62 | 10 | 0.077 | J | 0.04 | 1 | 0.75 | | 0.062 | 1 | 0.46 | J | 0.21 | 5 | 27 | | 2.6 | 5 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 0.62 | 10 | ND | U | 0.04 | 1 | 0.12 | J | 0.062 | 1 | ND | U | 0.21 | 5 | ND | U | 2.6 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 4.2 | | 0.62 | 10 | ND | U | 0.04 | 1 | 0.28 | J | 0.062 | 1 | 0.25 | J | 0.21 | 5 | 3.1 | J | 2.6 | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 1.9 | J | 0.62 | 10 | 0.06 | J | 0.04 | 1 | 1.1 | | 0.062 | 1 | 0.47 | J | 0.21 | 5 | 12 | J | 2.6 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 2.6 | J | 0.62 | 10 | 0.079 | J | 0.04 | 1 | 1.2 | | 0.062 | 1 | 0.68 | J | 0.21 | 5 | 49 | | 2.6 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | **2580** | | 0.475 | 50 | 250 | | 0.031 | 5 | 985 | | 0.192 | 20 | 244 | | 0.065 | 10 | 946 | | 0.159 | 20 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 46.3 | | 0.5 | 1 | 18 | | 0.5 | 1 | 46.8 | | 0.5 | 1 | 20.2 | | 0.5 | 1 | 35.7 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-73 | | | | BH-10-76 | | | | BH-10-78 | | | | BH-10-79 | | | | BH-10-80 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-73_0-2' | | | | BH-10-76_0-2' | | | | BH-10-78_0-2' | | | | BH-10-79_0-2' | | | | BH-10-80_0-2' | | | |
| | | | | | | Sample Date | 4/5/2011 | | | | 4/20/2011 | | | | 4/21/2011 | | | | 4/21/2011 | | | | 4/21/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | 0.005 | J | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | 0.003 | J | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.016 | | 9E-04 | 1.07 | 0.005 | J | 5E-04 | 0.89 | 0.001 | J | 5E-04 | 0.82 | 0.004 | J | 5E-04 | 0.8 | 0.009 | | 5E-04 | 0.81 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.012 | | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.003 | J | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.002 | 1.07 | ND | U | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | ND | U | 9E-04 | 0.8 | ND | U | 0.001 | 0.81 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 9E-04 | 1.07 | ND | U | 5E-04 | 0.89 | ND | U | 5E-04 | 0.82 | ND | U | 5E-04 | 0.8 | ND | U | 5E-04 | 0.81 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.018 | | 0.002 | 1.07 | 0.002 | J | 0.001 | 0.89 | ND | U | 0.001 | 0.82 | 0.001 | J | 9E-04 | 0.8 | 0.001 | J | 0.001 | 0.81 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 2.9 | 5 | 0.26 | | 0.04 | 1 | 0.43 | | 0.039 | 1 | ND | U | 0.038 | 1 | 0.57 | | 0.04 | 1 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | ND | U | 2.9 | 5 | 1.4 | | 0.04 | 1 | 0.91 | | 0.039 | 1 | 0.041 | J | 0.038 | 1 | 1.7 | | 0.04 | 1 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | ND | U | 2.9 | 5 | 1.8 | | 0.04 | 1 | 0.66 | | 0.039 | 1 | 0.046 | J | 0.038 | 1 | 1.4 | | 0.04 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | ND | U | 2.9 | 5 | 1.5 | | 0.04 | 1 | 0.81 | | 0.039 | 1 | 0.046 | J | 0.038 | 1 | 1.9 | | 0.04 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 3.9 | J | 2.9 | 5 | 2 | | 0.04 | 1 | 0.33 | | 0.039 | 1 | ND | U | 0.038 | 1 | 0.79 | | 0.04 | 1 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | ND | U | 2.9 | 5 | 1.6 | | 0.04 | 1 | 0.82 | | 0.039 | 1 | ND | U | 0.038 | 1 | 1.6 | | 0.04 | 1 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 2.9 | 5 | 0.083 | J | 0.04 | 1 | 0.14 | J | 0.039 | 1 | ND | U | 0.038 | 1 | 0.15 | J | 0.04 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 17 | | 2.9 | 5 | 0.34 | | 0.04 | 1 | 0.085 | J | 0.039 | 1 | ND | U | 0.038 | 1 | 0.18 | J | 0.04 | 1 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 4.4 | J | 2.9 | 5 | 0.74 | | 0.04 | 1 | 1.3 | | 0.039 | 1 | ND | U | 0.038 | 1 | 1.9 | | 0.04 | 1 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | ND | U | 2.9 | 5 | 0.99 | | 0.04 | 1 | 1.3 | | 0.039 | 1 | 0.042 | J | 0.038 | 1 | 2.9 | | 0.04 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | **4550** | | 0.887 | 100 | **1990** | | 0.621 | 100 | 79.3 | | 0.012 | 2 | 145 | | 0.029 | 5 | 234 | | 0.06 | 10 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 42.5 | | 0.5 | 1 | 17.1 | | 0.5 | 1 | 15.3 | | 0.5 | 1 | 12.6 | | 0.5 | 1 | 16.5 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | W-1D | | | | W-28 | | | | W-29 | | | | W-30 | | | | W-31 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | W-1D_0-2' | | | | W-28_0-2' | | | | W-29_0-2' | | | | W-30@0'-2' | | | | W-31@0'-2' | | | |
| | | | | | | Sample Date | 4/5/2011 | | | | 4/19/2011 | | | | 4/19/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | ND | U | 9E-04 | 0.8 | 1.6 | | 0.06 | 50.09 | ND | U | 0.001 | 0.95 | 0.004 | J | 0.003 | 1.45 | 0.092 | J | 0.075 | 63.87 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 9E-04 | 0.8 | ND | U | **0.06** | 50.09 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | ND | U | **0.075** | 63.87 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 9E-04 | 0.8 | ND | U | 0.06 | 50.09 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | ND | U | 0.075 | 63.87 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | ND | U | 9E-04 | 0.8 | 0.43 | | 0.06 | 50.09 | ND | U | 0.001 | 0.95 | 0.003 | J | 0.003 | 1.45 | 0.086 | J | 0.075 | 63.87 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.001 | J | 5E-04 | 0.8 | 0.17 | J | 0.03 | 50.09 | 0.004 | J | 5E-04 | 0.95 | 0.012 | J | 0.001 | 1.45 | 0.089 | J | 0.037 | 63.87 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | ND | U | 9E-04 | 0.8 | 0.54 | | 0.06 | 50.09 | 0.001 | J | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | 0.14 | J | 0.075 | 63.87 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | ND | U | 9E-04 | 0.8 | 0.065 | J | 0.06 | 50.09 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | 0.076 | J | 0.075 | 63.87 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 9E-04 | 0.8 | ND | U | 0.06 | 50.09 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | 0.4 | | 0.075 | 63.87 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 5E-04 | 0.8 | ND | U | 0.03 | 50.09 | ND | U | 5E-04 | 0.95 | ND | U | 0.001 | 1.45 | ND | U | 0.037 | 63.87 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | ND | U | 9E-04 | 0.8 | 0.11 | J | 0.06 | 50.09 | 0.006 | | 0.001 | 0.95 | 0.004 | J | 0.003 | 1.45 | 0.094 | J | 0.075 | 63.87 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | 2.3 | | 0.19 | 5 | 0.57 | | 0.04 | 1 | 0.83 | | 0.038 | 1 | ND | U | 0.057 | 1 | 0.49 | J | 0.39 | 10 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 3.7 | | 0.19 | 5 | 0.63 | | 0.04 | 1 | 0.9 | | 0.038 | 1 | 0.07 | J | 0.057 | 1 | 0.78 | J | 0.39 | 10 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 2.7 | | 0.19 | 5 | 0.39 | | 0.04 | 1 | 0.84 | | 0.038 | 1 | ND | U | 0.057 | 1 | 0.59 | J | 0.39 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 3.7 | | 0.19 | 5 | 0.27 | | 0.04 | 1 | 0.97 | | 0.038 | 1 | ND | U | 0.057 | 1 | 0.54 | J | 0.39 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 1.4 | | 0.19 | 5 | 0.22 | | 0.04 | 1 | 0.76 | | 0.038 | 1 | ND | U | 0.057 | 1 | ND | U | 0.39 | 10 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 3.2 | | 0.19 | 5 | 1.4 | | 0.04 | 1 | 1.1 | | 0.038 | 1 | 0.4 | | 0.057 | 1 | 2.6 | | 0.39 | 10 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | 1 | | 0.19 | 5 | 0.97 | | 0.04 | 1 | 0.14 | J | 0.038 | 1 | ND | U | 0.057 | 1 | ND | U | 0.39 | 10 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 0.42 | J | 0.19 | 5 | 0.67 | | 0.04 | 1 | 1.3 | | 0.038 | 1 | 0.11 | J | 0.057 | 1 | ND | U | 0.39 | 10 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 7.9 | | 0.19 | 5 | 1.9 | | 0.04 | 1 | 1.4 | | 0.038 | 1 | 0.35 | | 0.057 | 1 | 0.51 | J | 0.39 | 10 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 6.9 | | 0.19 | 5 | 1.4 | | 0.04 | 1 | 1.5 | | 0.038 | 1 | 0.28 | J | 0.057 | 1 | 2.2 | | 0.39 | 10 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 76.5 | | 0.012 | 2 | 181 | | 0.03 | 5 | 259 | | 0.058 | 10 | **1990** | | 0.431 | 50 | 955 | | 0.152 | 25 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 13.6 | | 0.5 | 1 | 17 | | 0.5 | 1 | 13.9 | | 0.5 | 1 | 42 | | 0.5 | 1 | 14.6 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 4**
**Summary of Shallow Soil Sample Analytical Results: Outside CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | W-32D | | | | W-33 | | | | W-34 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | W-32D_0-2' | | | | W-33_0-2' | | | | W-34_0-2' | | | |
| | | | | | | Sample Date | 4/7/2011 | | | | 4/20/2011 | | | | 4/20/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.003 | J | 7E-04 | 1.01 | 0.011 | | 5E-04 | 0.87 | 0.003 | J | 5E-04 | 0.89 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | ND | U | 0.001 | 1.01 | 0.006 | | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 0.87 | ND | U | 0.001 | 0.89 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 7E-04 | 1.01 | ND | U | 5E-04 | 0.87 | ND | U | 5E-04 | 0.89 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.002 | J | 0.001 | 1.01 | 0.011 | | 0.001 | 0.87 | 0.002 | J | 0.001 | 0.89 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 0.24 | 5 | 0.17 | J | 0.039 | 1 | 0.18 | J | 0.039 | 1 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 0.35 | J | 0.24 | 5 | 0.15 | J | 0.039 | 1 | 0.55 | | 0.039 | 1 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 0.43 | J | 0.24 | 5 | 0.2 | | 0.039 | 1 | 0.54 | | 0.039 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 0.44 | J | 0.24 | 5 | 0.16 | J | 0.039 | 1 | 0.62 | | 0.039 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 0.68 | J | 0.24 | 5 | 0.36 | | 0.039 | 1 | 0.47 | | 0.039 | 1 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 0.44 | J | 0.24 | 5 | 0.19 | J | 0.039 | 1 | 0.6 | | 0.039 | 1 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 0.24 | 5 | 0.041 | J | 0.039 | 1 | 0.053 | J | 0.039 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | ND | U | 0.24 | 5 | 0.14 | J | 0.039 | 1 | 0.18 | J | 0.039 | 1 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 0.42 | J | 0.24 | 5 | 0.24 | | 0.039 | 1 | 0.59 | | 0.039 | 1 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 0.52 | J | 0.24 | 5 | 0.26 | | 0.039 | 1 | 0.86 | | 0.039 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | **1200** | | 0.181 | 25 | 297 | | 0.06 | 10 | 561 | | 0.122 | 20 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 29.7 | | 0.5 | 1 | 14.4 | | 0.5 | 1 | 14.9 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 5**
**Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-43 | | | | BH-10-48 | | | | BH-10-51 | | | | BH-10-52 | | | | BH-10-57 | | | | BH-10-58 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-43_0-2' | | | | BH-10-48_0-2' | | | | BH-10-51_0-2' | | | | BH-10-52_0-2' | | | | BH-10-57_0-2' | | | | BH-10-58_0-2' | | | |
| | | | | | | Sample Date | 4/14/2011 | | | | 4/14/2011 | | | | 4/14/2011 | | | | 4/14/2011 | | | | 4/21/2011 | | | | 4/14/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 10000 | 20 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 38 | 0.03 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | **0.2** | 91.09 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | 1.5 | 607.74 | ND | U | 0.4 | 91.09 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 140 | 0.5 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 1400 | 16 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 10000 | 0.7 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 10000 | 27 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.37 | 0.02 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | **1.5** | 607.74 | ND | U | **0.4** | 91.09 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | **0.2** | 91.09 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 10000 | 60 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 220 | 0.5 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 8400 | 61 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 200 | 10 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 400 | 4.4 | mg/kg | ND | U | 0.003 | 0.74 | ND | U | 0.003 | 0.76 | ND | U | 0.004 | 0.99 | ND | U | 0.003 | 0.78 | ND | U | 2.3 | 607.74 | ND | U | 0.59 | 91.09 |
| Acetone | 67-64-1 | 9200 | 1000 | 10000 | 9200 | mg/kg | 0.091 | | 0.006 | 0.74 | 0.11 | | 0.007 | 0.76 | 0.21 | | 0.009 | 0.99 | 0.084 | | 0.006 | 0.78 | ND | U | 5.3 | 607.74 | ND | U | 1.4 | 91.09 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.012 | | 0.0004 | 0.74 | 0.007 | | 0.0005 | 0.76 | 0.006 | J | 0.0007 | 0.99 | 0.008 | | 0.0005 | 0.78 | 1.2 | J | 0.38 | 607.74 | ND | U | 0.099 | 91.09 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 60 | 8 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Bromoform | 75-25-2 | 8 | 3.5 | 2000 | 8 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 400 | 1 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | **1.5** | 607.74 | ND | U | 0.4 | 91.09 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 10000 | 620 | mg/kg | 0.004 | J | 0.0009 | 0.74 | 0.002 | J | 0.001 | 0.76 | 0.005 | J | 0.001 | 0.99 | 0.002 | J | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 150 | 0.5 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 4000 | 10 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Chloroethane | 75-00-3 | 90 | 19 | 10000 | 90 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | 1.5 | 607.74 | ND | U | 0.4 | 91.09 |
| Chloroform | 67-66-3 | 8 | 2 | 97 | 8 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 1200 | 3 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | 1.5 | 607.74 | ND | U | 0.4 | 91.09 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 10000 | 7 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 10000 | 6900 | mg/kg | ND | U | 0.0009 | 0.74 | 0.016 | | 0.001 | 0.76 | 0.007 | | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 82 | 8 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10000 | 100 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | 1.5 | 607.74 | ND | U | 0.4 | 91.09 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | ND | U | 0.0009 | 0.74 | 0.014 | | 0.001 | 0.76 | 0.027 | | 0.001 | 0.99 | 0.001 | J | 0.0009 | 0.78 | 25 | | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.001 | J | 0.0009 | 0.74 | 0.001 | J | 0.001 | 0.76 | 0.003 | J | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | 5.7 | | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.0009 | 0.74 | 0.013 | | 0.001 | 0.76 | 0.004 | J | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | 22 | | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 10000 | 10000 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | 1.5 | 607.74 | 1.7 | | 0.4 | 91.09 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 10000 | 400 | mg/kg | 0.011 | | 0.004 | 0.74 | 0.017 | | 0.004 | 0.76 | 0.034 | | 0.005 | 0.99 | 0.008 | J | 0.004 | 0.78 | ND | U | 3 | 607.74 | ND | U | 0.79 | 91.09 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 10000 | 820 | mg/kg | ND | U | 0.003 | 0.74 | ND | U | 0.003 | 0.76 | ND | U | 0.004 | 0.99 | ND | U | 0.003 | 0.78 | ND | U | 2.3 | 607.74 | ND | U | 0.59 | 91.09 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | mg/kg | 0.001 | J | 0.0009 | 0.74 | 0.081 | | 0.001 | 0.76 | 0.081 | | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | 7 | | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 4700 | 0.5 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | **1.5** | 607.74 | ND | U | 0.4 | 91.09 |
| Styrene | 100-42-5 | 10 | 24 | 10000 | 24 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 0.0004 | 0.74 | ND | U | 0.0005 | 0.76 | ND | U | 0.0007 | 0.99 | ND | U | 0.0005 | 0.78 | ND | U | 0.38 | 607.74 | ND | U | 0.099 | 91.09 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 1500 | 0.5 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | 0.003 | J | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | 1.6 | J | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.002 | J | 0.0009 | 0.74 | 0.002 | J | 0.001 | 0.76 | 0.005 | J | 0.001 | 0.99 | 0.003 | J | 0.0009 | 0.78 | 13 | | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 4800 | 10 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | 0.76 | 607.74 | ND | U | 0.2 | 91.09 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 1300 | 0.5 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | 0.2 | 91.09 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.76 | ND | U | 0.003 | 0.99 | ND | U | 0.002 | 0.78 | ND | U | 1.5 | 607.74 | ND | U | 0.4 | 91.09 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 110 | 0.2 | mg/kg | ND | U | 0.0009 | 0.74 | ND | U | 0.001 | 0.76 | ND | U | 0.001 | 0.99 | ND | U | 0.0009 | 0.78 | ND | U | **0.76** | 607.74 | ND | U | **0.2** | 91.09 |

**Table 5**
**Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-43 | | | | BH-10-48 | | | | BH-10-51 | | | | BH-10-52 | | | | BH-10-57 | | | | BH-10-58 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-43_0-2' | | | | BH-10-48_0-2' | | | | BH-10-51_0-2' | | | | BH-10-52_0-2' | | | | BH-10-57_0-2' | | | | BH-10-58_0-2' | | | |
| | | | | | | Sample Date | 4/14/2011 | | | | 4/14/2011 | | | | 4/14/2011 | | | | 4/14/2011 | | | | 4/21/2011 | | | | 4/14/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 190000 | 6100 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2800 | 29 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 8400 | 2 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | **2.1** | 10 | ND | U | 0.36 | 5 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 5600 | 20 | mg/kg | ND | U | 2 | 5 | ND | U | 2.1 | 5 | ND | U | 2.2 | 5 | ND | U | 1.9 | 5 | ND | U | **21** | 10 | ND | U | 3.6 | 5 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 260 | 0.84 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | **4.1** | 10 | ND | U | 0.72 | 5 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 2800 | 10 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 190000 | 18000 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 10000 | 4.4 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 11000 | 1600 | mg/kg | ND | U | 0.2 | 5 | 0.58 | J | 0.21 | 5 | 0.96 | J | 0.22 | 5 | ND | U | 0.19 | 5 | 2.7 | J | 2.1 | 10 | 0.82 | J | 0.36 | 5 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 140000 | 510 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 8400 | 31 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 22000 | 82 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 180 | 32 | mg/kg | ND | U | 0.59 | 5 | ND | U | 0.62 | 5 | ND | U | 0.67 | 5 | ND | U | 0.58 | 5 | ND | U | 6.2 | 10 | ND | U | 1.1 | 5 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 840 | 3.1 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | **4.1** | 10 | ND | U | 0.72 | 5 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 280 | 1 | mg/kg | ND | U | 0.98 | 5 | ND | U | **1** | 5 | ND | U | **1.1** | 5 | ND | U | 0.97 | 5 | ND | U | **10** | 10 | ND | U | **1.8** | 5 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | **2.1** | 10 | ND | U | 0.36 | 5 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 14000 | 110 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 400 | 1.6 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | **4.1** | 10 | ND | U | 0.72 | 5 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | **2.1** | 10 | ND | U | 0.36 | 5 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 14000 | 51 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 4000 | 13 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 22000 | 6 | mg/kg | ND | U | 0.98 | 5 | ND | U | 1 | 5 | ND | U | 1.1 | 5 | ND | U | 0.97 | 5 | ND | U | **10** | 10 | ND | U | 1.8 | 5 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 170000 | 4700 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 170000 | 6900 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Acetophenone | 98-86-2 | 1000 | 540 | 10000 | 1000 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | 0.31 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 340 | 0.3 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | **2.1** | 10 | ND | U | **0.36** | 5 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | ND | U | 0.2 | 5 | 0.39 | J | 0.21 | 5 | ND | U | 0.22 | 5 | 0.61 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | ND | U | 0.2 | 5 | 0.42 | J | 0.21 | 5 | 0.45 | J | 0.22 | 5 | 0.59 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | ND | U | 0.2 | 5 | 0.61 | J | 0.21 | 5 | 0.33 | J | 0.22 | 5 | 0.68 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | ND | U | 0.2 | 5 | 0.42 | J | 0.21 | 5 | 0.58 | J | 0.22 | 5 | 0.44 | J | 0.19 | 5 | 2.6 | J | 2.1 | 10 | ND | U | 0.36 | 5 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 1100 | 610 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | 0.35 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 140000 | 2200 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 8400 | 31 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 6.7 | 0.076 | mg/kg | ND | U | **0.2** | 5 | ND | U | **0.21** | 5 | ND | U | **0.22** | 5 | ND | U | **0.19** | 5 | ND | U | **2.1** | 10 | ND | U | **0.36** | 5 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 220 | 30 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 5700 | 130 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Carbazole | 86-74-8 | 13 | 83 | 4000 | 83 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | ND | U | 0.2 | 5 | 0.43 | J | 0.21 | 5 | 0.79 | J | 0.22 | 5 | 0.65 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 11 | 11 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 2800 | 260 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 10000 | 8200 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Dimethyl Phthalate | 131-11-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | **4.1** | 10 | ND | U | **0.72** | 5 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 10000 | 4100 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 110000 | 3200 | mg/kg | ND | U | 0.2 | 5 | 0.51 | J | 0.21 | 5 | ND | U | 0.22 | 5 | 1.1 | | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |

**Table 5**
**Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-43 | | | | BH-10-48 | | | | BH-10-51 | | | | BH-10-52 | | | | BH-10-57 | | | | BH-10-58 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-43_0-2' | | | | BH-10-48_0-2' | | | | BH-10-51_0-2' | | | | BH-10-52_0-2' | | | | BH-10-57_0-2' | | | | BH-10-58_0-2' | | | |
| | | | | | | Sample Date | 4/14/2011 | | | | 4/14/2011 | | | | 4/14/2011 | | | | 4/14/2011 | | | | 4/21/2011 | | | | 4/14/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 50 | 0.96 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | **2.1** | 10 | ND | U | 0.36 | 5 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 1000 | 39 | mg/kg | ND | U | 0.39 | 5 | ND | U | 0.42 | 5 | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 4.1 | 10 | ND | U | 0.72 | 5 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 10000 | 91 | mg/kg | ND | U | 0.98 | 5 | ND | U | 1 | 5 | ND | U | 1.1 | 5 | ND | U | 0.97 | 5 | ND | U | 10 | 10 | ND | U | 1.8 | 5 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 550 | 0.56 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | **2.1** | 10 | ND | U | 0.36 | 5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 110 | 110 | mg/kg | ND | U | 0.2 | 5 | 0.31 | J | 0.21 | 5 | ND | U | 0.22 | 5 | 0.35 | J | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Isophorone | 78-59-1 | 10 | 1.9 | 10000 | 10 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | ND | U | 0.2 | 5 | 0.23 | J | 0.21 | 5 | 0.24 | J | 0.22 | 5 | ND | U | 0.19 | 5 | 5.7 | J | 2.1 | 10 | 0.4 | J | 0.36 | 5 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 5600 | 20 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 11 | 0.037 | mg/kg | ND | U | **0.2** | 5 | ND | U | **0.21** | 5 | ND | U | **0.22** | 5 | ND | U | **0.19** | 5 | ND | U | **2.1** | 10 | ND | U | **0.36** | 5 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 16000 | 83 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 660 | 5 | mg/kg | ND | U | 0.98 | 5 | ND | U | 1 | 5 | ND | U | 1.1 | 5 | ND | U | 0.97 | 5 | ND | U | **10** | 10 | ND | U | 1.8 | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | ND | U | 0.2 | 5 | 0.42 | J | 0.21 | 5 | 0.68 | J | 0.22 | 5 | 1.1 | | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Phenol | 108-95-2 | 200 | 33 | 190000 | 200 | mg/kg | ND | U | 0.2 | 5 | ND | U | 0.21 | 5 | ND | U | 0.22 | 5 | ND | U | 0.19 | 5 | ND | U | 2.1 | 10 | ND | U | 0.36 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | ND | U | 0.2 | 5 | 0.47 | J | 0.21 | 5 | 0.59 | J | 0.22 | 5 | 0.98 | | 0.19 | 5 | 4 | J | 2.1 | 10 | ND | U | 0.36 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | 190000 | 190000 | mg/kg | 18800 | | 5.79 | 1 | 22200 | | 6.06 | 1 | 20100 | | 6.76 | 1 | 12600 | | 5.79 | 1 | 15100 | | 6.14 | 1 | 24900 | | 10.9 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 1100 | 27 | mg/kg | ND | U | 1.15 | 1 | ND | U | 1.21 | 1 | 13.5 | | 1.34 | 1 | ND | U | 1.15 | 1 | 1.92 | J | 1.22 | 1 | ND | U | 2.17 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 53 | 29 | mg/kg | 14.7 | | 1.09 | 1 | 20 | | 1.15 | 1 | 21.3 | | 1.28 | 1 | 12.2 | | 1.09 | 1 | 21.1 | | 1.16 | 1 | 18.6 | | 2.07 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 190000 | 8200 | mg/kg | 212 | | 0.046 | 1 | 317 | | 0.0482 | 1 | 271 | | 0.0537 | 1 | 174 | | 0.0461 | 1 | 188 | | 0.0488 | 1 | 735 | | 0.087 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 5600 | 320 | mg/kg | 0.692 | | 0.0782 | 1 | 0.857 | | 0.082 | 1 | 0.767 | | 0.0913 | 1 | 0.649 | | 0.0783 | 1 | 0.742 | | 0.083 | 1 | 0.724 | J | 0.148 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 1400 | 38 | mg/kg | ND | U | 0.161 | 1 | 2.22 | | 0.169 | 1 | 0.945 | | 0.188 | 1 | 0.238 | J | 0.161 | 1 | 0.792 | | 0.171 | 1 | 1.26 | | 0.304 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | mg/kg | 18100 | | 7.05 | 1 | 93700 | | 36.9 | 5 | 112000 | | 41.2 | 5 | 9200 | | 7.06 | 1 | 16200 | | 7.48 | 1 | 48000 | | 13.3 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | mg/kg | 56 | | 0.679 | 1 | 250 | | 0.711 | 1 | 1880 | | 0.792 | 1 | 52 | | 0.68 | 1 | 88.5 | | 0.72 | 1 | 57.3 | | 1.28 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 840 | 140 | mg/kg | 8.32 | | 0.219 | 1 | 8.12 | | 0.229 | 1 | 10.2 | | 0.255 | 1 | 7.07 | | 0.219 | 1 | 8.42 | | 0.232 | 1 | 11.3 | | 0.413 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 100000 | 43000 | mg/kg | 98.2 | | 0.253 | 1 | 187 | | 0.265 | 1 | 246 | | 0.295 | 1 | 79.3 | | 0.253 | 1 | 131 | | 0.269 | 1 | 363 | | 0.478 | 1 |
| Iron | 7439-89-6 | NS | NS | 190000 | 190000 | mg/kg | 23000 | | 5.42 | 1 | 42300 | | 28.4 | 5 | 23400 | | 6.33 | 1 | 19800 | | 5.43 | 1 | 20100 | | 5.75 | 1 | 28900 | | 10.2 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 167 | | 0.69 | 1 | 278 | | 0.723 | 1 | **1720** | | 4.03 | 5 | **1480** | | 3.46 | 5 | 743 | | 0.733 | 1 | 941 | | 1.3 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | mg/kg | 6630 | | 2.92 | 1 | 36900 | | 3.06 | 1 | 43400 | | 3.41 | 1 | 4510 | | 2.93 | 1 | 6350 | | 3.1 | 1 | 33200 | | 5.52 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 130000 | 2000 | mg/kg | 451 | | 0.0897 | 1 | 2810 | | 0.47 | 5 | 602 | | 0.105 | 1 | 276 | | 0.0899 | 1 | 596 | | 0.0952 | 1 | 730 | | 0.17 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 450 | 10 | mg/kg | 0.111 | J | 0.0033 | 1 | 0.0867 | J | 0.0035 | 1 | 1.52 | | 0.0189 | 5 | 0.715 | | 0.0034 | 1 | 0.607 | | 0.0034 | 1 | 4.82 | | 0.0295 | 5 |
| Nickel | 7440-02-0 | 10 | 650 | 56000 | 650 | mg/kg | 37.6 | | 0.219 | 1 | 52 | | 0.229 | 1 | 100 | | 0.255 | 1 | 24.9 | | 0.219 | 1 | 40.1 | | 0.232 | 1 | 61.6 | | 0.413 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | mg/kg | 1430 | | 20.7 | 1 | 1260 | | 21.7 | 1 | 874 | | 24.2 | 1 | 1520 | | 20.7 | 1 | 1020 | | 22 | 1 | 990 | | 39.1 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 14000 | 26 | mg/kg | ND | U | 1.13 | 1 | 2.58 | | 1.18 | 1 | ND | U | 1.32 | 1 | ND | U | 1.13 | 1 | 2.26 | J | 1.2 | 1 | ND | U | 2.13 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 14000 | 84 | mg/kg | ND | U | 0.207 | 1 | ND | U | 0.217 | 1 | ND | U | 0.242 | 1 | ND | U | 0.207 | 1 | 0.226 | J | 0.22 | 1 | 0.58 | J | 0.391 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | mg/kg | 130 | | 42.9 | 1 | 748 | | 45 | 1 | 323 | | 50.1 | 1 | 107 | J | 43 | 1 | 177 | | 45.5 | 1 | 212 | J | 81.1 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 200 | 14 | mg/kg | ND | U | 1.67 | 1 | ND | U | 1.75 | 1 | ND | U | 1.95 | 1 | ND | U | 1.67 | 1 | ND | U | 1.77 | 1 | ND | U | 3.15 | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 20000 | 20000 | mg/kg | 84.8 | | 0.219 | 1 | 233 | | 0.229 | 1 | 259 | | 0.255 | 1 | 51.6 | | 0.219 | 1 | 91.7 | | 0.232 | 1 | 100 | | 0.413 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 190000 | 12000 | mg/kg | 113 | | 0.759 | 1 | 750 | | 0.796 | 1 | 893 | | 0.886 | 1 | 177 | | 0.76 | 1 | 260 | | 0.806 | 1 | 431 | | 1.43 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 15.6 | | 0.5 | 1 | 21 | | 0.5 | 1 | 27 | | 0.5 | 1 | 14.9 | | 0.5 | 1 | 19.7 | | 0.5 | 1 | 54 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 5**
**Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-65 | | | | BH-10-68 | | | | BH-10-75 | | | | BH-10-81 | | | | BH-10-82 | | | | BH-10-83 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-65_0-2' | | | | BH-10-68_0-2' | | | | BH-10-75_0-2' | | | | BH-10-81_0-2' | | | | BH-10-82_0-2' | | | | BH-10-83_0-2' | | | |
| | | | | | | Sample Date | 4/14/2011 | | | | 4/14/2011 | | | | 4/19/2011 | | | | 4/21/2011 | | | | 4/20/2011 | | | | 4/21/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 10000 | 20 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 38 | 0.03 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 140 | 0.5 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 1400 | 16 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 10000 | 0.7 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 10000 | 27 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.37 | 0.02 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 10000 | 60 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 220 | 0.5 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 8400 | 61 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 200 | 10 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 400 | 4.4 | mg/kg | ND | U | 0.004 | 1 | ND | U | 0.003 | 0.74 | ND | U | 0.003 | 0.82 | ND | U | 0.003 | 0.77 | ND | U | 0.004 | 0.77 | ND | U | 0.004 | 0.98 |
| Acetone | 67-64-1 | 9200 | 1000 | 10000 | 9200 | mg/kg | 0.36 | | 0.01 | 1 | 0.087 | | 0.006 | 0.74 | 0.099 | | 0.007 | 0.82 | 0.033 | | 0.006 | 0.77 | 0.32 | | 0.008 | 0.77 | 0.26 | | 0.009 | 0.98 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.033 | | 0.0007 | 1 | 0.003 | J | 0.0004 | 0.74 | 0.005 | | 5E-04 | 0.82 | 0.0008 | J | 5E-04 | 0.77 | 0.001 | J | 6E-04 | 0.77 | 0.012 | | 6E-04 | 0.98 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 60 | 8 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Bromoform | 75-25-2 | 8 | 3.5 | 2000 | 8 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 400 | 1 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 10000 | 620 | mg/kg | 0.005 | J | 0.001 | 1 | 0.004 | J | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | 0.004 | J | 0.001 | 0.98 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 150 | 0.5 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 4000 | 10 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Chloroethane | 75-00-3 | 90 | 19 | 10000 | 90 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Chloroform | 67-66-3 | 8 | 2 | 97 | 8 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 1200 | 3 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 10000 | 7 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 10000 | 6900 | mg/kg | 0.009 | | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 82 | 8 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10000 | 100 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.012 | | 0.001 | 1 | ND | U | 0.0009 | 0.74 | 0.002 | J | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | 0.002 | J | 0.001 | 0.98 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.002 | J | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | 0.002 | J | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 10000 | 10000 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 10000 | 400 | mg/kg | 0.048 | | 0.006 | 1 | 0.009 | | 0.004 | 0.74 | 0.015 | | 0.004 | 0.82 | ND | U | 0.004 | 0.77 | 0.013 | | 0.005 | 0.77 | 0.027 | | 0.005 | 0.98 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 10000 | 820 | mg/kg | ND | U | 0.004 | 1 | ND | U | 0.003 | 0.74 | ND | U | 0.003 | 0.82 | ND | U | 0.003 | 0.77 | ND | U | 0.004 | 0.77 | ND | U | 0.004 | 0.98 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | mg/kg | 0.028 | | 0.001 | 1 | 0.002 | J | 0.0009 | 0.74 | 0.004 | J | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 4700 | 0.5 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Styrene | 100-42-5 | 10 | 24 | 10000 | 24 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 0.0007 | 1 | ND | U | 0.0004 | 0.74 | ND | U | 5E-04 | 0.82 | ND | U | 5E-04 | 0.77 | ND | U | 6E-04 | 0.77 | ND | U | 6E-04 | 0.98 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 1500 | 0.5 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.008 | | 0.001 | 1 | ND | U | 0.0009 | 0.74 | 0.003 | J | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | 0.009 | | 0.001 | 0.98 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 4800 | 10 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 1300 | 0.5 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.003 | 1 | ND | U | 0.002 | 0.74 | ND | U | 0.002 | 0.82 | ND | U | 0.002 | 0.77 | ND | U | 0.002 | 0.77 | ND | U | 0.003 | 0.98 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 110 | 0.2 | mg/kg | ND | U | 0.001 | 1 | ND | U | 0.0009 | 0.74 | ND | U | 9E-04 | 0.82 | ND | U | 9E-04 | 0.77 | ND | U | 0.001 | 0.77 | ND | U | 0.001 | 0.98 |

**Table 5**
**Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-65 | | | | BH-10-68 | | | | BH-10-75 | | | | BH-10-81 | | | | BH-10-82 | | | | BH-10-83 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-65_0-2' | | | | BH-10-68_0-2' | | | | BH-10-75_0-2' | | | | BH-10-81_0-2' | | | | BH-10-82_0-2' | | | | BH-10-83_0-2' | | | |
| | | | | | | Sample Date | 4/14/2011 | | | | 4/14/2011 | | | | 4/19/2011 | | | | 4/21/2011 | | | | 4/20/2011 | | | | 4/21/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 190000 | 6100 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2800 | 29 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 8400 | 2 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 5600 | 20 | mg/kg | ND | U | 2.3 | 5 | ND | U | 2 | 5 | ND | U | 0.38 | 1 | ND | U | 0.4 | 1 | ND | U | 0.5 | 1 | ND | U | 0.43 | 1 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 260 | 0.84 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 2800 | 10 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 190000 | 18000 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 10000 | 4.4 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 11000 | 1600 | mg/kg | 0.41 | J | 0.23 | 5 | ND | U | 0.2 | 5 | 0.26 | | 0.038 | 1 | 0.51 | | 0.04 | 1 | 0.15 | J | 0.05 | 1 | 0.2 | J | 0.043 | 1 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 140000 | 510 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 8400 | 31 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 22000 | 82 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 180 | 32 | mg/kg | ND | U | 0.68 | 5 | ND | U | 0.59 | 5 | ND | U | 0.11 | 1 | ND | U | 0.12 | 1 | ND | U | 0.15 | 1 | ND | U | 0.13 | 1 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 840 | 3.1 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 280 | 1 | mg/kg | ND | U | **1.1** | 5 | ND | U | 0.98 | 5 | ND | U | 0.19 | 1 | ND | U | 0.2 | 1 | ND | U | 0.25 | 1 | ND | U | 0.22 | 1 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 14000 | 110 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 400 | 1.6 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 14000 | 51 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 4000 | 13 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 22000 | 6 | mg/kg | ND | U | 1.1 | 5 | ND | U | 0.98 | 5 | ND | U | 0.19 | 1 | ND | U | 0.2 | 1 | ND | U | 0.25 | 1 | ND | U | 0.22 | 1 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 170000 | 4700 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.36 | | 0.038 | 1 | 0.083 | J | 0.04 | 1 | 0.25 | | 0.05 | 1 | 0.093 | J | 0.043 | 1 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 170000 | 6900 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.31 | | 0.038 | 1 | 0.064 | J | 0.04 | 1 | 0.096 | J | 0.05 | 1 | 0.077 | J | 0.043 | 1 |
| Acetophenone | 98-86-2 | 1000 | 540 | 10000 | 1000 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 1.2 | | 0.038 | 1 | 0.39 | | 0.04 | 1 | 0.74 | | 0.05 | 1 | 0.27 | | 0.043 | 1 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 340 | 0.3 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 3.8 | | 0.038 | 1 | 1.9 | | 0.04 | 1 | 1.3 | | 0.05 | 1 | 0.73 | | 0.043 | 1 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 2.8 | | 0.038 | 1 | 2.7 | | 0.04 | 1 | 0.96 | | 0.05 | 1 | 0.68 | | 0.043 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 3.6 | | 0.038 | 1 | 2.5 | | 0.04 | 1 | 1.1 | | 0.05 | 1 | 0.89 | | 0.043 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 1.9 | | 0.038 | 1 | 3.1 | | 0.04 | 1 | 0.54 | | 0.05 | 1 | 0.59 | | 0.043 | 1 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 1100 | 610 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 2.1 | | 0.038 | 1 | 0.84 | | 0.04 | 1 | 0.63 | | 0.05 | 1 | 0.37 | | 0.043 | 1 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | 0.74 | | 0.086 | 1 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 140000 | 2200 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.056 | J | 0.038 | 1 | 0.075 | J | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 8400 | 31 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 6.7 | 0.076 | mg/kg | ND | U | **0.23** | 5 | ND | U | **0.2** | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 220 | 30 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 5700 | 130 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | 0.11 | J | 0.077 | 1 | 0.4 | | 0.08 | 1 | 0.1 | J | 0.1 | 1 | 1 | | 0.086 | 1 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Carbazole | 86-74-8 | 13 | 83 | 4000 | 83 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.6 | | 0.038 | 1 | 0.12 | J | 0.04 | 1 | 0.27 | | 0.05 | 1 | 0.12 | J | 0.043 | 1 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 3.5 | | 0.038 | 1 | 2.4 | | 0.04 | 1 | 1.2 | | 0.05 | 1 | 0.84 | | 0.043 | 1 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 11 | 11 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.64 | | 0.038 | 1 | 2.2 | | 0.04 | 1 | 0.19 | J | 0.05 | 1 | 0.19 | J | 0.043 | 1 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 2800 | 260 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.34 | | 0.038 | 1 | 0.11 | J | 0.04 | 1 | 0.21 | J | 0.05 | 1 | 0.085 | J | 0.043 | 1 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 10000 | 8200 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| Dimethyl Phthalate | 131-11-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 10000 | 4100 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | 0.3 | | 0.086 | 1 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 110000 | 3200 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 6.6 | | 0.077 | 2 | 1.7 | | 0.04 | 1 | 1.9 | | 0.05 | 1 | 1.2 | | 0.043 | 1 |

**Table 5**
**Summary of Shallow Soil Sample Analytical Results for CAMU Delineation Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-65 | | | | BH-10-68 | | | | BH-10-75 | | | | BH-10-81 | | | | BH-10-82 | | | | BH-10-83 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-65_0-2' | | | | BH-10-68_0-2' | | | | BH-10-75_0-2' | | | | BH-10-81_0-2' | | | | BH-10-82_0-2' | | | | BH-10-83_0-2' | | | |
| | | | | | | Sample Date | 4/14/2011 | | | | 4/14/2011 | | | | 4/19/2011 | | | | 4/21/2011 | | | | 4/20/2011 | | | | 4/21/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.34 | | 0.038 | 1 | 0.1 | J | 0.04 | 1 | 0.28 | | 0.05 | 1 | 0.094 | J | 0.043 | 1 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 50 | 0.96 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 1000 | 39 | mg/kg | ND | U | 0.45 | 5 | ND | U | 0.39 | 5 | ND | U | 0.077 | 1 | ND | U | 0.08 | 1 | ND | U | 0.1 | 1 | ND | U | 0.086 | 1 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 10000 | 91 | mg/kg | ND | U | 1.1 | 5 | ND | U | 0.98 | 5 | ND | U | 0.19 | 1 | ND | U | 0.2 | 1 | ND | U | 0.25 | 1 | ND | U | 0.22 | 1 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 550 | 0.56 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 110 | 110 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 1.8 | | 0.038 | 1 | 1.9 | | 0.04 | 1 | 0.55 | | 0.05 | 1 | 0.44 | | 0.043 | 1 |
| Isophorone | 78-59-1 | 10 | 1.9 | 10000 | 10 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 0.29 | | 0.038 | 1 | 0.36 | | 0.04 | 1 | 0.16 | J | 0.05 | 1 | 0.16 | J | 0.043 | 1 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 5600 | 20 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 11 | 0.037 | mg/kg | ND | U | **0.23** | 5 | ND | U | **0.2** | 5 | ND | U | **0.038** | 1 | ND | U | **0.04** | 1 | ND | U | **0.05** | 1 | ND | U | **0.043** | 1 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 16000 | 83 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 660 | 5 | mg/kg | ND | U | 1.1 | 5 | ND | U | 0.98 | 5 | ND | U | 0.19 | 1 | ND | U | 0.2 | 1 | ND | U | 0.25 | 1 | ND | U | 0.22 | 1 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 4.8 | | 0.077 | 2 | 1.6 | | 0.04 | 1 | 2.5 | | 0.05 | 1 | 1 | | 0.043 | 1 |
| Phenol | 108-95-2 | 200 | 33 | 190000 | 200 | mg/kg | ND | U | 0.23 | 5 | 1.3 | | 0.2 | 5 | ND | U | 0.038 | 1 | ND | U | 0.04 | 1 | ND | U | 0.05 | 1 | ND | U | 0.043 | 1 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.2 | 5 | 5.4 | | 0.077 | 2 | 2 | | 0.04 | 1 | 2.5 | | 0.05 | 1 | 1.1 | | 0.043 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | 190000 | 190000 | mg/kg | 13100 | | 6.92 | 1 | 22600 | | 5.7 | 1 | 15700 | | 5.68 | 1 | 10100 | | 29.6 | 5 | 26300 | | 7.56 | 1 | 17200 | | 6.41 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 1100 | 27 | mg/kg | ND | U | 1.38 | 1 | ND | U | 1.13 | 1 | 1.47 | J | 1.13 | 1 | ND | U | 5.88 | 5 | ND | U | 1.5 | 1 | ND | U | 1.27 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 53 | 29 | mg/kg | 8.71 | | 1.31 | 1 | 7.99 | | 1.08 | 1 | **61.3** | | 1.07 | 1 | 38.9 | | 5.58 | 5 | 17 | | 1.43 | 1 | 13.7 | | 1.21 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 190000 | 8200 | mg/kg | 170 | | 0.055 | 1 | 135 | | 0.0454 | 1 | 147 | | 0.045 | 1 | 122 | | 0.047 | 1 | 261 | | 0.06 | 1 | 272 | | 0.051 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 5600 | 320 | mg/kg | 0.503 | J | 0.0935 | 1 | 1.11 | | 0.0771 | 1 | 0.856 | | 0.077 | 1 | 0.698 | | 0.08 | 1 | 1.1 | | 0.102 | 1 | 0.797 | | 0.087 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 1400 | 38 | mg/kg | 0.403 | J | 0.193 | 1 | ND | U | 0.159 | 1 | 0.418 | J | 0.158 | 1 | ND | U | 0.823 | 5 | ND | U | 0.21 | 1 | 3.98 | | 0.178 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | mg/kg | 20200 | | 8.43 | 1 | 25900 | | 6.95 | 1 | 9930 | | 6.92 | 1 | 6520 | | 7.21 | 1 | 21500 | | 9.21 | 1 | 15800 | | 7.82 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | mg/kg | 27 | | 0.812 | 1 | 142 | | 0.669 | 1 | 45.5 | | 0.666 | 1 | 54.8 | | 3.47 | 5 | 117 | | 0.886 | 1 | 86.9 | | 0.752 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 840 | 140 | mg/kg | 5.34 | | 0.261 | 1 | 9 | | 0.215 | 1 | 8.16 | | 0.215 | 1 | 13.1 | | 1.12 | 5 | 11 | | 0.285 | 1 | 9.93 | | 0.242 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 100000 | 43000 | mg/kg | 86.7 | | 0.303 | 1 | 41.2 | | 0.249 | 1 | 61.8 | | 0.248 | 1 | 94.2 | | 1.29 | 5 | 122 | | 0.331 | 1 | 212 | | 0.28 | 1 |
| Iron | 7439-89-6 | NS | NS | 190000 | 190000 | mg/kg | 14900 | | 6.48 | 1 | 30000 | | 5.34 | 1 | 26000 | | 5.32 | 1 | 68100 | | 27.7 | 5 | 47200 | | 35.4 | 5 | 28400 | | 6 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 307 | | 0.825 | 1 | 94.2 | | 0.68 | 1 | 192 | | 0.678 | 1 | 242 | | 3.53 | 5 | 584 | | 0.901 | 1 | 402 | | 0.765 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | mg/kg | 11200 | | 3.49 | 1 | 13800 | | 2.88 | 1 | 3960 | | 2.87 | 1 | 3040 | | 2.99 | 1 | 7070 | | 3.82 | 1 | 7310 | | 3.24 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 130000 | 2000 | mg/kg | 382 | | 0.107 | 1 | 777 | | 0.0884 | 1 | 464 | | 0.088 | 1 | 539 | | 0.092 | 1 | 576 | | 0.117 | 1 | 384 | | 0.099 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 450 | 10 | mg/kg | 0.648 | | 0.0038 | 1 | 0.335 | | 0.0032 | 1 | 0.182 | | 0.003 | 1 | 0.373 | | 0.003 | 1 | 0.215 | | 0.004 | 1 | 0.387 | | 0.004 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 56000 | 650 | mg/kg | 24.1 | | 0.261 | 1 | 30.2 | | 0.215 | 1 | 25.3 | | 0.215 | 1 | 37.2 | | 1.12 | 5 | 41.6 | | 0.285 | 1 | 44.8 | | 0.242 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | mg/kg | 836 | | 24.8 | 1 | 1050 | | 20.4 | 1 | 1630 | | 20.3 | 1 | 1690 | | 106 | 5 | 2020 | | 27 | 1 | 1820 | | 22.9 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 14000 | 26 | mg/kg | ND | U | 1.35 | 1 | ND | U | 1.11 | 1 | ND | U | 1.11 | 1 | ND | U | 5.76 | 5 | ND | U | 7.36 | 5 | 1.68 | J | 1.25 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 14000 | 84 | mg/kg | ND | U | 0.248 | 1 | ND | U | 0.204 | 1 | ND | U | 0.203 | 1 | ND | U | 1.06 | 5 | ND | U | 0.27 | 1 | ND | U | 0.229 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | mg/kg | 99.3 | J | 51.3 | 1 | 88.4 | J | 42.3 | 1 | 292 | | 42.1 | 1 | 138 | | 43.8 | 1 | 105 | J | 56 | 1 | 160 | | 47.6 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 200 | 14 | mg/kg | ND | U | 1.99 | 1 | ND | U | 1.64 | 1 | 2.02 | J | 1.64 | 1 | ND | U | 8.52 | 5 | ND | U | 10.9 | 5 | ND | U | 1.85 | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 20000 | 20000 | mg/kg | 48.8 | | 0.261 | 1 | 60.8 | | 0.215 | 1 | 62.9 | | 0.215 | 1 | 63.1 | | 1.12 | 5 | 106 | | 0.285 | 1 | 65.3 | | 0.242 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 190000 | 12000 | mg/kg | 181 | | 0.908 | 1 | 115 | | 0.748 | 1 | 189 | | 0.745 | 1 | 141 | | 3.88 | 5 | 271 | | 0.992 | 1 | 369 | | 0.841 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 27.3 | | 0.5 | 1 | 16 | | 0.5 | 1 | 13.2 | | 0.5 | 1 | 16.6 | | 0.5 | 1 | 34.1 | | 0.5 | 1 | 23.1 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 6**
**Summary of Shallow Soil Sample Analytical Results:**
**CAMU Area Soil Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | | BH-10-63 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-44-WC_0-2' | | | | BH-10-45-WC_0-2' | | | | BH-10-46-WC_0-2' | | | | BH-10-55-WC_0-2' | | | | BH-10-56-WC_0-2' | | | | BH-10-63-WC_0-2' | | | |
| | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/13/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 10000 | 20 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 38 | 0.03 | mg/kg | ND | U | **0.054** | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 140 | 0.5 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 1400 | 16 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 10000 | 0.7 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 10000 | 27 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.37 | 0.02 | mg/kg | ND | U | **0.11** | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | **0.054** | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 10000 | 60 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 220 | 0.5 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 8400 | 61 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 200 | 10 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 400 | 4.4 | mg/kg | ND | U | 0.16 | 44.95 | ND | U | 0.003 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.004 | 0.98 | ND | U | 0.004 | 1.02 | ND | U | 0.003 | 0.75 |
| Acetone | 67-64-1 | 9200 | 1000 | 10000 | 9200 | mg/kg | ND | U | 0.38 | 44.95 | 0.29 | | 0.007 | 0.86 | 0.21 | | 0.006 | 0.68 | 0.093 | | 0.009 | 0.98 | 0.03 | | 0.008 | 1.02 | 0.15 | | 0.006 | 0.75 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.033 | J | 0.027 | 44.95 | 0.019 | | 5E-04 | 0.86 | 0.012 | | 4E-04 | 0.68 | 0.035 | | 6E-04 | 0.98 | 0.016 | | 6E-04 | 1.02 | 0.006 | | 4E-04 | 0.75 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 60 | 8 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Bromoform | 75-25-2 | 8 | 3.5 | 2000 | 8 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 400 | 1 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 10000 | 620 | mg/kg | ND | U | 0.054 | 44.95 | 0.004 | J | 0.001 | 0.86 | 0.002 | J | 8E-04 | 0.68 | 0.004 | J | 0.001 | 0.98 | 0.002 | J | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 150 | 0.5 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 4000 | 10 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Chloroethane | 75-00-3 | 90 | 19 | 10000 | 90 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Chloroform | 67-66-3 | 8 | 2 | 97 | 8 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 1200 | 3 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 10000 | 7 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 10000 | 6900 | mg/kg | ND | U | 0.054 | 44.95 | 0.002 | J | 0.001 | 0.86 | 0.014 | | 8E-04 | 0.68 | 0.003 | J | 0.001 | 0.98 | 0.001 | J | 0.001 | 1.02 | 0.001 | J | 9E-04 | 0.75 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 82 | 8 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10000 | 100 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.91 | | 0.054 | 44.95 | 0.074 | | 0.001 | 0.86 | 0.12 | | 8E-04 | 0.68 | 0.034 | | 0.001 | 0.98 | 0.017 | | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.14 | J | 0.054 | 44.95 | 0.017 | | 0.001 | 0.86 | 0.024 | | 8E-04 | 0.68 | 0.007 | | 0.001 | 0.98 | 0.003 | J | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | U | 0.054 | 44.95 | 0.005 | J | 0.001 | 0.86 | 0.005 | | 8E-04 | 0.68 | 0.003 | J | 0.001 | 0.98 | 0.001 | J | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 10000 | 10000 | mg/kg | 0.46 | | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 10000 | 400 | mg/kg | ND | U | 0.22 | 44.95 | 0.04 | | 0.004 | 0.86 | 0.029 | | 0.003 | 0.68 | 0.011 | J | 0.005 | 0.98 | ND | U | 0.005 | 1.02 | 0.007 | J | 0.003 | 0.75 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 10000 | 820 | mg/kg | ND | U | 0.16 | 44.95 | ND | U | 0.003 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.004 | 0.98 | ND | U | 0.004 | 1.02 | ND | U | 0.003 | 0.75 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | mg/kg | 0.085 | J | 0.054 | 44.95 | 0.005 | J | 0.001 | 0.86 | 0.044 | | 8E-04 | 0.68 | 0.008 | | 0.001 | 0.98 | 0.004 | J | 0.001 | 1.02 | 0.003 | J | 9E-04 | 0.75 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 4700 | 0.5 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Styrene | 100-42-5 | 10 | 24 | 10000 | 24 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 0.027 | 44.95 | ND | U | 5E-04 | 0.86 | ND | U | 4E-04 | 0.68 | ND | U | 6E-04 | 0.98 | ND | U | 6E-04 | 1.02 | ND | U | 4E-04 | 0.75 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 1500 | 0.5 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | 0.002 | J | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.3 | | 0.054 | 44.95 | 0.041 | | 0.001 | 0.86 | 0.073 | | 8E-04 | 0.68 | 0.026 | | 0.001 | 0.98 | 0.009 | | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 4800 | 10 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 1300 | 0.5 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.11 | 44.95 | ND | U | 0.002 | 0.86 | ND | U | 0.002 | 0.68 | ND | U | 0.003 | 0.98 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.75 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 110 | 0.2 | mg/kg | ND | U | 0.054 | 44.95 | ND | U | 0.001 | 0.86 | ND | U | 8E-04 | 0.68 | ND | U | 0.001 | 0.98 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.75 |

**Table 6**
**Summary of Shallow Soil Sample Analytical Results:**
**CAMU Area Soil Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | | BH-10-63 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-44-WC_0-2' | | | | BH-10-45-WC_0-2' | | | | BH-10-46-WC_0-2' | | | | BH-10-55-WC_0-2' | | | | BH-10-56-WC_0-2' | | | | BH-10-63-WC_0-2' | | | |
| | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/13/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 190000 | 6100 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2800 | 29 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 8400 | 2 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 5600 | 20 | mg/kg | ND | U | 0.4 | 1 | ND | U | 4 | 10 | ND | U | 3.8 | 10 | ND | U | 2.1 | 5 | ND | U | 1.9 | 5 | ND | U | 1.9 | 5 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 260 | 0.84 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 2800 | 10 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 190000 | 18000 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 10000 | 4.4 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 11000 | 1600 | mg/kg | 2.1 | | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.92 | J | 0.21 | 5 | 0.52 | J | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 140000 | 510 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 8400 | 31 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 22000 | 82 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 180 | 32 | mg/kg | ND | U | 0.12 | 1 | ND | U | 1.2 | 10 | ND | U | 1.1 | 10 | ND | U | 0.63 | 5 | ND | U | 0.58 | 5 | ND | U | 0.57 | 5 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 840 | 3.1 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 280 | 1 | mg/kg | ND | U | 0.2 | 1 | ND | U | **2** | 10 | ND | U | **1.9** | 10 | ND | U | **1.1** | 5 | ND | U | 0.97 | 5 | ND | U | 0.95 | 5 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 14000 | 110 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 400 | 1.6 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 14000 | 51 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 4000 | 13 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 22000 | 6 | mg/kg | ND | U | 0.2 | 1 | ND | U | 2 | 10 | ND | U | 1.9 | 10 | ND | U | 1.1 | 5 | ND | U | 0.97 | 5 | ND | U | 0.95 | 5 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 170000 | 4700 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 170000 | 6900 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Acetophenone | 98-86-2 | 1000 | 540 | 10000 | 1000 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.25 | J | 0.21 | 5 | 0.25 | J | 0.19 | 5 | ND | U | 0.19 | 5 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 340 | 0.3 | mg/kg | ND | U | 0.04 | 1 | ND | U | **0.4** | 10 | ND | U | **0.38** | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 0.069 | J | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.68 | J | 0.21 | 5 | 1.2 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 0.18 | J | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.82 | J | 0.21 | 5 | 1.6 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 0.085 | J | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 1.2 | | 0.21 | 5 | 2.1 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 0.042 | J | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.99 | J | 0.21 | 5 | 1.5 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 1100 | 610 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.4 | J | 0.21 | 5 | 0.76 | J | 0.19 | 5 | ND | U | 0.19 | 5 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 140000 | 2200 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 8400 | 31 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 6.7 | 0.076 | mg/kg | ND | U | 0.04 | 1 | ND | U | **0.4** | 10 | ND | U | **0.38** | 10 | ND | U | **0.21** | 5 | ND | U | **0.19** | 5 | ND | U | **0.19** | 5 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 220 | 30 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 5700 | 130 | mg/kg | 0.2 | J | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | 0.46 | J | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Carbazole | 86-74-8 | 13 | 83 | 4000 | 83 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 0.35 | | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.85 | J | 0.21 | 5 | 1.3 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 11 | 11 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.29 | J | 0.21 | 5 | 0.52 | J | 0.19 | 5 | ND | U | 0.19 | 5 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 2800 | 260 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 10000 | 8200 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Dimethyl Phthalate | 131-11-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | 0.079 | 1 | ND | U | **0.81** | 10 | ND | U | **0.76** | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 10000 | 4100 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 110000 | 3200 | mg/kg | 0.058 | J | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.94 | J | 0.21 | 5 | 1.5 | | 0.19 | 5 | ND | U | 0.19 | 5 |

**Table 6**
**Summary of Shallow Soil Sample Analytical Results:**
**CAMU Area Soil Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | | BH-10-63 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-44-WC_0-2' | | | | BH-10-45-WC_0-2' | | | | BH-10-46-WC_0-2' | | | | BH-10-55-WC_0-2' | | | | BH-10-56-WC_0-2' | | | | BH-10-63-WC_0-2' | | | |
| | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/13/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 50 | 0.96 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 1000 | 39 | mg/kg | ND | U | 0.079 | 1 | ND | U | 0.81 | 10 | ND | U | 0.76 | 10 | ND | U | 0.42 | 5 | ND | U | 0.39 | 5 | ND | U | 0.38 | 5 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 10000 | 91 | mg/kg | ND | U | 0.2 | 1 | ND | U | 2 | 10 | ND | U | 1.9 | 10 | ND | U | 1.1 | 5 | ND | U | 0.97 | 5 | ND | U | 0.95 | 5 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 550 | 0.56 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 110 | 110 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.66 | J | 0.21 | 5 | 1.1 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| Isophorone | 78-59-1 | 10 | 1.9 | 10000 | 10 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 0.88 | | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.56 | J | 0.21 | 5 | 0.45 | J | 0.19 | 5 | ND | U | 0.19 | 5 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 5600 | 20 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 11 | 0.037 | mg/kg | ND | U | **0.04** | 1 | ND | U | **0.4** | 10 | ND | U | **0.38** | 10 | ND | U | **0.21** | 5 | ND | U | **0.19** | 5 | ND | U | **0.19** | 5 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 16000 | 83 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 660 | 5 | mg/kg | ND | U | 0.2 | 1 | ND | U | 2 | 10 | ND | U | 1.9 | 10 | ND | U | 1.1 | 5 | ND | U | 0.97 | 5 | ND | U | 0.95 | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 0.26 | | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.87 | J | 0.21 | 5 | 0.93 | J | 0.19 | 5 | ND | U | 0.19 | 5 |
| Phenol | 108-95-2 | 200 | 33 | 190000 | 200 | mg/kg | ND | U | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | ND | U | 0.21 | 5 | ND | U | 0.19 | 5 | ND | U | 0.19 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 0.13 | J | 0.04 | 1 | ND | U | 0.4 | 10 | ND | U | 0.38 | 10 | 0.9 | J | 0.21 | 5 | 1.4 | | 0.19 | 5 | ND | U | 0.19 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | 190000 | 190000 | mg/kg | 19400 | | 5.86 | 1 | 11200 | | 5.83 | 1 | 24600 | | 5.54 | 1 | 12500 | | 6.25 | 1 | 14900 | | 5.95 | 1 | 13000 | | 5.76 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 1100 | 27 | mg/kg | ND | U | 1.16 | 1 | ND | U | 1.16 | 1 | ND | U | 1.1 | 1 | ND | U | 1.24 | 1 | ND | U | 1.18 | 1 | ND | U | 1.15 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 53 | 29 | mg/kg | 6.77 | | 1.11 | 1 | 6.94 | | 1.1 | 1 | 8.36 | | 1.05 | 1 | 17.1 | | 1.18 | 1 | 9.44 | | 1.12 | 1 | 6.21 | | 1.09 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 190000 | 8200 | mg/kg | 122 | | 0.047 | 1 | 75.7 | | 0.046 | 1 | 103 | | 0.044 | 1 | 108 | | 0.05 | 1 | 100 | | 0.047 | 1 | 49.5 | | 0.046 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 5600 | 320 | mg/kg | 2.4 | | 0.079 | 1 | 0.523 | J | 0.079 | 1 | 1.4 | | 0.075 | 1 | 0.645 | | 0.085 | 1 | 0.796 | | 0.08 | 1 | 0.55 | J | 0.078 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 1400 | 38 | mg/kg | ND | U | 0.163 | 1 | ND | U | 0.162 | 1 | ND | U | 0.154 | 1 | 0.557 | J | 0.174 | 1 | ND | U | 0.165 | 1 | ND | U | 0.16 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | mg/kg | 34500 | | 7.14 | 1 | 37300 | | 7.1 | 1 | 13100 | | 6.75 | 1 | 71000 | | 38.1 | 5 | 18400 | | 7.25 | 1 | 962 | | 7.02 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | mg/kg | 19.3 | | 0.687 | 1 | 32.3 | | 0.684 | 1 | 45.3 | | 0.65 | 1 | 254 | | 0.733 | 1 | 93.1 | | 0.697 | 1 | 21 | | 0.676 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 840 | 140 | mg/kg | 11.7 | | 0.221 | 1 | 8.02 | | 0.22 | 1 | 11.8 | | 0.209 | 1 | 7.77 | | 0.236 | 1 | 6.74 | | 0.225 | 1 | 7.43 | | 0.218 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 100000 | 43000 | mg/kg | 33.2 | | 0.256 | 1 | 48.8 | | 0.255 | 1 | 37.1 | | 0.242 | 1 | 545 | | 0.273 | 1 | 58.8 | | 0.26 | 1 | 20.4 | | 0.252 | 1 |
| Iron | 7439-89-6 | NS | NS | 190000 | 190000 | mg/kg | 41000 | | 27.4 | 5 | 14700 | | 5.46 | 1 | 34100 | | 25.9 | 5 | 21300 | | 5.86 | 1 | 19900 | | 5.57 | 1 | 18700 | | 5.4 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 22.3 | | 0.698 | 1 | 96.7 | | 0.695 | 1 | 48.5 | | 0.661 | 1 | 953 | | 0.746 | 1 | 86.4 | | 0.709 | 1 | 25.2 | | 0.687 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | mg/kg | 17200 | | 2.96 | 1 | 22200 | | 2.94 | 1 | 8710 | | 2.8 | 1 | 32500 | | 3.16 | 1 | 7330 | | 3 | 1 | 2500 | | 2.91 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 130000 | 2000 | mg/kg | 2040 | | 0.454 | 5 | 396 | | 0.09 | 1 | 861 | | 0.086 | 1 | 479 | | 0.097 | 1 | 242 | | 0.092 | 1 | 302 | | 0.089 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 450 | 10 | mg/kg | 0.0693 | J | 0.003 | 1 | 0.267 | | 0.003 | 1 | 0.054 | J | 0.003 | 1 | 2.32 | | 0.018 | 5 | 0.153 | | 0.003 | 1 | 0.072 | J | 0.003 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 56000 | 650 | mg/kg | 25.8 | | 0.221 | 1 | 16.1 | | 0.22 | 1 | 27.3 | | 0.209 | 1 | 39.1 | | 0.236 | 1 | 23.5 | | 0.225 | 1 | 14.4 | | 0.218 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | mg/kg | 1230 | | 21 | 1 | 904 | | 20.9 | 1 | 1350 | | 19.8 | 1 | 1040 | | 22.4 | 1 | 1540 | | 21.3 | 1 | 1240 | | 20.6 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 14000 | 26 | mg/kg | ND | U | 1.14 | 1 | ND | U | 1.14 | 1 | ND | U | 1.08 | 1 | 1.57 | J | 1.22 | 1 | ND | U | 1.16 | 1 | ND | U | 1.12 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 14000 | 84 | mg/kg | ND | U | 0.21 | 1 | ND | U | 0.209 | 1 | ND | U | 0.198 | 1 | 0.286 | J | 0.224 | 1 | ND | U | 0.213 | 1 | ND | U | 0.206 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | mg/kg | 80 | J | 43.4 | 1 | 61.2 | J | 43.2 | 1 | 72.1 | J | 41.1 | 1 | 142 | | 46.4 | 1 | 142 | | 44.1 | 1 | 51.2 | J | 42.7 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 200 | 14 | mg/kg | ND | U | 1.69 | 1 | ND | U | 1.68 | 1 | ND | U | 1.6 | 1 | 5.11 | | 1.8 | 1 | 3.51 | J | 1.71 | 1 | ND | U | 1.66 | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 20000 | 20000 | mg/kg | 40.5 | | 0.221 | 1 | 35.6 | | 0.22 | 1 | 50.3 | | 0.209 | 1 | 100 | | 0.236 | 1 | 58.6 | | 0.225 | 1 | 26.5 | | 0.218 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 190000 | 12000 | mg/kg | 88.1 | | 0.768 | 1 | 70.8 | | 0.765 | 1 | 67.7 | | 0.727 | 1 | 427 | | 0.82 | 1 | 106 | | 0.78 | 1 | 55.4 | | 0.756 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 16.6 | | 0.5 | 1 | 17.8 | | 0.5 | 1 | 13.5 | | 0.5 | 1 | 21.9 | | 0.5 | 1 | 15.4 | | 0.5 | 1 | 12.7 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration Exceeds the PADEP Non-Residential Direct Contact Standard

**Table 6**
**Summary of Shallow Soil Sample Analytical Results:**
**CAMU Area Soil Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-64 | | | | BH-10-69 | | | | BH-10-70 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-64-WC_0-2' | | | | BH-10-69-WC_0-2' | | | | BH-10-70-WC@0'-2' | | | | BH-10-77-WC_0-2' | | | |
| | | | | | | Sample Date | 4/13/2011 | | | | 4/12/2011 | | | | 4/11/2011 | | | | 4/13/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 10000 | 20 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 38 | 0.03 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 10000 | 10000 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 140 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 1400 | 16 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 10000 | 0.7 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 10000 | 27 | mg/kg | 0.001 | J | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.37 | 0.02 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 10000 | 60 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 220 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 8400 | 61 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 200 | 10 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 400 | 4.4 | mg/kg | ND | U | 0.004 | 1.01 | ND | U | 0.004 | 1.02 | ND | U | 0.003 | 0.81 | ND | U | 0.003 | 0.74 |
| Acetone | 67-64-1 | 9200 | 1000 | 10000 | 9200 | mg/kg | 0.31 | | 0.008 | 1.01 | 0.081 | | 0.008 | 1.02 | 0.057 | | 0.007 | 0.81 | 0.082 | | 0.006 | 0.74 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.15 | | 6E-04 | 1.01 | 0.004 | J | 6E-04 | 1.02 | ND | U | 5E-04 | 0.81 | 0.002 | J | 4E-04 | 0.74 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 60 | 8 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Bromoform | 75-25-2 | 8 | 3.5 | 2000 | 8 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 400 | 1 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 10000 | 620 | mg/kg | 0.003 | J | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | 0.001 | J | 9E-04 | 0.81 | 0.001 | J | 9E-04 | 0.74 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 150 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 4000 | 10 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Chloroethane | 75-00-3 | 90 | 19 | 10000 | 90 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Chloroform | 67-66-3 | 8 | 2 | 97 | 8 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 1200 | 3 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 10000 | 7 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 10000 | 6900 | mg/kg | 0.039 | | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 82 | 8 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10000 | 100 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.043 | | 0.001 | 1.01 | 0.016 | | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.021 | | 0.001 | 1.01 | 0.003 | J | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | 0.019 | | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 10000 | 10000 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 10000 | 400 | mg/kg | 0.026 | | 0.005 | 1.01 | ND | U | 0.005 | 1.02 | ND | U | 0.004 | 0.81 | 0.008 | J | 0.004 | 0.74 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 10000 | 820 | mg/kg | ND | U | 0.004 | 1.01 | ND | U | 0.004 | 1.02 | ND | U | 0.003 | 0.81 | ND | U | 0.003 | 0.74 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | mg/kg | 0.099 | | 0.001 | 1.01 | 0.003 | J | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | 0.0009 | J | 9E-04 | 0.74 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 4700 | 0.5 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Styrene | 100-42-5 | 10 | 24 | 10000 | 24 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | U | 6E-04 | 1.01 | ND | U | 6E-04 | 1.02 | ND | U | 5E-04 | 0.81 | ND | U | 4E-04 | 0.74 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 1500 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.013 | | 0.001 | 1.01 | 0.017 | | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 4800 | 10 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 1300 | 0.5 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 0.002 | 1.01 | ND | U | 0.002 | 1.02 | ND | U | 0.002 | 0.81 | ND | U | 0.002 | 0.74 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 110 | 0.2 | mg/kg | ND | U | 0.001 | 1.01 | ND | U | 0.001 | 1.02 | ND | U | 9E-04 | 0.81 | ND | U | 9E-04 | 0.74 |

**Table 6**
**Summary of Shallow Soil Sample Analytical Results:**
**CAMU Area Soil Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-64 | | | | BH-10-69 | | | | BH-10-70 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-64-WC_0-2' | | | | BH-10-69-WC_0-2' | | | | BH-10-70-WC@0'-2' | | | | BH-10-77-WC_0-2' | | | |
| | | | | | | Sample Date | 4/13/2011 | | | | 4/12/2011 | | | | 4/11/2011 | | | | 4/13/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 190000 | 6100 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2800 | 29 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 8400 | 2 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 10000 | 200 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 5600 | 20 | mg/kg | ND | U | **20** | 5 | ND | U | 0.39 | 1 | ND | U | 0.39 | 1 | ND | U | 2 | 5 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 260 | 0.84 | mg/kg | ND | U | **3.9** | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 2800 | 10 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 190000 | 18000 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 10000 | 4.4 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 11000 | 1600 | mg/kg | ND | U | 2 | 5 | 0.085 | J | 0.039 | 1 | ND | U | 0.039 | 1 | 0.23 | J | 0.2 | 5 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 140000 | 510 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 8400 | 31 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 22000 | 82 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 180 | 32 | mg/kg | ND | U | 5.9 | 5 | ND | U | 0.12 | 1 | ND | U | 0.12 | 1 | ND | U | 0.6 | 5 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 840 | 3.1 | mg/kg | ND | U | **3.9** | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 280 | 1 | mg/kg | ND | U | **9.8** | 5 | ND | U | 0.2 | 1 | ND | U | 0.19 | 1 | ND | U | **1** | 5 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 14000 | 110 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 400 | 1.6 | mg/kg | ND | U | **3.9** | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 14000 | 51 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 4000 | 13 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 22000 | 6 | mg/kg | ND | U | **9.8** | 5 | ND | U | 0.2 | 1 | ND | U | 0.19 | 1 | ND | U | 1 | 5 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 170000 | 4700 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 0.27 | J | 0.2 | 5 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 170000 | 6900 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Acetophenone | 98-86-2 | 1000 | 540 | 10000 | 1000 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 0.52 | J | 0.2 | 5 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 340 | 0.3 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 41 | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 2 | | 0.2 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | **120** | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 1.9 | | 0.2 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 54 | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 2.5 | | 0.2 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 96 | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 1.5 | | 0.2 | 5 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 1100 | 610 | mg/kg | 10 | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 1.1 | | 0.2 | 5 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 10000 | 10000 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 140000 | 2200 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 8400 | 31 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 6.7 | 0.076 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | **0.2** | 5 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 220 | 30 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 5700 | 130 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | 0.36 | J | 0.077 | 1 | ND | U | 0.4 | 5 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Carbazole | 86-74-8 | 13 | 83 | 4000 | 83 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 0.38 | J | 0.2 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 83 | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 2 | | 0.2 | 5 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 11 | 11 | mg/kg | **73** | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 0.53 | J | 0.2 | 5 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 2800 | 260 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 10000 | 8200 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Dimethyl Phthalate | 131-11-3 | 0.5 | NS | 100 | 0.5 | mg/kg | ND | U | **3.9** | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 10000 | 4100 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 10000 | 10000 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 110000 | 3200 | mg/kg | 2.2 | J | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 3.7 | | 0.2 | 5 |

**Table 6**
**Summary of Shallow Soil Sample Analytical Results:**
**CAMU Area Soil Samples**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | BH-10-64 | | | | BH-10-69 | | | | BH-10-70 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | BH-10-64-WC_0-2' | | | | BH-10-69-WC_0-2' | | | | BH-10-70-WC@0'-2' | | | | BH-10-77-WC_0-2' | | | |
| | | | | | | Sample Date | 4/13/2011 | | | | 4/12/2011 | | | | 4/11/2011 | | | | 4/13/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 0.22 | J | 0.2 | 5 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 50 | 0.96 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 1000 | 39 | mg/kg | ND | U | 3.9 | 5 | ND | U | 0.079 | 1 | ND | U | 0.077 | 1 | ND | U | 0.4 | 5 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 10000 | 91 | mg/kg | ND | U | 9.8 | 5 | ND | U | 0.2 | 1 | ND | U | 0.19 | 1 | ND | U | 1 | 5 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 550 | 0.56 | mg/kg | ND | U | **2** | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 110 | 110 | mg/kg | 59 | | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 1.3 | | 0.2 | 5 |
| Isophorone | 78-59-1 | 10 | 1.9 | 10000 | 10 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | ND | U | 2 | 5 | 0.055 | J | 0.039 | 1 | ND | U | 0.039 | 1 | 0.24 | J | 0.2 | 5 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 5600 | 20 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 11 | 0.037 | mg/kg | ND | U | **2** | 5 | ND | U | **0.039** | 1 | ND | U | **0.039** | 1 | ND | U | **0.2** | 5 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 16000 | 83 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 660 | 5 | mg/kg | ND | U | **9.8** | 5 | ND | U | 0.2 | 1 | ND | U | 0.19 | 1 | ND | U | 1 | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 2.1 | J | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 2.7 | | 0.2 | 5 |
| Phenol | 108-95-2 | 200 | 33 | 190000 | 200 | mg/kg | ND | U | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | ND | U | 0.2 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 8.4 | J | 2 | 5 | ND | U | 0.039 | 1 | ND | U | 0.039 | 1 | 3.2 | | 0.2 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | 190000 | 190000 | mg/kg | 10200 | | 5.7 | 1 | 17000 | | 5.7 | 1 | 102000 | | 29.3 | 5 | 16700 | | 5.91 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 1100 | 27 | mg/kg | ND | U | 1.13 | 1 | ND | U | 1.13 | 1 | ND | U | 5.83 | 5 | ND | U | 1.17 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 53 | 29 | mg/kg | 10.1 | | 1.08 | 1 | 7.9 | | 1.08 | 1 | 6.26 | J | 5.54 | 5 | 12.2 | | 1.12 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 190000 | 8200 | mg/kg | 114 | | 0.045 | 1 | 80.8 | | 0.045 | 1 | 154 | | 0.047 | 1 | 128 | | 0.047 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 5600 | 320 | mg/kg | 0.427 | J | 0.077 | 1 | 1.6 | | 0.077 | 1 | 2.06 | | 0.079 | 1 | 0.78 | | 0.08 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 1400 | 38 | mg/kg | 0.193 | J | 0.159 | 1 | ND | U | 0.159 | 1 | 2.09 | J | 0.816 | 5 | ND | U | 0.164 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | mg/kg | 7050 | | 6.95 | 1 | 37200 | | 6.94 | 1 | 988 | | 7.14 | 1 | 6090 | | 7.2 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | mg/kg | 69.5 | | 0.669 | 1 | 20.9 | | 0.668 | 1 | 298 | | 3.44 | 5 | 37 | | 0.693 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 840 | 140 | mg/kg | 6.7 | | 0.215 | 1 | 10.9 | | 0.215 | 1 | 46.6 | | 1.11 | 5 | 7.6 | | 0.223 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 100000 | 43000 | mg/kg | 59.9 | | 0.249 | 1 | 25.3 | | 0.249 | 1 | 88.9 | | 1.28 | 5 | 160 | | 0.258 | 1 |
| Iron | 7439-89-6 | NS | NS | 190000 | 190000 | mg/kg | 31600 | | 26.7 | 5 | 29300 | | 5.33 | 1 | 69100 | | 27.4 | 5 | 26700 | | 5.53 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 229 | | 0.68 | 1 | 21.2 | | 0.68 | 1 | 20.8 | | 3.5 | 5 | 225 | | 0.704 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | mg/kg | 4450 | | 2.88 | 1 | 23700 | | 2.88 | 1 | 2100 | | 2.96 | 1 | 3450 | | 2.98 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 130000 | 2000 | mg/kg | 413 | | 0.088 | 1 | 804 | | 0.088 | 1 | 798 | | 0.091 | 1 | 214 | | 0.092 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 450 | 10 | mg/kg | 2.24 | | 0.016 | 5 | 0.0447 | J | 0.003 | 1 | 0.0188 | J | 0.003 | 1 | 0.414 | | 0.003 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 56000 | 650 | mg/kg | 63.1 | | 0.215 | 1 | 17.7 | | 0.215 | 1 | 132 | | 1.11 | 5 | 26.1 | | 0.223 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | mg/kg | 1260 | | 20.4 | 1 | 1200 | | 20.4 | 1 | 1010 | | 105 | 5 | 1550 | | 21.1 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 14000 | 26 | mg/kg | ND | U | 1.11 | 1 | 1.94 | J | 1.11 | 1 | ND | U | 5.71 | 5 | ND | U | 1.15 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 14000 | 84 | mg/kg | ND | U | 0.204 | 1 | ND | U | 0.204 | 1 | ND | U | 1.05 | 5 | ND | U | 0.211 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | mg/kg | 122 | | 42.3 | 1 | 70.7 | J | 42.2 | 1 | 147 | | 43.5 | 1 | 83.3 | J | 43.8 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 200 | 14 | mg/kg | ND | U | 1.64 | 1 | ND | U | 1.64 | 1 | ND | U | 8.45 | 5 | ND | U | 1.7 | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 20000 | 20000 | mg/kg | 163 | | 0.215 | 1 | 33.1 | | 0.215 | 1 | 141 | | 1.11 | 5 | 50.2 | | 0.223 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 190000 | 12000 | mg/kg | 234 | | 0.748 | 1 | 72 | | 0.747 | 1 | 66.4 | | 3.85 | 5 | 109 | | 0.775 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | % | 15.2 | | 0.5 | 1 | 15.1 | | 0.5 | 1 | 14.2 | | 0.5 | 1 | 17.3 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration Exceeds the PADEP Non-Residential Direct Contact Standard

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-44-WC_10-12' | | | | BH-10-45-WC_5-8' | | | | BH-10-46-WC_5-8' | | | | BH-10-55-WC_5-8' | | | | BH-10-56-WC_10-12' | | | |
| | | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 10.0-12.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 10.0-12.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 0.72 | 10000.00 | 20 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 0.00093 | 44 | 0.03 | mg/kg | ND | U | **0.36** | 172.4 | ND | U | **0.076** | 61.23 | ND | U | **0.68** | 558.5 | ND | U | **0.11** | 66.54 | ND | U | **0.093** | 62.71 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 1000 | 10000 | 10000 | mg/kg | ND | U | 0.71 | 172.4 | ND | U | 0.15 | 61.23 | ND | U | 1.4 | 558.5 | ND | U | 0.22 | 66.54 | ND | U | 0.19 | 62.71 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 0.015 | 160 | 0.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 0.39 | 1600 | 16 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 0.019 | 10000 | 0.7 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 2.7 | 10000 | 7 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.00092 | 0.43 | 0.02 | mg/kg | ND | U | **0.71** | 172.4 | ND | U | **0.15** | 61.23 | ND | U | **1.4** | 558.5 | ND | U | **0.22** | 66.54 | ND | U | **0.19** | 62.71 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 0.00012 | 4.3 | 0.005 | mg/kg | ND | U | **0.36** | 172.4 | ND | U | **0.076** | 61.23 | ND | U | **0.68** | 558.5 | ND | U | **0.11** | 66.54 | ND | U | **0.093** | 62.71 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 5.9 | 10000 | 60 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 0.01 | 98 | 0.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 0.011 | 260 | 0.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 6.1 | 10000 | 60 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 1 | 230 | 7.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 0.11 | 460 | 4.4 | mg/kg | ND | U | 1.1 | 172.4 | ND | U | 0.23 | 61.23 | ND | U | 2 | 558.5 | ND | U | 0.33 | 66.54 | ND | U | 0.28 | 62.71 |
| Acetone | 67-64-1 | 9200 | 1000 | 100 | 10000 | 9200 | mg/kg | ND | U | 2.5 | 172.4 | ND | U | 0.53 | 61.23 | ND | U | 4.7 | 558.5 | ND | U | 0.77 | 66.54 | ND | U | 0.65 | 62.71 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 0.013 | 330 | 0.5 | mg/kg | 8.1 | | 0.18 | 172.4 | 0.89 | | 0.038 | 61.23 | 1.1 | J | 0.34 | 558.5 | ND | U | 0.055 | 66.54 | 11 | | 0.046 | 62.71 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 0.27 | 69 | 8 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Bromoform | 75-25-2 | 8 | 3.5 | 0.35 | 2300 | 8 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 0.054 | 460 | 1 | mg/kg | ND | U | 0.71 | 172.4 | ND | U | 0.15 | 61.23 | ND | U | **1.4** | 558.5 | ND | U | 0.22 | 66.54 | ND | U | 0.19 | 62.71 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 53 | 10000 | 620 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 0.026 | 170 | 0.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 0.61 | 4600 | 10 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Chloroethane | 75-00-3 | 90 | 19 | 1.9 | 10000 | 90 | mg/kg | ND | U | 0.71 | 172.4 | ND | U | 0.15 | 61.23 | ND | U | 1.4 | 558.5 | ND | U | 0.22 | 66.54 | ND | U | 0.19 | 62.71 |
| Chloroform | 67-66-3 | 8 | 2 | 0.2 | 110 | 8 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 0.038 | 1400 | 3 | mg/kg | ND | U | 0.71 | 172.4 | ND | U | 0.15 | 61.23 | ND | U | 1.4 | 558.5 | ND | U | 0.22 | 66.54 | ND | U | 0.19 | 62.71 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 0.16 | 10000 | 7 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 690 | 10000 | 5300 | mg/kg | 13 | | 0.36 | 172.4 | 2.1 | | 0.076 | 61.23 | 0.77 | J | 0.68 | 558.5 | 0.21 | J | 0.11 | 66.54 | 0.59 | | 0.093 | 62.71 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 0.25 | 95 | 8 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10 | 10000 | 100 | mg/kg | ND | U | 0.71 | 172.4 | ND | U | 0.15 | 61.23 | ND | U | 1.4 | 558.5 | ND | U | 0.22 | 66.54 | ND | U | 0.19 | 62.71 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 99 | 9100 | 1000 | mg/kg | 460 | | 3.6 | 1724 | 11 | | 0.076 | 61.23 | 7.3 | | 0.68 | 558.5 | 2.7 | | 0.11 | 66.54 | 13 | | 0.093 | 62.71 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 4.6 | 10000 | 70 | mg/kg | 76 | | 0.36 | 172.4 | 5.9 | | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | 0.39 | J | 0.11 | 66.54 | 2.5 | | 0.093 | 62.71 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 250 | 10000 | 350 | mg/kg | 20 | | 0.36 | 172.4 | 3.9 | | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | 0.53 | J | 0.11 | 66.54 | 1.2 | | 0.093 | 62.71 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 190 | 10000 | 10000 | mg/kg | ND | U | 0.71 | 172.4 | 0.26 | J | 0.15 | 61.23 | 6.6 | | 1.4 | 558.5 | ND | U | 0.22 | 66.54 | 0.67 | | 0.19 | 62.71 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 7.6 | 10000 | 400 | mg/kg | ND | U | 1.4 | 172.4 | ND | U | 0.31 | 61.23 | ND | U | 2.7 | 558.5 | ND | U | 0.44 | 66.54 | ND | U | 0.37 | 62.71 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 13 | 10000 | 820 | mg/kg | ND | U | 1.1 | 172.4 | ND | U | 0.23 | 61.23 | ND | U | 2 | 558.5 | ND | U | 0.33 | 66.54 | ND | U | 0.28 | 62.71 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | NS | mg/kg | 63 | | 0.36 | 172.4 | 12 | | 0.076 | 61.23 | 1.6 | J | 0.68 | 558.5 | 2.3 | | 0.11 | 66.54 | 1.5 | | 0.093 | 62.71 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 0.0076 | 5400 | 0.5 | mg/kg | ND | U | **0.71** | 172.4 | ND | U | 0.15 | 61.23 | ND | U | **1.4** | 558.5 | ND | U | 0.22 | 66.54 | 0.5 | | 0.19 | 62.71 |
| Styrene | 100-42-5 | 10 | 24 | 2.4 | 10000 | 10 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 0.028 | 3700 | 2 | mg/kg | ND | U | 0.18 | 172.4 | ND | U | 0.038 | 61.23 | ND | U | 0.34 | 558.5 | ND | U | 0.055 | 66.54 | ND | U | 0.046 | 62.71 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 0.043 | 4400 | 0.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | 0.52 | | 0.093 | 62.71 |
| Toluene | 108-88-3 | 100 | 44 | 4.4 | 10000 | 100 | mg/kg | 140 | | 3.6 | 1724 | 0.36 | J | 0.076 | 61.23 | 3.3 | J | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | 11 | | 0.093 | 62.71 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 0.23 | 5500 | 10 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | 0.68 | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 0.017 | 1500 | 0.5 | mg/kg | ND | U | 0.36 | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | 0.11 | J | 0.093 | 62.71 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 0.71 | 172.4 | ND | U | 0.15 | 61.23 | ND | U | 1.4 | 558.5 | ND | U | 0.22 | 66.54 | ND | U | 0.19 | 62.71 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 0.0027 | 580 | 0.2 | mg/kg | ND | U | **0.36** | 172.4 | ND | U | 0.076 | 61.23 | ND | U | **0.68** | 558.5 | ND | U | 0.11 | 66.54 | ND | U | 0.093 | 62.71 |

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-44-WC_10-12' | | | | BH-10-45-WC_5-8' | | | | BH-10-46-WC_5-8' | | | | BH-10-55-WC_5-8' | | | | BH-10-56-WC_10-12' | | | |
| | | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 10.0-12.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 10.0-12.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 610 | 190000 | 1000 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2.9 | 190000 | 10 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 0.1 | 190000 | 2 | mg/kg | ND | U | **4.1** | 10 | ND | U | **2.1** | 5 | ND | U | **2** | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 0.23 | 190000 | 20 | mg/kg | ND | U | **41** | 10 | ND | U | **21** | 5 | ND | U | **20** | 10 | ND | U | 2.7 | 1 | ND | U | 12 | 5 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 0.02 | 190000 | 0.84 | mg/kg | ND | U | **8.3** | 10 | ND | U | **4.1** | 5 | ND | U | **4** | 10 | ND | U | 0.54 | 1 | ND | U | **2.4** | 5 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 0.3 | 190000 | 10 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 1800 | 190000 | 1800 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 0.44 | 10000 | 4 | mg/kg | ND | U | **4.1** | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 160 | 190000 | 160 | mg/kg | 1500 | | 21 | 50 | 110 | | 2.1 | 5 | 39 | | 2 | 10 | 18 | | 0.27 | 1 | 15 | | 1.2 | 5 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 8.5 | 190000 | 510 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 0.55 | 190000 | 31 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 1.7 | 190000 | 82 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 3.2 | 190000 | 3.2 | mg/kg | ND | U | **12** | 10 | ND | U | **6.2** | 5 | ND | U | **6** | 10 | ND | U | 0.82 | 1 | ND | U | **3.7** | 5 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 0.048 | 190000 | 3.1 | mg/kg | ND | U | **8.3** | 10 | ND | U | **4.1** | 5 | ND | U | **4** | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 0.075 | 190000 | 1 | mg/kg | ND | U | **21** | 10 | ND | U | **10** | 5 | ND | U | **10** | 10 | ND | U | **1.4** | 1 | ND | U | **6.1** | 5 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 11 | 190000 | 51 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 0.16 | 190000 | 1.3 | mg/kg | ND | U | **8.3** | 10 | ND | U | **4.1** | 5 | ND | U | **4** | 10 | ND | U | 0.54 | 1 | ND | U | **2.4** | 5 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 1.2 | 190000 | 51 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 0.19 | 190000 | 13 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 0.41 | 190000 | 6 | mg/kg | ND | U | **21** | 10 | ND | U | **10** | 5 | ND | U | **10** | 10 | ND | U | 1.4 | 1 | ND | U | **6.1** | 5 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 470 | 190000 | 470 | mg/kg | 66 | | 4.1 | 10 | 5.7 | J | 2.1 | 5 | ND | U | 2 | 10 | 1.6 | | 0.27 | 1 | 2.2 | J | 1.2 | 5 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 690 | 190000 | 690 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Acetophenone | 98-86-2 | 1000 | 540 | 54 | 10000 | 1000 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Anthracene | 120-12-7 | 6.6 | 350 | 35 | 190000 | 35 | mg/kg | 32 | | 4.1 | 10 | 2.5 | J | 2.1 | 5 | ND | U | 2 | 10 | 0.45 | J | 0.27 | 1 | 1.5 | J | 1.2 | 5 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 0.013 | 190000 | 0.3 | mg/kg | ND | U | **4.1** | 10 | ND | U | **2.1** | 5 | ND | U | **2** | 10 | ND | U | 0.27 | 1 | ND | U | **1.2** | 5 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | NS | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 32 | 190000 | 32 | mg/kg | 8.4 | J | 4.1 | 10 | 3.4 | J | 2.1 | 5 | ND | U | 2 | 10 | 0.34 | J | 0.27 | 1 | 3.3 | J | 1.2 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 4.6 | 190000 | 4.6 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | 7.3 | J | 2 | 10 | ND | U | 0.27 | 1 | 3.1 | J | 1.2 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 17 | 190000 | 17 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | 2.4 | J | 2 | 10 | ND | U | 0.27 | 1 | 2.6 | J | 1.2 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 18 | 190000 | 18 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | 3.3 | J | 1.2 | 5 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 61 | 190000 | 61 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 220 | 190000 | 510 | mg/kg | 98 | | 4.1 | 10 | 6.4 | J | 2.1 | 5 | ND | U | 2 | 10 | 1.6 | | 0.27 | 1 | ND | U | 1.2 | 5 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 0.82 | 10000 | 31 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 0.0023 | 7.7 | 0.076 | mg/kg | ND | U | **4.1** | 10 | ND | U | **2.1** | 5 | ND | U | **2** | 10 | ND | U | **0.27** | 1 | ND | U | **1.2** | 5 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 0.8 | 250 | 30 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 13 | 10000 | 13 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | NS | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Carbazole | 86-74-8 | 13 | 83 | 8.3 | 190000 | 13 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 23 | 190000 | 23 | mg/kg | 16 | J | 4.1 | 10 | 15 | | 2.1 | 5 | 14 | | 2 | 10 | 0.67 | J | 0.27 | 1 | 5.7 | J | 1.2 | 5 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 16 | 190000 | 16 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 26 | 190000 | 26 | mg/kg | 57 | | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | 1.8 | J | 1.2 | 5 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 260 | 10000 | 8200 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Dimethyl Phthalate | 131-11-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 410 | 10000 | 1000 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 8.3 | 10 | ND | U | 4.1 | 5 | ND | U | 4 | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 320 | 190000 | 320 | mg/kg | 6.3 | J | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | 0.33 | J | 0.27 | 1 | 2.3 | J | 1.2 | 5 |

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-44-WC_10-12' | | | | BH-10-45-WC_5-8' | | | | BH-10-46-WC_5-8' | | | | BH-10-55-WC_5-8' | | | | BH-10-56-WC_10-12' | | | |
| | | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 10.0-12.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | | 10.0-12.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 380 | 190000 | 380 | mg/kg | 96 | | 4.1 | 10 | 8.6 | J | 2.1 | 5 | ND | U | 2 | 10 | 1.5 | | 0.27 | 1 | 2.7 | J | 1.2 | 5 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 0.096 | 190000 | 0.1 | mg/kg | ND | U | **4.1** | 10 | ND | U | **2.1** | 5 | ND | U | **2** | 10 | ND | U | **0.27** | 1 | ND | U | **1.2** | 5 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 3.9 | 10000 | 3.9 | mg/kg | ND | U | **8.3** | 10 | ND | U | **4.1** | 5 | ND | U | **4** | 10 | ND | U | 0.54 | 1 | ND | U | 2.4 | 5 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 9.1 | 10000 | 9.1 | mg/kg | ND | U | **21** | 10 | ND | U | **10** | 5 | ND | U | **10** | 10 | ND | U | 1.4 | 1 | ND | U | 6.1 | 5 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 0.056 | 640 | 0.1 | mg/kg | ND | U | **4.1** | 10 | ND | U | **2.1** | 5 | ND | U | **2** | 10 | ND | U | **0.27** | 1 | ND | U | **1.2** | 5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 2800 | 190000 | 2800 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | 1.4 | J | 1.2 | 5 |
| Isophorone | 78-59-1 | 10 | 1.9 | 0.19 | 10000 | 10 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 2.5 | 190000 | 10 | mg/kg | 410 | | 4.1 | 10 | 27 | | 2.1 | 5 | 16 | | 2 | 10 | 2.5 | | 0.27 | 1 | 7.1 | | 1.2 | 5 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 0.87 | 10000 | 20 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 0.00051 | 10000 | 0.037 | mg/kg | ND | U | **4.1** | 10 | ND | U | **2.1** | 5 | ND | U | **2** | 10 | ND | U | **0.27** | 1 | ND | U | **1.2** | 5 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 8.3 | 190000 | 53 | mg/kg | ND | U | 4.1 | 10 | 15 | | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 0.5 | 190000 | 0.5 | mg/kg | ND | U | **21** | 10 | ND | U | **10** | 5 | ND | U | **10** | 10 | ND | U | **1.4** | 1 | ND | U | **6.1** | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 1000 | 190000 | 1000 | mg/kg | 200 | | 4.1 | 10 | 23 | | 2.1 | 5 | 9.4 | J | 2 | 10 | 5.6 | | 0.27 | 1 | 12 | | 1.2 | 5 |
| Phenol | 108-95-2 | 200 | 33 | 3.3 | 190000 | 200 | mg/kg | ND | U | 4.1 | 10 | ND | U | 2.1 | 5 | ND | U | 2 | 10 | ND | U | 0.27 | 1 | ND | U | 1.2 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 220 | 190000 | 220 | mg/kg | 21 | J | 4.1 | 10 | 4.7 | J | 2.1 | 5 | 6.1 | J | 2 | 10 | 0.72 | J | 0.27 | 1 | 4.7 | J | 1.2 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | NS | 190000 | 190000 | mg/kg | 20400 | | 10.3 | 1 | 12000 | | 6.09 | 1 | 7050 | | 5.98 | 1 | 14000 | | 8.22 | 1 | 15500 | | 7.45 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 2.7 | 190000 | 2.7 | mg/kg | 4.02 | J | 2.05 | 1 | ND | U | 1.21 | 1 | ND | U | 1.19 | 1 | ND | U | **8.17** | 5 | ND | U | 1.48 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 2.9 | 190000 | 2.9 | mg/kg | 21.9 | | 1.95 | 1 | 10.7 | | 1.15 | 1 | 6.14 | | 1.13 | 1 | 12.7 | | 1.55 | 1 | 13.5 | | 1.41 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 820 | 190000 | 820 | mg/kg | 349 | | 0.082 | 1 | 122 | | 0.048 | 1 | 116 | | 0.048 | 1 | 88.8 | | 0.065 | 1 | 178 | | 0.059 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 32 | 190000 | 32 | mg/kg | 0.664 | J | 0.139 | 1 | 0.551 | J | 0.082 | 1 | 0.103 | J | 0.081 | 1 | 0.425 | J | 0.111 | 1 | 0.64 | J | 0.101 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 3.8 | 190000 | 3.8 | mg/kg | 0.744 | J | 0.287 | 1 | ND | U | 0.169 | 1 | ND | U | 0.166 | 1 | 0.422 | J | 0.229 | 1 | ND | U | 0.207 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | NS | mg/kg | 140000 | | 62.8 | 5 | 20900 | | 7.42 | 1 | 9240 | | 7.28 | 1 | 152000 | | 50.1 | 5 | 53700 | | 9.08 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | NS | mg/kg | 908 | | 1.21 | 1 | 160 | | 0.714 | 1 | 20.1 | | 0.701 | 1 | 475 | | 0.964 | 1 | 282 | | 0.874 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 14 | 190000 | 14 | mg/kg | 10.2 | | 0.389 | 1 | 10 | | 0.23 | 1 | 1.01 | | 0.226 | 1 | 6.24 | | 0.31 | 1 | 9.6 | | 0.281 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 4300 | 190000 | 4300 | mg/kg | 191 | | 0.451 | 1 | 80.3 | | 0.266 | 1 | 165 | | 0.261 | 1 | 120 | | 0.359 | 1 | 163 | | 0.326 | 1 |
| Iron | 7439-89-6 | NS | NS | NS | 190000 | 190000 | mg/kg | 16200 | | 9.66 | 1 | 26600 | | 5.7 | 1 | 4770 | | 5.6 | 1 | 11300 | | 7.7 | 1 | 28100 | | 6.98 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 45 | 190000 | 45 | mg/kg | 640 | | 1.23 | 1 | 307 | | 0.726 | 1 | 79.6 | | 0.713 | 1 | 316 | | 0.98 | 1 | 676 | | 0.889 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | NS | mg/kg | 47000 | | 5.21 | 1 | 8680 | | 3.07 | 1 | 2330 | | 3.02 | 1 | 116000 | | 20.7 | 5 | 24900 | | 3.76 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 200 | 190000 | 200 | mg/kg | 937 | | 0.16 | 1 | 434 | | 0.094 | 1 | 110 | | 0.093 | 1 | 617 | | 0.127 | 1 | 675 | | 0.116 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 1 | 190000 | 1 | mg/kg | 1.07 | | 0.006 | 1 | 0.667 | | 0.003 | 1 | 0.0629 | J | 0.003 | 1 | 0.116 | J | 0.005 | 1 | 1.88 | | 0.021 | 5 |
| Nickel | 7440-02-0 | 10 | 650 | 65 | 190000 | 65 | mg/kg | 53.4 | | 0.389 | 1 | 34.1 | | 0.23 | 1 | 9.31 | | 0.226 | 1 | 38.4 | | 0.31 | 1 | 67.7 | | 0.281 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | NS | mg/kg | 990 | | 36.9 | 1 | 1490 | | 21.8 | 1 | 397 | | 21.4 | 1 | 496 | | 29.4 | 1 | 2010 | | 26.7 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 2.6 | 190000 | 5 | mg/kg | ND | U | 2.01 | 1 | ND | U | 1.19 | 1 | ND | U | 1.16 | 1 | 1.68 | J | 1.6 | 1 | ND | U | 1.45 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 8.4 | 190000 | 10 | mg/kg | ND | U | 0.369 | 1 | ND | U | 0.218 | 1 | ND | U | 0.214 | 1 | ND | U | 0.294 | 1 | 0.29 | J | 0.267 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | NS | mg/kg | 269 | | 76.5 | 1 | 114 | J | 45.2 | 1 | 114 | J | 44.3 | 1 | 85.4 | J | 60.9 | 1 | 402 | | 55.3 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 1.4 | 190000 | 1.4 | mg/kg | ND | U | **2.97** | 1 | 4.31 | | **1.76** | 1 | ND | U | **1.72** | 1 | 3.3 | J | **2.37** | 1 | 6.02 | | **2.15** | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 7200 | 190000 | 7200 | mg/kg | 100 | | 0.389 | 1 | 76.5 | | 0.23 | 1 | 19.8 | | 0.226 | 1 | 71.7 | | 0.31 | 1 | 120 | | 0.281 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 1200 | 190000 | 1200 | mg/kg | 870 | | 1.35 | 1 | 229 | | 0.799 | 1 | 21.3 | | 0.784 | 1 | 641 | | 1.08 | 1 | 513 | | 0.978 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | NS | % | 51.7 | | 0.5 | 1 | 19.8 | | 0.5 | 1 | 17.5 | | 0.5 | 1 | 39.4 | | 0.5 | 1 | 32.5 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-63 | | | | BH-10-64 | | | | BH-10-65 | | | | BH-10-69 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-63-WC_12-14' | | | | BH-10-64-WC_11-13' | | | | BH-10-65_6-8' | | | | BH-10-69-WC_5-8' | | | |
| | | | | | | | Sample Date | 4/13/2011 | | | | 4/13/2011 | | | | 4/14/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 12.0-14.0 ft bgs | | | | 11.0-13.0 ft bgs | | | | 6.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 0.72 | 10000.00 | 20 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 0.00093 | 44 | 0.03 | mg/kg | ND | U | **0.064** | 50.69 | ND | U | **0.13** | 104.6 | ND | U | **0.18** | 126.7 | ND | U | **0.68** | 547 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 1000 | 10000 | 10000 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | 1.4 | 547 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 0.015 | 160 | 0.5 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 0.39 | 1600 | 16 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 0.019 | 10000 | 0.7 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 2.7 | 10000 | 7 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.00092 | 0.43 | 0.02 | mg/kg | ND | U | **0.13** | 50.69 | ND | U | **0.26** | 104.6 | ND | U | **0.37** | 126.7 | ND | U | **1.4** | 547 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 0.00012 | 4.3 | 0.005 | mg/kg | ND | U | **0.064** | 50.69 | ND | U | **0.13** | 104.6 | ND | U | **0.18** | 126.7 | ND | U | **0.68** | 547 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 5.9 | 10000 | 60 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 0.01 | 98 | 0.5 | mg/kg | ND | U | 0.064 | 50.69 | 9.3 | | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 0.011 | 260 | 0.5 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 6.1 | 10000 | 60 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 1 | 230 | 7.5 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 0.11 | 460 | 4.4 | mg/kg | ND | U | 0.19 | 50.69 | ND | U | 0.39 | 104.6 | ND | U | 0.55 | 126.7 | ND | U | 2 | 547 |
| Acetone | 67-64-1 | 9200 | 1000 | 100 | 10000 | 9200 | mg/kg | 0.47 | J | 0.45 | 50.69 | ND | U | 0.9 | 104.6 | ND | U | 1.3 | 126.7 | ND | U | 4.7 | 547 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 0.013 | 330 | 0.5 | mg/kg | 1.9 | | 0.032 | 50.69 | 19 | | 0.065 | 104.6 | 35 | | 0.092 | 126.7 | 0.9 | J | 0.34 | 547 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 0.27 | 69 | 8 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Bromoform | 75-25-2 | 8 | 3.5 | 0.35 | 2300 | 8 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 0.054 | 460 | 1 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | **1.4** | 547 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 53 | 10000 | 620 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 0.026 | 170 | 0.5 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 0.61 | 4600 | 10 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Chloroethane | 75-00-3 | 90 | 19 | 1.9 | 10000 | 90 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | 1.4 | 547 |
| Chloroform | 67-66-3 | 8 | 2 | 0.2 | 110 | 8 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 0.038 | 1400 | 3 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | 1.4 | 547 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 0.16 | 10000 | 7 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 690 | 10000 | 5300 | mg/kg | 1.9 | | 0.064 | 50.69 | 2.8 | | 0.13 | 104.6 | 6.7 | | 0.18 | 126.7 | 1.7 | J | 0.68 | 547 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 0.25 | 95 | 8 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10 | 10000 | 100 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | 1.4 | 547 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 99 | 9100 | 1000 | mg/kg | 0.092 | J | 0.064 | 50.69 | 5.7 | | 0.13 | 104.6 | 57 | | 0.18 | 126.7 | 4.9 | | 0.68 | 547 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 4.6 | 10000 | 70 | mg/kg | 0.08 | J | 0.064 | 50.69 | 2.4 | | 0.13 | 104.6 | 7.5 | | 0.18 | 126.7 | 1.3 | J | 0.68 | 547 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 250 | 10000 | 350 | mg/kg | 1.4 | | 0.064 | 50.69 | 4.5 | | 0.13 | 104.6 | 5.1 | | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 190 | 10000 | 10000 | mg/kg | 0.33 | | 0.13 | 50.69 | 0.33 | J | 0.26 | 104.6 | 0.91 | J | 0.37 | 126.7 | ND | U | 1.4 | 547 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 7.6 | 10000 | 400 | mg/kg | ND | U | 0.26 | 50.69 | ND | U | 0.52 | 104.6 | ND | U | 0.73 | 126.7 | ND | U | 2.7 | 547 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 13 | 10000 | 820 | mg/kg | ND | U | 0.19 | 50.69 | ND | U | 0.39 | 104.6 | ND | U | 0.55 | 126.7 | ND | U | 2 | 547 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | NS | mg/kg | 11 | | 0.064 | 50.69 | 16 | | 0.13 | 104.6 | 26 | | 0.18 | 126.7 | 3.1 | J | 0.68 | 547 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 0.0076 | 5400 | 0.5 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | **1.4** | 547 |
| Styrene | 100-42-5 | 10 | 24 | 2.4 | 10000 | 10 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 0.028 | 3700 | 2 | mg/kg | ND | U | 0.032 | 50.69 | ND | U | 0.065 | 104.6 | ND | U | 0.092 | 126.7 | ND | U | 0.34 | 547 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 0.043 | 4400 | 0.5 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |
| Toluene | 108-88-3 | 100 | 44 | 4.4 | 10000 | 100 | mg/kg | ND | U | 0.064 | 50.69 | 0.64 | J | 0.13 | 104.6 | 5.8 | | 0.18 | 126.7 | 1.1 | J | 0.68 | 547 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 0.23 | 5500 | 10 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | 0.68 | 547 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 0.017 | 1500 | 0.5 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 0.13 | 50.69 | ND | U | 0.26 | 104.6 | ND | U | 0.37 | 126.7 | ND | U | 1.4 | 547 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 0.0027 | 580 | 0.2 | mg/kg | ND | U | 0.064 | 50.69 | ND | U | 0.13 | 104.6 | ND | U | 0.18 | 126.7 | ND | U | **0.68** | 547 |

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-63 | | | | BH-10-64 | | | | BH-10-65 | | | | BH-10-69 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-63-WC_12-14' | | | | BH-10-64-WC_11-13' | | | | BH-10-65_6-8' | | | | BH-10-69-WC_5-8' | | | |
| | | | | | | | Sample Date | 4/13/2011 | | | | 4/13/2011 | | | | 4/14/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 12.0-14.0 ft bgs | | | | 11.0-13.0 ft bgs | | | | 6.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 610 | 190000 | 1000 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2.9 | 190000 | 10 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 0.1 | 190000 | 2 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | **2.4** | 5 | ND | U | **2** | 10 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 2.1 | 5 | 2.2 | | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 0.23 | 190000 | 20 | mg/kg | ND | U | 10 | 5 | ND | U | 2 | 5 | ND | U | **24** | 5 | ND | U | **20** | 10 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 0.02 | 190000 | 0.84 | mg/kg | ND | U | **2.1** | 5 | ND | U | 0.41 | 5 | ND | U | **4.8** | 5 | ND | U | **4.1** | 10 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 0.3 | 190000 | 10 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 1800 | 190000 | 1800 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 0.44 | 10000 | 4 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 160 | 190000 | 160 | mg/kg | 57 | | 1 | 5 | 38 | | 2 | 50 | 280 | | 24 | 50 | 21 | | 2 | 10 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 8.5 | 190000 | 510 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 0.55 | 190000 | 31 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 1.7 | 190000 | 82 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 3.2 | 190000 | 3.2 | mg/kg | ND | U | 3.1 | 5 | ND | U | 0.61 | 5 | ND | U | **7.2** | 5 | ND | U | **6.1** | 10 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 0.048 | 190000 | 3.1 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | **4.8** | 5 | ND | U | **4.1** | 10 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 0.075 | 190000 | 1 | mg/kg | ND | U | **5.2** | 5 | ND | U | **1** | 5 | ND | U | **12** | 5 | ND | U | **10** | 10 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 11 | 190000 | 51 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 0.16 | 190000 | 1.3 | mg/kg | ND | U | **2.1** | 5 | ND | U | 0.41 | 5 | ND | U | **4.8** | 5 | ND | U | **4.1** | 10 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 1.2 | 190000 | 51 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 0.19 | 190000 | 13 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 0.41 | 190000 | 6 | mg/kg | ND | U | 5.2 | 5 | ND | U | 1 | 5 | ND | U | **12** | 5 | ND | U | **10** | 10 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 470 | 190000 | 470 | mg/kg | 2 | J | 1 | 5 | 3.4 | | 0.2 | 5 | 15 | | 2.4 | 5 | ND | U | 2 | 10 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 690 | 190000 | 690 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Acetophenone | 98-86-2 | 1000 | 540 | 54 | 10000 | 1000 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Anthracene | 120-12-7 | 6.6 | 350 | 35 | 190000 | 35 | mg/kg | 1.7 | J | 1 | 5 | 2.9 | | 0.2 | 5 | 7.8 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 0.013 | 190000 | 0.3 | mg/kg | ND | U | **1** | 5 | ND | U | 0.2 | 5 | ND | U | **2.4** | 5 | ND | U | **2** | 10 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | NS | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 32 | 190000 | 32 | mg/kg | 3.1 | J | 1 | 5 | 3.4 | | 0.2 | 5 | 7.2 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 4.6 | 190000 | 4.6 | mg/kg | 3.5 | J | 1 | 5 | 2.8 | | 0.2 | 5 | 5.7 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 17 | 190000 | 17 | mg/kg | 3 | J | 1 | 5 | 3.3 | | 0.2 | 5 | 6.1 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 18 | 190000 | 18 | mg/kg | 3.7 | J | 1 | 5 | 1.8 | | 0.2 | 5 | 5.2 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 61 | 190000 | 61 | mg/kg | ND | U | 1 | 5 | 1.1 | | 0.2 | 5 | 2.6 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 220 | 190000 | 510 | mg/kg | 1.9 | J | 1 | 5 | 2.1 | | 0.2 | 5 | 26 | | 2.4 | 5 | ND | U | 2 | 10 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 0.82 | 10000 | 31 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 0.0023 | 7.7 | 0.076 | mg/kg | ND | U | **1** | 5 | ND | U | **0.2** | 5 | ND | U | **2.4** | 5 | ND | U | **2** | 10 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 0.8 | 250 | 30 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 13 | 10000 | 13 | mg/kg | 4.4 | J | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | NS | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Carbazole | 86-74-8 | 13 | 83 | 8.3 | 190000 | 13 | mg/kg | ND | U | 1 | 5 | 0.48 | J | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Chrysene | 218-01-9 | 0.19 | 230 | 23 | 190000 | 23 | mg/kg | 9 | | 1 | 5 | 4 | | 0.2 | 5 | 14 | | 2.4 | 5 | 10 | | 2 | 10 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 16 | 190000 | 16 | mg/kg | 1.2 | J | 1 | 5 | 0.64 | J | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 26 | 190000 | 26 | mg/kg | 3.8 | J | 1 | 5 | 2.2 | | 0.2 | 5 | 14 | | 2.4 | 5 | ND | U | 2 | 10 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 260 | 10000 | 8200 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Dimethyl Phthalate | 131-11-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 410 | 10000 | 1000 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | 4.8 | 5 | ND | U | 4.1 | 10 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 320 | 190000 | 320 | mg/kg | 2.3 | J | 1 | 5 | 7.5 | | 0.2 | 5 | 10 | J | 2.4 | 5 | ND | U | 2 | 10 |

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-63 | | | | BH-10-64 | | | | BH-10-65 | | | | BH-10-69 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-63-WC_12-14' | | | | BH-10-64-WC_11-13' | | | | BH-10-65_6-8' | | | | BH-10-69-WC_5-8' | | | |
| | | | | | | | Sample Date | 4/13/2011 | | | | 4/13/2011 | | | | 4/14/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 12.0-14.0 ft bgs | | | | 11.0-13.0 ft bgs | | | | 6.0-8.0 ft bgs | | | | 5.0-8.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 380 | 190000 | 380 | mg/kg | 6.5 | | 1 | 5 | 4.3 | | 0.2 | 5 | 24 | | 2.4 | 5 | ND | U | 2 | 10 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 0.096 | 190000 | 0.1 | mg/kg | ND | U | **1** | 5 | ND | U | **0.2** | 5 | ND | U | **2.4** | 5 | ND | U | **2** | 10 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 3.9 | 10000 | 3.9 | mg/kg | ND | U | 2.1 | 5 | ND | U | 0.41 | 5 | ND | U | **4.8** | 5 | ND | U | **4.1** | 10 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 9.1 | 10000 | 9.1 | mg/kg | ND | U | 5.2 | 5 | ND | U | 1 | 5 | ND | U | **12** | 5 | ND | U | **10** | 10 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 0.056 | 640 | 0.1 | mg/kg | ND | U | **1** | 5 | ND | U | **0.2** | 5 | ND | U | **2.4** | 5 | ND | U | **2** | 10 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 2800 | 190000 | 2800 | mg/kg | 1.2 | J | 1 | 5 | 1.4 | | 0.2 | 5 | 3.4 | J | 2.4 | 5 | ND | U | 2 | 10 |
| Isophorone | 78-59-1 | 10 | 1.9 | 0.19 | 10000 | 10 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Naphthalene | 91-20-3 | 10 | 25 | 2.5 | 190000 | 10 | mg/kg | 5.4 | | 1 | 5 | 8.4 | | 0.2 | 5 | 110 | | 2.4 | 5 | 7.3 | J | 2 | 10 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 0.87 | 10000 | 20 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 0.00051 | 10000 | 0.037 | mg/kg | ND | U | **1** | 5 | ND | U | **0.2** | 5 | ND | U | **2.4** | 5 | ND | U | **2** | 10 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 8.3 | 190000 | 53 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 0.5 | 190000 | 0.5 | mg/kg | ND | U | **5.2** | 5 | ND | U | **1** | 5 | ND | U | **12** | 5 | ND | U | **10** | 10 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 1000 | 190000 | 1000 | mg/kg | 14 | | 1 | 5 | 14 | | 0.2 | 5 | 55 | | 2.4 | 5 | 7.1 | J | 2 | 10 |
| Phenol | 108-95-2 | 200 | 33 | 3.3 | 190000 | 200 | mg/kg | ND | U | 1 | 5 | ND | U | 0.2 | 5 | ND | U | 2.4 | 5 | ND | U | 2 | 10 |
| Pyrene | 129-00-0 | 13 | 2200 | 220 | 190000 | 220 | mg/kg | 3.9 | J | 1 | 5 | 7.3 | | 0.2 | 5 | 17 | | 2.4 | 5 | 4.9 | J | 2 | 10 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | NS | 190000 | 190000 | mg/kg | 6070 | | 6.32 | 1 | 11600 | | 6.1 | 1 | 10200 | | 7.29 | 1 | 9620 | | 6.1 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 2.7 | 190000 | 2.7 | mg/kg | 2.61 | | 1.26 | 1 | ND | U | 1.21 | 1 | 4.55 | | 1.45 | 1 | ND | U | 1.21 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 2.9 | 190000 | 2.9 | mg/kg | 12 | | 1.19 | 1 | 11 | | 1.15 | 1 | 28.3 | | 1.38 | 1 | 7.18 | | 1.15 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 820 | 190000 | 820 | mg/kg | 91.6 | | 0.05 | 1 | 215 | | 0.049 | 1 | 508 | | 0.058 | 1 | 157 | | 0.049 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 32 | 190000 | 32 | mg/kg | 0.426 | J | 0.085 | 1 | 0.648 | | 0.082 | 1 | 0.49 | J | 0.099 | 1 | 0.158 | J | 0.083 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 3.8 | 190000 | 3.8 | mg/kg | ND | U | 0.176 | 1 | 0.175 | J | 0.17 | 1 | 1.05 | | 0.203 | 1 | ND | U | 0.17 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | NS | mg/kg | 9710 | | 7.7 | 1 | 5670 | | 7.43 | 1 | 12100 | | 8.88 | 1 | 14000 | | 7.44 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | NS | mg/kg | 225 | | 0.741 | 1 | 23.6 | | 0.715 | 1 | 163 | | 0.855 | 1 | 32.5 | | 0.716 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 14 | 190000 | 14 | mg/kg | 10.7 | | 0.239 | 1 | 6.67 | | 0.23 | 1 | 27.7 | | 0.275 | 1 | 1.28 | | 0.231 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 4300 | 190000 | 4300 | mg/kg | 275 | | 0.276 | 1 | 53.2 | | 0.267 | 1 | 684 | | 0.319 | 1 | 192 | | 0.267 | 1 |
| Iron | 7439-89-6 | NS | NS | NS | 190000 | 190000 | mg/kg | 65000 | | 29.6 | 5 | 17500 | | 5.71 | 1 | 77000 | | 68.3 | 10 | 6060 | | 5.71 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 45 | 190000 | 45 | mg/kg | 161 | | 0.754 | 1 | 330 | | 0.727 | 1 | 1500 | | 4.35 | 5 | 98.2 | | 0.728 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | NS | mg/kg | 5420 | | 3.19 | 1 | 2330 | | 3.08 | 1 | 55100 | | 3.68 | 1 | 2510 | | 3.08 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 200 | 190000 | 200 | mg/kg | 707 | | 0.098 | 1 | 153 | | 0.095 | 1 | 639 | | 0.113 | 1 | 32.1 | | 0.095 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 1 | 190000 | 1 | mg/kg | 0.67 | | 0.003 | 1 | ND | U | 0.004 | 1 | 1.29 | | 0.02 | 5 | 0.101 | J | 0.003 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 65 | 190000 | 65 | mg/kg | 35 | | 0.239 | 1 | 15.9 | | 0.23 | 1 | 332 | | 0.275 | 1 | 11.4 | | 0.231 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | NS | mg/kg | 817 | | 22.6 | 1 | 1510 | | 21.8 | 1 | 1020 | | 26.1 | 1 | 448 | | 21.8 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 2.6 | 190000 | 5 | mg/kg | ND | U | **6.16** | 5 | ND | U | 1.19 | 1 | ND | U | **7.1** | 5 | ND | U | 1.19 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 8.4 | 190000 | 10 | mg/kg | ND | U | 0.226 | 1 | ND | U | 0.218 | 1 | 0.299 | J | 0.261 | 1 | ND | U | 0.218 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | NS | mg/kg | 290 | | 46.9 | 1 | 276 | | 45.2 | 1 | 328 | | 54.1 | 1 | 61.7 | J | 45.3 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 1.4 | 190000 | 1.4 | mg/kg | 1.84 | J | **1.82** | 1 | ND | U | **1.76** | 1 | 2.32 | J | **2.1** | 1 | ND | U | **1.76** | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 7200 | 190000 | 7200 | mg/kg | 35.7 | | 0.239 | 1 | 30.6 | | 0.23 | 1 | 95.6 | | 0.275 | 1 | 36.6 | | 0.231 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 1200 | 190000 | 1200 | mg/kg | 404 | | 0.829 | 1 | 196 | | 0.8 | 1 | 2550 | | 4.78 | 5 | 29.4 | | 0.801 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | NS | % | 21.2 | | 0.5 | 1 | 19.1 | | 0.5 | 1 | 31 | | 0.5 | 1 | 19.2 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-70 | | | | BH-10-77 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-70-WC@5'-8' | | | | BH-10-77-WC_10-12' | | | | BH-10-77-WC_6.5-7' | | | |
| | | | | | | | Sample Date | 4/11/2011 | | | | 4/13/2011 | | | | 4/13/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 5.0-8.0 ft bgs | | | | 10.0-12.0 ft bgs | | | | 6.5-7.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 0.72 | 10000.00 | 20 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 0.00093 | 44 | 0.03 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | **0.11** | 86.54 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 1000 | 10000 | 10000 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | 2.4 | 725.7 | ND | U | 0.23 | 86.54 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 0.015 | 160 | 0.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 0.39 | 1600 | 16 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 0.019 | 10000 | 0.7 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 2.7 | 10000 | 7 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.00092 | 0.43 | 0.02 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | **2.4** | 725.7 | ND | U | **0.23** | 86.54 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 0.00012 | 4.3 | 0.005 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | **0.11** | 86.54 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 5.9 | 10000 | 60 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 0.01 | 98 | 0.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 0.011 | 260 | 0.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 6.1 | 10000 | 60 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 1 | 230 | 7.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 0.11 | 460 | 4.4 | mg/kg | ND | U | 0.008 | 1.9 | ND | U | 3.5 | 725.7 | ND | U | 0.34 | 86.54 |
| Acetone | 67-64-1 | 9200 | 1000 | 100 | 10000 | 9200 | mg/kg | 0.088 | | 0.019 | 1.9 | ND | U | 8.3 | 725.7 | ND | U | 0.79 | 86.54 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 0.013 | 330 | 0.5 | mg/kg | 0.024 | | 0.001 | 1.9 | 2.4 | J | **0.59** | 725.7 | 0.12 | J | 0.056 | 86.54 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 0.27 | 69 | 8 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Bromoform | 75-25-2 | 8 | 3.5 | 0.35 | 2300 | 8 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 0.054 | 460 | 1 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | **2.4** | 725.7 | ND | U | 0.23 | 86.54 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 53 | 10000 | 620 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 0.026 | 170 | 0.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 0.61 | 4600 | 10 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Chloroethane | 75-00-3 | 90 | 19 | 1.9 | 10000 | 90 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | 2.4 | 725.7 | ND | U | 0.23 | 86.54 |
| Chloroform | 67-66-3 | 8 | 2 | 0.2 | 110 | 8 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 0.038 | 1400 | 3 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | 2.4 | 725.7 | ND | U | 0.23 | 86.54 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 0.16 | 10000 | 7 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 690 | 10000 | 5300 | mg/kg | 0.062 | | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | 0.32 | J | 0.11 | 86.54 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 0.25 | 95 | 8 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10 | 10000 | 100 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | 2.4 | 725.7 | ND | U | 0.23 | 86.54 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 99 | 9100 | 1000 | mg/kg | 0.017 | | 0.003 | 1.9 | 9.9 | | 1.2 | 725.7 | 1.5 | | 0.11 | 86.54 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 4.6 | 10000 | 70 | mg/kg | 0.003 | J | 0.003 | 1.9 | 1.5 | J | 1.2 | 725.7 | 0.21 | J | 0.11 | 86.54 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 250 | 10000 | 350 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | 0.28 | J | 0.11 | 86.54 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 190 | 10000 | 10000 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | 2.4 | 725.7 | 0.29 | J | 0.23 | 86.54 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 7.6 | 10000 | 400 | mg/kg | 0.027 | | 0.011 | 1.9 | ND | U | 4.7 | 725.7 | ND | U | 0.45 | 86.54 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 13 | 10000 | 820 | mg/kg | ND | U | 0.008 | 1.9 | 6.2 | J | 3.5 | 725.7 | ND | U | 0.34 | 86.54 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | NS | mg/kg | 0.079 | | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | 1.6 | | 0.11 | 86.54 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 0.0076 | 5400 | 0.5 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | **2.4** | 725.7 | ND | U | 0.23 | 86.54 |
| Styrene | 100-42-5 | 10 | 24 | 2.4 | 10000 | 10 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 0.028 | 3700 | 2 | mg/kg | ND | U | 0.001 | 1.9 | ND | U | 0.59 | 725.7 | ND | U | 0.056 | 86.54 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 0.043 | 4400 | 0.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| Toluene | 108-88-3 | 100 | 44 | 4.4 | 10000 | 100 | mg/kg | 0.003 | J | 0.003 | 1.9 | 3.2 | J | 1.2 | 725.7 | 0.21 | J | 0.11 | 86.54 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 0.23 | 5500 | 10 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.003 | 1.9 | ND | U | 1.2 | 725.7 | ND | U | 0.11 | 86.54 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 0.017 | 1500 | 0.5 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 0.005 | 1.9 | ND | U | 2.4 | 725.7 | ND | U | 0.23 | 86.54 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 0.0027 | 580 | 0.2 | mg/kg | ND | U | 0.003 | 1.9 | ND | U | **1.2** | 725.7 | ND | U | 0.11 | 86.54 |

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-70 | | | | BH-10-77 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-70-WC@5'-8' | | | | BH-10-77-WC_10-12' | | | | BH-10-77-WC_6.5-7' | | | |
| | | | | | | | Sample Date | 4/11/2011 | | | | 4/13/2011 | | | | 4/13/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 5.0-8.0 ft bgs | | | | 10.0-12.0 ft bgs | | | | 6.5-7.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 610 | 190000 | 1000 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2.9 | 190000 | 10 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 0.1 | 190000 | 2 | mg/kg | ND | U | **2.9** | 1 | ND | U | 1.3 | 5 | ND | U | **2.2** | 1 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 0.23 | 190000 | 20 | mg/kg | ND | U | **29** | 1 | ND | U | 13 | 5 | ND | U | **22** | 1 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 0.02 | 190000 | 0.84 | mg/kg | ND | U | **5.8** | 1 | ND | U | **2.7** | 5 | ND | U | **4.4** | 1 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 0.3 | 190000 | 10 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 1800 | 190000 | 1800 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 0.44 | 10000 | 4 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 160 | 190000 | 160 | mg/kg | ND | U | 2.9 | 1 | 8.7 | | 1.3 | 5 | ND | U | 2.2 | 1 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 8.5 | 190000 | 510 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 0.55 | 190000 | 31 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 1.7 | 190000 | 82 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 3.2 | 190000 | 3.2 | mg/kg | ND | U | **8.7** | 1 | ND | U | **4** | 5 | ND | U | **6.5** | 1 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 0.048 | 190000 | 3.1 | mg/kg | ND | U | **5.8** | 1 | ND | U | 2.7 | 5 | ND | U | **4.4** | 1 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 0.075 | 190000 | 1 | mg/kg | ND | U | **14** | 1 | ND | U | **6.7** | 5 | ND | U | **11** | 1 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 11 | 190000 | 51 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 0.16 | 190000 | 1.3 | mg/kg | ND | U | **5.8** | 1 | ND | U | **2.7** | 5 | ND | U | **4.4** | 1 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 1.2 | 190000 | 51 | mg/kg | ND | U | 5.8 | 1 | 6.2 | J | 2.7 | 5 | ND | U | 4.4 | 1 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 0.19 | 190000 | 13 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 0.41 | 190000 | 6 | mg/kg | ND | U | **14** | 1 | ND | U | **6.7** | 5 | ND | U | **11** | 1 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 470 | 190000 | 470 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 690 | 190000 | 690 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Acetophenone | 98-86-2 | 1000 | 540 | 54 | 10000 | 1000 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Anthracene | 120-12-7 | 6.6 | 350 | 35 | 190000 | 35 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 0.013 | 190000 | 0.3 | mg/kg | ND | U | **2.9** | 1 | ND | U | **1.3** | 5 | ND | U | **2.2** | 1 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | NS | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 32 | 190000 | 32 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 4.6 | 190000 | 4.6 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 17 | 190000 | 17 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 18 | 190000 | 18 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 61 | 190000 | 61 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 220 | 190000 | 510 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 0.82 | 10000 | 31 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 0.0023 | 7.7 | 0.076 | mg/kg | ND | U | **2.9** | 1 | ND | U | **1.3** | 5 | ND | U | **2.2** | 1 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 0.8 | 250 | 30 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 13 | 10000 | 13 | mg/kg | ND | U | 5.8 | 1 | 3.5 | J | 2.7 | 5 | ND | U | 4.4 | 1 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | NS | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Carbazole | 86-74-8 | 13 | 83 | 8.3 | 190000 | 13 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Chrysene | 218-01-9 | 0.19 | 230 | 23 | 190000 | 23 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 16 | 190000 | 16 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 26 | 190000 | 26 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 260 | 10000 | 8200 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Dimethyl Phthalate | 131-11-3 | NS | NS | NS | NS | NS | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 410 | 10000 | 1000 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 5.8 | 1 | ND | U | 2.7 | 5 | ND | U | 4.4 | 1 |
| Fluoranthene | 206-44-0 | 26 | 3200 | 320 | 190000 | 320 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |

**Table 7**
**Summary of Analytical Results for Waste in CAMU Areas**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-70 | | | | BH-10-77 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-70-WC@5'-8' | | | | BH-10-77-WC_10-12' | | | | BH-10-77-WC_6.5-7' | | | |
| | | | | | | | Sample Date | 4/11/2011 | | | | 4/13/2011 | | | | 4/13/2011 | | | |
| | | | | | | | Sample Matrix | Waste Soil | | | | Waste Soil | | | | Waste Soil | | | |
| | | | | | | | Sample Interval | 5.0-8.0 ft bgs | | | | 10.0-12.0 ft bgs | | | | 6.5-7.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluorene | 86-73-7 | 190 | 3800 | 380 | 190000 | 380 | mg/kg | ND | U | 2.9 | 1 | 1.5 | J | 1.3 | 5 | ND | U | 2.2 | 1 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 0.096 | 190000 | 0.1 | mg/kg | ND | U | **2.9** | 1 | ND | U | **1.3** | 5 | ND | U | **2.2** | 1 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 3.9 | 10000 | 3.9 | mg/kg | ND | U | **5.8** | 1 | ND | U | 2.7 | 5 | ND | U | **4.4** | 1 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 9.1 | 10000 | 9.1 | mg/kg | ND | U | **14** | 1 | ND | U | 6.7 | 5 | ND | U | **11** | 1 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 0.056 | 640 | 0.1 | mg/kg | ND | U | **2.9** | 1 | ND | U | **1.3** | 5 | ND | U | **2.2** | 1 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 2800 | 190000 | 2800 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Isophorone | 78-59-1 | 10 | 1.9 | 0.19 | 10000 | 10 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 2.5 | 190000 | 10 | mg/kg | ND | U | 2.9 | 1 | 4.5 | J | 1.3 | 5 | ND | U | 2.2 | 1 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 0.87 | 10000 | 20 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 0.00051 | 10000 | 0.037 | mg/kg | ND | U | **2.9** | 1 | ND | U | **1.3** | 5 | ND | U | **2.2** | 1 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 8.3 | 190000 | 53 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 0.5 | 190000 | 0.5 | mg/kg | ND | U | **14** | 1 | ND | U | **6.7** | 5 | ND | U | **11** | 1 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 1000 | 190000 | 1000 | mg/kg | 3.8 | J | 2.9 | 1 | 4.7 | J | 1.3 | 5 | ND | U | 2.2 | 1 |
| Phenol | 108-95-2 | 200 | 33 | 3.3 | 190000 | 200 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| Pyrene | 129-00-0 | 13 | 2200 | 220 | 190000 | 220 | mg/kg | ND | U | 2.9 | 1 | ND | U | 1.3 | 5 | ND | U | 2.2 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | NS | 190000 | 190000 | mg/kg | 153 | | 7.19 | 1 | 21500 | | 8.02 | 1 | 1270 | | 6.31 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 2.7 | 190000 | 2.7 | mg/kg | ND | U | 1.43 | 1 | ND | U | 1.59 | 1 | ND | U | 1.26 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 2.9 | 190000 | 2.9 | mg/kg | ND | U | 1.36 | 1 | 10.9 | | 1.51 | 1 | 2.14 | J | 1.19 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 820 | 190000 | 820 | mg/kg | 25.3 | | 0.057 | 1 | 1020 | | 0.064 | 1 | 62.9 | | 0.05 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 32 | 190000 | 32 | mg/kg | ND | U | 0.097 | 1 | 0.872 | | 0.108 | 1 | ND | U | 0.085 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 3.8 | 190000 | 3.8 | mg/kg | ND | U | 0.2 | 1 | 1.97 | | 0.223 | 1 | ND | U | 0.176 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | NS | mg/kg | 115 | | 8.76 | 1 | 16100 | | 9.77 | 1 | 3610 | | 7.69 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | NS | mg/kg | 0.926 | J | 0.843 | 1 | 77.4 | | 0.941 | 1 | 4.81 | | 0.741 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 14 | 190000 | 14 | mg/kg | ND | U | 0.271 | 1 | 9.53 | | 0.303 | 1 | 0.443 | J | 0.239 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 4300 | 190000 | 4300 | mg/kg | 1.46 | | 0.314 | 1 | 163 | | 0.351 | 1 | 3.41 | | 0.276 | 1 |
| Iron | 7439-89-6 | NS | NS | NS | 190000 | 190000 | mg/kg | 219 | | 6.73 | 1 | 32500 | | 7.51 | 1 | 2280 | | 5.91 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 45 | 190000 | 45 | mg/kg | 7.74 | | 0.857 | 1 | 208 | | 0.956 | 1 | 131 | | 0.753 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | NS | NS | mg/kg | 56.8 | | 3.63 | 1 | 19400 | | 4.05 | 1 | 2830 | | 3.19 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 200 | 190000 | 200 | mg/kg | 2.23 | | 0.111 | 1 | 399 | | 0.124 | 1 | 33.5 | | 0.098 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 1 | 190000 | 1 | mg/kg | ND | U | 0.004 | 1 | 24.4 | | 0.217 | 50 | 0.264 | | 0.004 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 65 | 190000 | 65 | mg/kg | 0.997 | J | 0.271 | 1 | 50.2 | | 0.303 | 1 | 4.97 | | 0.239 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | NS | NS | mg/kg | ND | U | 25.7 | 1 | 3290 | | 28.7 | 1 | 151 | | 22.6 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 2.6 | 190000 | 5 | mg/kg | ND | U | 1.4 | 1 | ND | U | 1.56 | 1 | ND | U | 1.23 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 8.4 | 190000 | 10 | mg/kg | ND | U | 0.257 | 1 | ND | U | 0.287 | 1 | ND | U | 0.226 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | NS | mg/kg | ND | U | 53.3 | 1 | 1200 | | 59.5 | 1 | 48.1 | J | 46.8 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 1.4 | 190000 | 1.4 | mg/kg | ND | U | **2.07** | 1 | ND | U | **2.31** | 1 | ND | U | **1.82** | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 7200 | 190000 | 7200 | mg/kg | 0.706 | J | 0.271 | 1 | 121 | | 0.303 | 1 | 7.82 | | 0.239 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 1200 | 190000 | 1200 | mg/kg | 2.22 | J | 0.943 | 1 | 215 | | 1.05 | 1 | 15.7 | | 0.828 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | NS | % | 30.7 | | 0.5 | 1 | 38.5 | | 0.5 | 1 | 23.4 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 8**
**Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-44-WC_24-26' | | | | BH-10-45-WC_18-20' | | | | BH-10-46-WC_17-18' | | | | BH-10-55-WC_20-22' | | | | BH-10-56-WC_22-24' | | | |
| | | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | | Sample Interval | 24.0-26.0 ft bgs | | | | 18.0-20.0 ft bgs | | | | 17.0-18.0 ft bgs | | | | 20.0-22.0 ft bgs | | | | 22.0-24.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 0.72 | 10000.00 | 20 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 0.00093 | 44 | 0.03 | mg/kg | ND | U | **0.1** | 70.5 | ND | U | **0.1** | 70.4 | ND | U | 0.002 | 1.1 | ND | U | **0.096** | 64.7 | ND | U | **0.11** | 70.3 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 1000 | 10000 | 10000 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 0.015 | 160 | 0.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 0.39 | 1600 | 16 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 0.019 | 10000 | 0.7 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 2.7 | 10000 | 7 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.00092 | 0.43 | 0.02 | mg/kg | ND | U | **0.21** | 70.5 | ND | U | **0.2** | 70.4 | ND | U | 0.005 | 1.1 | ND | U | **0.19** | 64.7 | ND | U | **0.21** | 70.3 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 0.00012 | 4.3 | 0.005 | mg/kg | ND | U | **0.1** | 70.5 | ND | U | **0.1** | 70.4 | ND | U | 0.002 | 1.1 | ND | U | **0.096** | 64.7 | ND | U | **0.11** | 70.3 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 5.9 | 10000 | 60 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 0.01 | 98 | 0.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 0.011 | 260 | 0.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 6.1 | 10000 | 60 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 1 | 230 | 7.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 0.11 | 460 | 4.4 | mg/kg | ND | U | 0.31 | 70.5 | ND | U | 0.31 | 70.4 | ND | U | 0.007 | 1.1 | ND | U | 0.29 | 64.7 | ND | U | 0.32 | 70.3 |
| Acetone | 67-64-1 | 9200 | 1000 | 100 | 10000 | 9200 | mg/kg | ND | U | 0.73 | 70.5 | ND | U | 0.72 | 70.4 | 1.1 | | 0.017 | 1.1 | ND | U | 0.67 | 64.7 | ND | U | 0.74 | 70.3 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 0.013 | 330 | 0.5 | mg/kg | 0.098 | J | 0.052 | 70.5 | 1.2 | | 0.051 | 70.4 | 0.058 | | 0.001 | 1.1 | 0.12 | J | 0.048 | 64.7 | 0.16 | J | 0.053 | 70.3 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 0.27 | 69 | 8 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Bromoform | 75-25-2 | 8 | 3.5 | 0.35 | 2300 | 8 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 0.054 | 460 | 1 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 53 | 10000 | 620 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | 0.033 | | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 0.026 | 170 | 0.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 0.61 | 4600 | 10 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Chloroethane | 75-00-3 | 90 | 19 | 1.9 | 10000 | 90 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| Chloroform | 67-66-3 | 8 | 2 | 0.2 | 110 | 8 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 0.038 | 1400 | 3 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 0.16 | 10000 | 7 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 690 | 10000 | 5300 | mg/kg | 0.42 | J | 0.1 | 70.5 | 2 | | 0.1 | 70.4 | 0.041 | | 0.002 | 1.1 | 0.46 | J | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 0.25 | 95 | 8 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10 | 10000 | 100 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 99 | 9100 | 1000 | mg/kg | 0.9 | | 0.1 | 70.5 | 2.6 | | 0.1 | 70.4 | 0.5 | | 0.002 | 1.1 | 0.4 | J | 0.096 | 64.7 | 0.59 | | 0.11 | 70.3 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 4.6 | 10000 | 70 | mg/kg | 0.26 | J | 0.1 | 70.5 | 0.52 | | 0.1 | 70.4 | 0.1 | | 0.002 | 1.1 | 0.14 | J | 0.096 | 64.7 | 0.21 | J | 0.11 | 70.3 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 250 | 10000 | 350 | mg/kg | 0.46 | J | 0.1 | 70.5 | 6.4 | | 0.1 | 70.4 | 0.025 | | 0.002 | 1.1 | 0.29 | J | 0.096 | 64.7 | 0.19 | J | 0.11 | 70.3 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 190 | 10000 | 10000 | mg/kg | 0.44 | J | 0.21 | 70.5 | 0.48 | J | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | 0.32 | J | 0.21 | 70.3 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 7.6 | 10000 | 400 | mg/kg | ND | U | 0.42 | 70.5 | ND | U | 0.41 | 70.4 | 0.26 | | 0.01 | 1.1 | ND | U | 0.38 | 64.7 | ND | U | 0.42 | 70.3 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 13 | 10000 | 820 | mg/kg | ND | U | 0.31 | 70.5 | ND | U | 0.31 | 70.4 | ND | U | 0.007 | 1.1 | ND | U | 0.29 | 64.7 | ND | U | 0.32 | 70.3 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | NS | mg/kg | 4 | | 0.1 | 70.5 | 11 | | 0.1 | 70.4 | 0.12 | | 0.002 | 1.1 | 4.3 | | 0.096 | 64.7 | 0.52 | J | 0.11 | 70.3 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 0.0076 | 5400 | 0.5 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| Styrene | 100-42-5 | 10 | 24 | 2.4 | 10000 | 10 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 0.028 | 3700 | 2 | mg/kg | ND | U | 0.052 | 70.5 | ND | U | 0.051 | 70.4 | ND | U | 0.001 | 1.1 | ND | U | 0.048 | 64.7 | ND | U | 0.053 | 70.3 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 0.043 | 4400 | 0.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Toluene | 108-88-3 | 100 | 44 | 4.4 | 10000 | 100 | mg/kg | 0.8 | | 0.1 | 70.5 | 0.31 | J | 0.1 | 70.4 | 0.24 | | 0.002 | 1.1 | 1.1 | | 0.096 | 64.7 | 1.3 | | 0.11 | 70.3 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 0.23 | 5500 | 10 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 0.017 | 1500 | 0.5 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 0.21 | 70.5 | ND | U | 0.2 | 70.4 | ND | U | 0.005 | 1.1 | ND | U | 0.19 | 64.7 | ND | U | 0.21 | 70.3 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 0.0027 | 580 | 0.2 | mg/kg | ND | U | 0.1 | 70.5 | ND | U | 0.1 | 70.4 | ND | U | 0.002 | 1.1 | ND | U | 0.096 | 64.7 | ND | U | 0.11 | 70.3 |

**Table 8**
**Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-44-WC_24-26' | | | | BH-10-45-WC_18-20' | | | | BH-10-46-WC_17-18' | | | | BH-10-55-WC_20-22' | | | | BH-10-56-WC_22-24' | | | |
| | | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | | Sample Interval | 24.0-26.0 ft bgs | | | | 18.0-20.0 ft bgs | | | | 17.0-18.0 ft bgs | | | | 20.0-22.0 ft bgs | | | | 22.0-24.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 610 | 190000 | 1000 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2.9 | 190000 | 10 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 0.1 | 190000 | 2 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | 0.63 | J | 0.49 | 5 | 0.97 | J | 0.5 | 5 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 0.23 | 190000 | 20 | mg/kg | ND | U | 4.8 | 10 | ND | U | 2.4 | 5 | ND | U | 0.7 | 1 | ND | U | 2.4 | 5 | ND | U | 2.5 | 5 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 0.02 | 190000 | 0.84 | mg/kg | ND | U | **0.97** | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 0.3 | 190000 | 10 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 1800 | 190000 | 1800 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 0.44 | 10000 | 4 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 160 | 190000 | 160 | mg/kg | 21 | | 0.48 | 10 | 25 | | 0.24 | 5 | 1.8 | | 0.07 | 1 | 12 | | 0.24 | 5 | 17 | | 0.25 | 5 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 8.5 | 190000 | 510 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | 0.53 | J | 0.5 | 5 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 0.55 | 190000 | 31 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 1.7 | 190000 | 82 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 3.2 | 190000 | 3.2 | mg/kg | ND | U | 1.5 | 10 | ND | U | 0.72 | 5 | ND | U | 0.21 | 1 | ND | U | 0.73 | 5 | ND | U | 0.75 | 5 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 0.048 | 190000 | 3.1 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 0.075 | 190000 | 1 | mg/kg | ND | U | **2.4** | 10 | ND | U | **1.2** | 5 | ND | U | 0.35 | 1 | ND | U | **1.2** | 5 | ND | U | **1.2** | 5 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | 0.5 | NS | NS | 100 | 0.5 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 11 | 190000 | 51 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 0.16 | 190000 | 1.3 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | 0.5 | NS | NS | 100 | 0.5 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 1.2 | 190000 | 51 | mg/kg | 5 | | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | 6.7 | | 0.49 | 5 | 7.2 | | 0.5 | 5 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 0.19 | 190000 | 13 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 0.41 | 190000 | 6 | mg/kg | ND | U | 2.4 | 10 | ND | U | 1.2 | 5 | ND | U | 0.35 | 1 | ND | U | 1.2 | 5 | ND | U | 1.2 | 5 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 470 | 190000 | 470 | mg/kg | 22 | | 0.48 | 10 | 4.9 | | 0.24 | 5 | ND | U | 0.07 | 1 | 8.7 | | 0.24 | 5 | 7.3 | | 0.25 | 5 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 690 | 190000 | 690 | mg/kg | 3.4 | | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | 2.1 | | 0.24 | 5 | 1.7 | | 0.25 | 5 |
| Acetophenone | 98-86-2 | 1000 | 540 | 54 | 10000 | 1000 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| Anthracene | 120-12-7 | 6.6 | 350 | 35 | 190000 | 35 | mg/kg | 16 | | 0.48 | 10 | 2.8 | | 0.24 | 5 | ND | U | 0.07 | 1 | 5.9 | | 0.24 | 5 | 6 | | 0.25 | 5 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 0.013 | 190000 | 0.3 | mg/kg | ND | U | **0.48** | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 32 | 190000 | 32 | mg/kg | 14 | | 0.48 | 10 | 2.8 | | 0.24 | 5 | 0.11 | J | 0.07 | 1 | 7.1 | | 0.24 | 5 | 5.3 | | 0.25 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 4.6 | 190000 | 4.6 | mg/kg | 9 | | 0.48 | 10 | 2.2 | | 0.24 | 5 | 0.21 | J | 0.07 | 1 | 6 | | 0.24 | 5 | 4.5 | | 0.25 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 17 | 190000 | 17 | mg/kg | 10 | | 0.48 | 10 | 2.6 | | 0.24 | 5 | 0.076 | J | 0.07 | 1 | 6.9 | | 0.24 | 5 | 5.3 | | 0.25 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 18 | 190000 | 18 | mg/kg | 4.3 | | 0.48 | 10 | 1.2 | J | 0.24 | 5 | ND | U | 0.07 | 1 | 3.1 | | 0.24 | 5 | 2.5 | | 0.25 | 5 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 61 | 190000 | 61 | mg/kg | 5 | | 0.48 | 10 | 0.9 | J | 0.24 | 5 | ND | U | 0.07 | 1 | 3.3 | | 0.24 | 5 | 1.9 | | 0.25 | 5 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 220 | 190000 | 510 | mg/kg | 2.8 | | 0.48 | 10 | 0.63 | J | 0.24 | 5 | 0.1 | J | 0.07 | 1 | 1.7 | | 0.24 | 5 | 2.2 | | 0.25 | 5 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 0.82 | 10000 | 31 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 0.0023 | 7.7 | 0.076 | mg/kg | ND | U | **0.48** | 10 | ND | U | **0.24** | 5 | ND | U | 0.07 | 1 | ND | U | **0.24** | 5 | ND | U | **0.25** | 5 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 0.8 | 250 | 30 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 13 | 10000 | 13 | mg/kg | 1.3 | J | 0.97 | 10 | 2.1 | J | 0.48 | 5 | 0.17 | J | 0.14 | 1 | 1.5 | J | 0.49 | 5 | 0.58 | J | 0.5 | 5 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| Carbazole | 86-74-8 | 13 | 83 | 8.3 | 190000 | 13 | mg/kg | 1.4 | J | 0.48 | 10 | 0.51 | J | 0.24 | 5 | ND | U | 0.07 | 1 | 0.82 | J | 0.24 | 5 | 0.81 | J | 0.25 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 23 | 190000 | 23 | mg/kg | 13 | | 0.48 | 10 | 3.7 | | 0.24 | 5 | 0.46 | | 0.07 | 1 | 7.1 | | 0.24 | 5 | 6.4 | | 0.25 | 5 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 16 | 190000 | 16 | mg/kg | 1.5 | J | 0.48 | 10 | 0.43 | J | 0.24 | 5 | ND | U | 0.07 | 1 | 1.1 | J | 0.24 | 5 | 0.85 | J | 0.25 | 5 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 26 | 190000 | 26 | mg/kg | 7.5 | | 0.48 | 10 | 3.5 | | 0.24 | 5 | 0.082 | J | 0.07 | 1 | 3.7 | | 0.24 | 5 | 3.3 | | 0.25 | 5 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 260 | 10000 | 8200 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| Dimethyl Phthalate | 131-11-3 | 0.5 | NS | NS | 100 | 0.5 | mg/kg | ND | U | **0.97** | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | **0.5** | 5 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 410 | 10000 | 1000 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |

**Table 8**
**Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-44 | | | | BH-10-45 | | | | BH-10-46 | | | | BH-10-55 | | | | BH-10-56 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-44-WC_24-26' | | | | BH-10-45-WC_18-20' | | | | BH-10-46-WC_17-18' | | | | BH-10-55-WC_20-22' | | | | BH-10-56-WC_22-24' | | | |
| | | | | | | | Sample Date | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | | 4/12/2011 | | | |
| | | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | | Sample Interval | 24.0-26.0 ft bgs | | | | 18.0-20.0 ft bgs | | | | 17.0-18.0 ft bgs | | | | 20.0-22.0 ft bgs | | | | 22.0-24.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluoranthene | 206-44-0 | 26 | 3200 | 320 | 190000 | 320 | mg/kg | 32 | | 0.48 | 10 | 4.6 | | 0.24 | 5 | 0.089 | J | 0.07 | 1 | 15 | | 0.24 | 5 | 12 | | 0.25 | 5 |
| Fluorene | 86-73-7 | 190 | 3800 | 380 | 190000 | 380 | mg/kg | 17 | | 0.48 | 10 | 6.1 | | 0.24 | 5 | 0.11 | J | 0.07 | 1 | 6.8 | | 0.24 | 5 | 6.1 | | 0.25 | 5 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 0.096 | 190000 | 0.1 | mg/kg | ND | U | **0.48** | 10 | ND | U | **0.24** | 5 | ND | U | 0.07 | 1 | ND | U | **0.24** | 5 | ND | U | **0.25** | 5 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 3.9 | 10000 | 3.9 | mg/kg | ND | U | 0.97 | 10 | ND | U | 0.48 | 5 | ND | U | 0.14 | 1 | ND | U | 0.49 | 5 | ND | U | 0.5 | 5 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 9.1 | 10000 | 9.1 | mg/kg | ND | U | 2.4 | 10 | ND | U | 1.2 | 5 | ND | U | 0.35 | 1 | ND | U | 1.2 | 5 | ND | U | 1.2 | 5 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 0.056 | 640 | 0.1 | mg/kg | ND | U | **0.48** | 10 | ND | U | **0.24** | 5 | ND | U | 0.07 | 1 | ND | U | **0.24** | 5 | ND | U | **0.25** | 5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 2800 | 190000 | 2800 | mg/kg | 4 | | 0.48 | 10 | 1 | J | 0.24 | 5 | ND | U | 0.07 | 1 | 2.9 | | 0.24 | 5 | 2.1 | | 0.25 | 5 |
| Isophorone | 78-59-1 | 10 | 1.9 | 0.19 | 10000 | 10 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 2.5 | 190000 | 10 | mg/kg | 41 | | 0.48 | 10 | 9 | | 0.24 | 5 | 1.3 | | 0.07 | 1 | 27 | | 0.24 | 5 | 34 | | 2.5 | 50 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 0.87 | 10000 | 20 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 0.00051 | 10000 | 0.037 | mg/kg | ND | U | **0.48** | 10 | ND | U | **0.24** | 5 | ND | U | **0.07** | 1 | ND | U | **0.24** | 5 | ND | U | **0.25** | 5 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 8.3 | 190000 | 53 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | ND | U | 0.24 | 5 | ND | U | 0.25 | 5 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 0.5 | 190000 | 0.5 | mg/kg | ND | U | **2.4** | 10 | ND | U | **1.2** | 5 | ND | U | 0.35 | 1 | ND | U | **1.2** | 5 | ND | U | **1.2** | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 1000 | 190000 | 1000 | mg/kg | 58 | | 0.48 | 10 | 20 | | 0.24 | 5 | 1.3 | | 0.07 | 1 | 24 | | 0.24 | 5 | 20 | | 0.25 | 5 |
| Phenol | 108-95-2 | 200 | 33 | 3.3 | 190000 | 200 | mg/kg | ND | U | 0.48 | 10 | ND | U | 0.24 | 5 | ND | U | 0.07 | 1 | 0.27 | J | 0.24 | 5 | 0.37 | J | 0.25 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 220 | 190000 | 220 | mg/kg | 32 | | 0.48 | 10 | 4.6 | | 0.24 | 5 | 0.2 | J | 0.07 | 1 | 15 | | 0.24 | 5 | 13 | | 0.25 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | NS | 190000 | 190000 | mg/kg | 15400 | | 7.43 | 1 | 21500 | | 7.32 | 1 | 37400 | | 10.4 | 1 | 12800 | | 7.15 | 1 | 15500 | | 7.28 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 2.7 | 190000 | 2.7 | mg/kg | ND | U | 1.48 | 1 | ND | U | 1.46 | 1 | ND | U | 2.08 | 1 | ND | U | 1.42 | 1 | ND | U | 1.45 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 2.9 | 190000 | 2.9 | mg/kg | 17.6 | | 1.4 | 1 | 6.88 | | 1.38 | 1 | 57.3 | | 1.97 | 1 | 12.3 | | 1.35 | 1 | 18 | | 1.38 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 820 | 190000 | 820 | mg/kg | 259 | | 0.059 | 1 | 224 | | 0.058 | 1 | 1180 | | 0.083 | 1 | 345 | | 0.057 | 1 | 245 | | 0.058 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 32 | 190000 | 32 | mg/kg | 1.41 | | 0.1 | 1 | 1.19 | | 0.099 | 1 | 1.04 | | 0.141 | 1 | 1.45 | | 0.097 | 1 | 1.61 | | 0.099 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 3.8 | 190000 | 3.8 | mg/kg | 1.26 | | 0.207 | 1 | ND | U | 0.204 | 1 | 0.897 | J | 0.291 | 1 | 1.56 | | 0.199 | 1 | 1.66 | | 0.203 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | NS | mg/kg | 3250 | | 9.05 | 1 | 4740 | | 8.92 | 1 | 183000 | | 63.6 | 5 | 4830 | | 8.72 | 1 | 4390 | | 8.88 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | NS | mg/kg | 50.8 | | 0.871 | 1 | 46.6 | | 0.859 | 1 | 236 | | 1.22 | 1 | 47.7 | | 0.839 | 1 | 50.3 | | 0.854 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 14 | 190000 | 14 | mg/kg | 20.2 | | 0.281 | 1 | 13.1 | | 0.277 | 1 | 13.3 | | 0.394 | 1 | 17.9 | | 0.27 | 1 | 19.7 | | 0.275 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 4300 | 190000 | 4300 | mg/kg | 103 | | 0.325 | 1 | 52.7 | | 0.32 | 1 | 409 | | 0.457 | 1 | 97.4 | | 0.313 | 1 | 109 | | 0.319 | 1 |
| Iron | 7439-89-6 | NS | NS | NS | 190000 | 190000 | mg/kg | 23200 | | 6.96 | 1 | 25200 | | 6.86 | 1 | 16700 | | 9.78 | 1 | 21200 | | 6.7 | 1 | 23300 | | 6.82 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 45 | 190000 | 45 | mg/kg | 281 | | 0.886 | 1 | 159 | | 0.873 | 1 | 1400 | | 1.25 | 1 | 304 | | 0.853 | 1 | 316 | | 0.869 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | #N/A | NS | mg/kg | 3320 | | 3.75 | 1 | 6760 | | 3.7 | 1 | 36600 | | 5.27 | 1 | 3140 | | 3.61 | 1 | 3580 | | 3.68 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 200 | 190000 | 200 | mg/kg | 460 | | 0.115 | 1 | 449 | | 0.114 | 1 | 1030 | | 0.162 | 1 | 369 | | 0.111 | 1 | 424 | | 0.113 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 1 | 190000 | 1 | mg/kg | 0.752 | | 0.004 | 1 | 0.669 | | 0.004 | 1 | 0.0304 | J | 0.006 | 1 | 0.735 | | 0.004 | 1 | 0.906 | | 0.004 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 65 | 190000 | 65 | mg/kg | 34.8 | | 0.281 | 1 | 30.6 | | 0.277 | 1 | 221 | | 0.394 | 1 | 32.8 | | 0.27 | 1 | 35.6 | | 0.275 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | #N/A | NS | mg/kg | 1710 | | 26.6 | 1 | 2050 | | 26.2 | 1 | 243 | | 37.4 | 1 | 1450 | | 25.6 | 1 | 1720 | | 26.1 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 2.6 | 190000 | 5 | mg/kg | 2.04 | J | 1.45 | 1 | 1.6 | J | 1.43 | 1 | ND | U | 2.03 | 1 | 2.76 | J | 1.39 | 1 | 3.57 | | 1.42 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 8.4 | 190000 | 10 | mg/kg | 0.496 | J | 0.266 | 1 | ND | U | 0.262 | 1 | 1.26 | | 0.374 | 1 | 0.583 | J | 0.256 | 1 | 0.52 | J | 0.261 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | NS | mg/kg | 167 | | 55.1 | 1 | 300 | | 54.3 | 1 | 653 | | 77.4 | 1 | 215 | | 53.1 | 1 | 656 | | 54 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 1.4 | 190000 | 1.4 | mg/kg | ND | U | **2.14** | 1 | 3.53 | J | **2.11** | 1 | ND | U | **3.01** | 1 | ND | U | **2.06** | 1 | ND | U | **2.1** | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 7200 | 190000 | 7200 | mg/kg | 34 | | 0.281 | 1 | 52.3 | | 0.277 | 1 | 488 | | 0.394 | 1 | 30.3 | | 0.27 | 1 | 31.1 | | 0.275 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 1200 | 190000 | 1200 | mg/kg | 427 | | 0.975 | 1 | 204 | | 0.961 | 1 | 570 | | 1.37 | 1 | 399 | | 0.939 | 1 | 457 | | 0.956 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | NS | % | 32.3 | | 0.5 | 1 | 31.3 | | 0.5 | 1 | 52.3 | | 0.5 | 1 | 32.4 | | 0.5 | 1 | 33.6 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact

**Table 8**
**Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-63 | | | | BH-10-64 | | | | BH-10-65 | | | | BH-10-69 | | | | BH-10-70 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-63-WC_21-23' | | | | BH-10-64-WC_24-26' | | | | BH-10-65_14-16' | | | | BH-10-69-WC_15.5-16' | | | | BH-10-70-WC@15.5-16' | | | | BH-10-77-WC_20-22' | | | |
| | | | | | | | Sample Date | 4/13/2011 | | | | 4/13/2011 | | | | 4/14/2011 | | | | 4/12/2011 | | | | 4/11/2011 | | | | 4/13/2011 | | | |
| | | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | | Sample Interval | 21.0-23.0 ft bgs | | | | 24.0-26.0 ft bgs | | | | 14.0-16.0 ft bgs | | | | 15.5-16.0 ft bgs | | | | 15.5-16.0 ft bgs | | | | 20.0-22.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | 20 | 7.2 | 0.72 | 10000.00 | 20 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.03 | 0.0093 | 0.00093 | 44 | 0.03 | mg/kg | ND | U | **0.088** | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | **0.12** | 72.3 | ND | U | **0.069** | 55.5 | ND | U | **0.1** | 69.1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 76-13-1 | 10000 | 10000 | 1000 | 10000 | 10000 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.5 | 0.15 | 0.015 | 160 | 0.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,1-Dichloroethane | 75-34-3 | 16 | 3.9 | 0.39 | 1600 | 16 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,1-Dichloroethene | 75-35-4 | 0.7 | 0.19 | 0.019 | 10000 | 0.7 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7 | 27 | 2.7 | 10000 | 7 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,2-Dibromo-3-Chloropropane | 96-12-8 | 0.02 | 0.0092 | 0.00092 | 0.43 | 0.02 | mg/kg | ND | U | **0.18** | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | **0.24** | 72.3 | ND | U | **0.14** | 55.5 | ND | U | **0.21** | 69.1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 0.00012 | 4.3 | 0.005 | mg/kg | ND | U | **0.088** | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | **0.12** | 72.3 | ND | U | **0.069** | 55.5 | ND | U | **0.1** | 69.1 |
| 1,2-Dichlorobenzene | 95-50-1 | 60 | 59 | 5.9 | 10000 | 60 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 0.01 | 98 | 0.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,2-Dichloropropane | 78-87-5 | 0.5 | 0.11 | 0.011 | 260 | 0.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,3-Dichlorobenzene | 541-73-1 | 60 | 61 | 6.1 | 10000 | 60 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 1,4-Dichlorobenzene | 106-46-7 | 7.5 | 10 | 1 | 230 | 7.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| 2-Hexanone | 591-78-6 | 4.4 | 1.1 | 0.11 | 460 | 4.4 | mg/kg | ND | U | 0.27 | 62.7 | ND | U | 0.005 | 1 | ND | U | 0.005 | 1 | ND | U | 0.36 | 72.3 | ND | U | 0.21 | 55.5 | ND | U | 0.31 | 69.1 |
| Acetone | 67-64-1 | 9200 | 1000 | 100 | 10000 | 9200 | mg/kg | ND | U | 0.62 | 62.7 | 0.14 | | 0.012 | 1 | 0.16 | | 0.011 | 1 | ND | U | 0.84 | 72.3 | ND | U | 0.48 | 55.5 | ND | U | 0.73 | 69.1 |
| Benzene | 71-43-2 | 0.5 | 0.13 | 0.013 | 330 | 0.5 | mg/kg | 0.51 | | 0.044 | 62.7 | 0.03 | | 9E-04 | 1 | 0.002 | J | 8E-04 | 1 | 0.12 | J | 0.06 | 72.3 | 0.35 | | 0.034 | 55.5 | ND | U | 0.052 | 69.1 |
| Bromodichloromethane | 75-27-4 | 8 | 2.7 | 0.27 | 69 | 8 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Bromoform | 75-25-2 | 8 | 3.5 | 0.35 | 2300 | 8 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Bromomethane | 74-83-9 | 1 | 0.54 | 0.054 | 460 | 1 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| Carbon Disulfide | 75-15-0 | 620 | 530 | 53 | 10000 | 620 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Carbon Tetrachloride | 56-23-5 | 0.5 | 0.26 | 0.026 | 170 | 0.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Chlorobenzene | 108-90-7 | 10 | 6.1 | 0.61 | 4600 | 10 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Chloroethane | 75-00-3 | 90 | 19 | 1.9 | 10000 | 90 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| Chloroform | 67-66-3 | 8 | 2 | 0.2 | 110 | 8 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Chloromethane | 74-87-3 | 3 | 0.38 | 0.038 | 1400 | 3 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| Cis-1,2-Dichloroethylene | 156-59-2 | 7 | 1.6 | 0.16 | 10000 | 7 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Cis-1,3-Dichloropropene | 10061-01-5 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Cyclohexane | 110-82-7 | 5300 | 6900 | 690 | 10000 | 5300 | mg/kg | 1.9 | | 0.088 | 62.7 | 0.081 | | 0.002 | 1 | 0.071 | | 0.002 | 1 | 0.5 | J | 0.12 | 72.3 | 2.1 | | 0.069 | 55.5 | 1.6 | | 0.1 | 69.1 |
| Dibromochloromethane | 124-48-1 | 8 | 2.5 | 0.25 | 95 | 8 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Dichlorodifluoromethane | 75-71-8 | 100 | 100 | 10 | 10000 | 100 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 99 | 9100 | 1000 | mg/kg | 0.23 | J | 0.088 | 62.7 | 0.002 | J | 0.002 | 1 | 0.013 | | 0.002 | 1 | 0.89 | | 0.12 | 72.3 | 3.8 | | 0.069 | 55.5 | 0.54 | | 0.1 | 69.1 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 4.6 | 10000 | 70 | mg/kg | 0.12 | J | 0.088 | 62.7 | ND | U | 0.002 | 1 | 0.002 | J | 0.002 | 1 | 0.31 | J | 0.12 | 72.3 | 0.78 | | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 250 | 10000 | 350 | mg/kg | 1 | | 0.088 | 62.7 | 0.003 | J | 0.002 | 1 | 0.007 | J | 0.002 | 1 | 0.62 | | 0.12 | 72.3 | 0.44 | | 0.069 | 55.5 | 0.67 | | 0.1 | 69.1 |
| Methyl Acetate | 79-20-9 | 10000 | 1900 | 190 | 10000 | 10000 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | 0.48 | J | 0.24 | 72.3 | 0.26 | J | 0.14 | 55.5 | 0.7 | | 0.21 | 69.1 |
| Methyl Ethyl Ketone (2-Butanone) | 78-93-3 | 400 | 76 | 7.6 | 10000 | 400 | mg/kg | ND | U | 0.35 | 62.7 | 0.013 | J | 0.007 | 1 | 0.027 | | 0.006 | 1 | ND | U | 0.48 | 72.3 | ND | U | 0.27 | 55.5 | ND | U | 0.42 | 69.1 |
| Methyl Isobutyl Ketone (4-Methyl-2-Pentanone) | 108-10-1 | 820 | 130 | 13 | 10000 | 820 | mg/kg | ND | U | 0.27 | 62.7 | ND | U | 0.005 | 1 | ND | U | 0.005 | 1 | ND | U | 0.36 | 72.3 | ND | U | 0.21 | 55.5 | ND | U | 0.31 | 69.1 |
| Methylcyclohexane | 108-87-2 | NS | NS | NS | NS | NS | mg/kg | 10 | | 0.088 | 62.7 | 0.11 | | 0.002 | 1 | 0.35 | | 0.002 | 1 | 4.5 | | 0.12 | 72.3 | 5.8 | | 0.069 | 55.5 | 9.6 | | 0.1 | 69.1 |
| Methylene Chloride | 75-09-2 | 0.5 | 0.076 | 0.0076 | 5400 | 0.5 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| Styrene | 100-42-5 | 10 | 24 | 2.4 | 10000 | 10 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 0.028 | 3700 | 2 | mg/kg | ND | U | 0.044 | 62.7 | ND | U | 9E-04 | 1 | ND | U | 8E-04 | 1 | ND | U | 0.06 | 72.3 | ND | U | 0.034 | 55.5 | ND | U | 0.052 | 69.1 |
| Tetrachloroethylene(PCE) | 127-18-4 | 0.5 | 0.43 | 0.043 | 4400 | 0.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Toluene | 108-88-3 | 100 | 44 | 4.4 | 10000 | 100 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | 0.9 | | 0.12 | 72.3 | 0.39 | | 0.069 | 55.5 | 0.11 | J | 0.1 | 69.1 |
| Trans-1,2-Dichloroethene | 156-60-5 | 10 | 2.3 | 0.23 | 5500 | 10 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Trans-1,3-Dichloropropene | 10061-02-6 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Trichloroethylene (TCE) | 79-01-6 | 0.5 | 0.17 | 0.017 | 1500 | 0.5 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |
| Trichlorofluoromethane | 75-69-4 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | ND | U | 0.18 | 62.7 | ND | U | 0.004 | 1 | ND | U | 0.003 | 1 | ND | U | 0.24 | 72.3 | ND | U | 0.14 | 55.5 | ND | U | 0.21 | 69.1 |
| Vinyl Chloride | 75-01-4 | 0.2 | 0.027 | 0.0027 | 580 | 0.2 | mg/kg | ND | U | 0.088 | 62.7 | ND | U | 0.002 | 1 | ND | U | 0.002 | 1 | ND | U | 0.12 | 72.3 | ND | U | 0.069 | 55.5 | ND | U | 0.1 | 69.1 |

**Table 8**
**Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-63 | | | | BH-10-64 | | | | BH-10-65 | | | | BH-10-69 | | | | BH-10-70 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-63-WC_21-23' | | | | BH-10-64-WC_24-26' | | | | BH-10-65_14-16' | | | | BH-10-69-WC_15.5-16' | | | | BH-10-70-WC@15.5-16' | | | | BH-10-77-WC_20-22' | | | |
| | | | | | | | Sample Date | 4/13/2011 | | | | 4/13/2011 | | | | 4/14/2011 | | | | 4/12/2011 | | | | 4/11/2011 | | | | 4/13/2011 | | | |
| | | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | | Sample Interval | 21.0-23.0 ft bgs | | | | 24.0-26.0 ft bgs | | | | 14.0-16.0 ft bgs | | | | 15.5-16.0 ft bgs | | | | 15.5-16.0 ft bgs | | | | 20.0-22.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | 95-95-4 | 1000 | 6100 | 610 | 190000 | 1000 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| 2,4,6-Trichlorophenol | 88-06-2 | 10 | 29 | 2.9 | 190000 | 10 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| 2,4-Dichlorophenol | 120-83-2 | 2 | 1 | 0.1 | 190000 | 2 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | **2.5** | 5 |
| 2,4-Dimethylphenol | 105-67-9 | 200 | 87 | 8.7 | 10000 | 200 | mg/kg | 0.85 | J | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| 2,4-Dinitrophenol | 51-28-5 | 20 | 2.3 | 0.23 | 190000 | 20 | mg/kg | ND | U | 2.3 | 5 | ND | U | 2.9 | 5 | ND | U | 0.5 | 1 | ND | U | 5.4 | 10 | ND | U | 4.1 | 10 | ND | U | **25** | 5 |
| 2,4-Dinitrotoluene | 121-14-2 | 0.84 | 0.2 | 0.02 | 190000 | 0.84 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | **1.1** | 10 | ND | U | 0.82 | 10 | ND | U | **5** | 5 |
| 2,6-Dinitrotoluene | 606-20-2 | 10 | 3 | 0.3 | 190000 | 10 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| 2-Chloronaphthalene | 91-58-7 | 820 | 18000 | 1800 | 190000 | 1800 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| 2-Chlorophenol | 95-57-8 | 4 | 4.4 | 0.44 | 10000 | 4 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| 2-Methylnaphthalene | 91-57-6 | 41 | 1600 | 160 | 190000 | 160 | mg/kg | 4 | | 0.23 | 5 | ND | U | 0.29 | 5 | 0.16 | J | 0.05 | 1 | 28 | | 0.54 | 10 | 4.9 | | 0.41 | 10 | 3.5 | J | 2.5 | 5 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | 510 | 85 | 8.5 | 190000 | 510 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| 2-Nitroaniline | 88-74-4 | 31 | 5.5 | 0.55 | 190000 | 31 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| 2-Nitrophenol | 88-75-5 | 82 | 17 | 1.7 | 190000 | 82 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 0.58 | 32 | 3.2 | 190000 | 3.2 | mg/kg | ND | U | 0.69 | 5 | ND | U | 0.86 | 5 | ND | U | 0.15 | 1 | ND | U | 1.6 | 10 | ND | U | 1.2 | 10 | ND | U | **7.5** | 5 |
| 3-Nitroaniline | 99-09-2 | 3.1 | 0.48 | 0.048 | 190000 | 3.1 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | **5** | 5 |
| 4,6-Dinitro-2-Methylphenol | 534-52-1 | 1 | 0.75 | 0.075 | 190000 | 1 | mg/kg | ND | U | **1.2** | 5 | ND | U | **1.4** | 5 | ND | U | 0.25 | 1 | ND | U | **2.7** | 10 | ND | U | **2.1** | 10 | ND | U | **13** | 5 |
| 4-Bromophenyl Phenyl Ether | 101-55-3 | 0.5 | NS | NS | 100 | 0.5 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | **0.54** | 10 | ND | U | 0.41 | 10 | ND | U | **2.5** | 5 |
| 4-Chloro-3-Methylphenol | 59-50-7 | 51 | 110 | 11 | 190000 | 51 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| 4-Chloroaniline | 106-47-8 | 1.3 | 1.6 | 0.16 | 190000 | 1.3 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | **5** | 5 |
| 4-Chlorophenyl Phenyl Ether | 7005-72-3 | 0.5 | NS | NS | 100 | 0.5 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | **0.54** | 10 | ND | U | 0.41 | 10 | ND | U | **2.5** | 5 |
| 4-Methylphenol (P-Cresol) | 106-44-5 | 51 | 12 | 1.2 | 190000 | 51 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | 6.4 | | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| 4-Nitroaniline | 100-01-6 | 13 | 1.9 | 0.19 | 190000 | 13 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| 4-Nitrophenol | 100-02-7 | 6 | 4.1 | 0.41 | 190000 | 6 | mg/kg | ND | U | 1.2 | 5 | ND | U | 1.4 | 5 | ND | U | 0.25 | 1 | ND | U | 2.7 | 10 | ND | U | 2.1 | 10 | ND | U | **13** | 5 |
| Acenaphthene | 83-32-9 | 380 | 4700 | 470 | 190000 | 470 | mg/kg | 1.2 | | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 32 | | 0.54 | 10 | ND | U | 0.41 | 10 | 3.2 | J | 2.5 | 5 |
| Acenaphthylene | 208-96-8 | 610 | 6900 | 690 | 190000 | 690 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 3.9 | | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Acetophenone | 98-86-2 | 1000 | 540 | 54 | 10000 | 1000 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | 0.83 | J | 0.82 | 10 | ND | U | 5 | 5 |
| Anthracene | 120-12-7 | 6.6 | 350 | 35 | 190000 | 35 | mg/kg | 0.74 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 21 | | 0.54 | 10 | ND | U | 0.41 | 10 | 5.3 | J | 2.5 | 5 |
| Atrazine | 1912-24-9 | 0.3 | 0.13 | 0.013 | 190000 | 0.3 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | **0.54** | 10 | ND | U | **0.41** | 10 | ND | U | **2.5** | 5 |
| Benzaldehyde | 100-52-7 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 32 | 190000 | 32 | mg/kg | 0.93 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 17 | | 0.54 | 10 | 0.78 | J | 0.41 | 10 | 5.3 | J | 2.5 | 5 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 4.6 | 190000 | 4.6 | mg/kg | 0.77 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 11 | | 0.54 | 10 | 0.85 | J | 0.41 | 10 | 4.4 | J | 2.5 | 5 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 17 | 190000 | 17 | mg/kg | 0.78 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 13 | | 0.54 | 10 | 0.49 | J | 0.41 | 10 | 3.1 | J | 2.5 | 5 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 18 | 190000 | 18 | mg/kg | 0.67 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 5.3 | | 0.54 | 10 | 0.47 | J | 0.41 | 10 | 3 | J | 2.5 | 5 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.055 | 610 | 61 | 190000 | 61 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 4.7 | | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Benzyl Butyl Phthalate | 85-68-7 | 140 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| Biphenyl (Diphenyl) | 92-52-4 | 510 | 2200 | 220 | 190000 | 510 | mg/kg | 0.32 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 3.8 | | 0.54 | 10 | 0.65 | J | 0.41 | 10 | ND | U | 2.5 | 5 |
| Bis(2-Chloroethoxy) Methane | 111-91-1 | 31 | 8.2 | 0.82 | 10000 | 31 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether) | 111-44-4 | 0.076 | 0.023 | 0.0023 | 7.7 | 0.076 | mg/kg | ND | U | **0.23** | 5 | ND | U | **0.29** | 5 | ND | U | 0.05 | 1 | ND | U | **0.54** | 10 | ND | U | **0.41** | 10 | ND | U | **2.5** | 5 |
| Bis(2-Chloroisopropyl) Ether | 108-60-1 | 30 | 8 | 0.8 | 250 | 30 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | 0.6 | 130 | 13 | 10000 | 13 | mg/kg | 1.6 | J | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | 4.5 | J | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| Caprolactam | 105-60-2 | NS | NS | NS | NS | NS | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | 3.6 | | 0.41 | 10 | ND | U | 2.5 | 5 |
| Carbazole | 86-74-8 | 13 | 83 | 8.3 | 190000 | 13 | mg/kg | 0.24 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 1.5 | J | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Chrysene | 218-01-9 | 0.19 | 230 | 23 | 190000 | 23 | mg/kg | 1.6 | | 0.23 | 5 | ND | U | 0.29 | 5 | 0.056 | J | 0.05 | 1 | 17 | | 0.54 | 10 | 1.6 | J | 0.41 | 10 | 9.7 | J | 2.5 | 5 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.036 | 160 | 16 | 190000 | 16 | mg/kg | 0.34 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 2 | J | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Dibenzofuran | 132-64-9 | 10 | 260 | 26 | 190000 | 26 | mg/kg | 0.95 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 9.3 | | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Diethyl Phthalate | 84-66-2 | 8200 | 2600 | 260 | 10000 | 8200 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| Dimethyl Phthalate | 131-11-3 | 0.5 | NS | NS | 100 | 0.5 | mg/kg | ND | U | 0.46 | 5 | ND | U | **0.57** | 5 | ND | U | 0.1 | 1 | ND | U | **1.1** | 10 | ND | U | **0.82** | 10 | ND | U | **5** | 5 |
| Di-N-Butyl Phthalate | 84-74-2 | 1000 | 4100 | 410 | 10000 | 1000 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |
| Di-N-Octylphthalate | 117-84-0 | 300 | 10000 | 1000 | 10000 | 1000 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | 5 | 5 |

**Table 8**
**Summary of Soil Sample Analytical Results for Vertical Delineation Soil Samples Beneath Waste in CAMU**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater 10th of Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (2 - 15 ft bgs) | PADEP Non-Residential Used Aquifer Saturated Soil MSCs (TDS<2,500) | Location ID | BH-10-63 | | | | BH-10-64 | | | | BH-10-65 | | | | BH-10-69 | | | | BH-10-70 | | | | BH-10-77 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | BH-10-63-WC_21-23' | | | | BH-10-64-WC_24-26' | | | | BH-10-65_14-16' | | | | BH-10-69-WC_15.5-16' | | | | BH-10-70-WC@15.5-16' | | | | BH-10-77-WC_20-22' | | | |
| | | | | | | | Sample Date | 4/13/2011 | | | | 4/13/2011 | | | | 4/14/2011 | | | | 4/12/2011 | | | | 4/11/2011 | | | | 4/13/2011 | | | |
| | | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | | Sample Interval | 21.0-23.0 ft bgs | | | | 24.0-26.0 ft bgs | | | | 14.0-16.0 ft bgs | | | | 15.5-16.0 ft bgs | | | | 15.5-16.0 ft bgs | | | | 20.0-22.0 ft bgs | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Fluoranthene | 206-44-0 | 26 | 3200 | 320 | 190000 | 320 | mg/kg | 0.87 | J | 0.23 | 5 | ND | U | 0.29 | 5 | 0.054 | J | 0.05 | 1 | 39 | | 0.54 | 10 | ND | U | 0.41 | 10 | 3.9 | J | 2.5 | 5 |
| Fluorene | 86-73-7 | 190 | 3800 | 380 | 190000 | 380 | mg/kg | 1.6 | | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 22 | | 0.54 | 10 | 0.52 | J | 0.41 | 10 | 4.9 | J | 2.5 | 5 |
| Hexachlorobenzene | 118-74-1 | 0.1 | 0.96 | 0.096 | 190000 | 0.1 | mg/kg | ND | U | **0.23** | 5 | ND | U | **0.29** | 5 | ND | U | 0.05 | 1 | ND | U | **0.54** | 10 | ND | U | **0.41** | 10 | ND | U | **2.5** | 5 |
| Hexachlorobutadiene | 87-68-3 | 3.3 | 39 | 3.9 | 10000 | 3.9 | mg/kg | ND | U | 0.46 | 5 | ND | U | 0.57 | 5 | ND | U | 0.1 | 1 | ND | U | 1.1 | 10 | ND | U | 0.82 | 10 | ND | U | **5** | 5 |
| Hexachlorocyclopentadiene | 77-47-4 | 5 | 91 | 9.1 | 10000 | 9.1 | mg/kg | ND | U | 1.2 | 5 | ND | U | 1.4 | 5 | ND | U | 0.25 | 1 | ND | U | 2.7 | 10 | ND | U | 2.1 | 10 | ND | U | **13** | 5 |
| Hexachloroethane | 67-72-1 | 0.1 | 0.56 | 0.056 | 640 | 0.1 | mg/kg | ND | U | **0.23** | 5 | ND | U | **0.29** | 5 | ND | U | 0.05 | 1 | ND | U | **0.54** | 10 | ND | U | **0.41** | 10 | ND | U | **2.5** | 5 |
| Indeno[1,2,3-cd]pyrene | 193-39-5 | 0.36 | 28000 | 2800 | 190000 | 2800 | mg/kg | 0.37 | J | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | 4.8 | | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Isophorone | 78-59-1 | 10 | 1.9 | 0.19 | 10000 | 10 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Naphthalene | 91-20-3 | 10 | 25 | 2.5 | 190000 | 10 | mg/kg | 1.1 | J | 0.23 | 5 | ND | U | 0.29 | 5 | 0.063 | J | 0.05 | 1 | 52 | | 0.54 | 10 | 1.6 | J | 0.41 | 10 | 2.9 | J | 2.5 | 5 |
| Nitrobenzene | 98-95-3 | 20 | 8.7 | 0.87 | 10000 | 20 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| N-Nitrosodi-N-Propylamine | 621-64-7 | 0.037 | 0.0051 | 0.00051 | 10000 | 0.037 | mg/kg | ND | U | **0.23** | 5 | ND | U | **0.29** | 5 | ND | U | **0.05** | 1 | ND | U | **0.54** | 10 | ND | U | **0.41** | 10 | ND | U | **2.5** | 5 |
| N-Nitrosodiphenylamine | 86-30-6 | 53 | 83 | 8.3 | 190000 | 53 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Pentachlorophenol | 87-86-5 | 0.1 | 5 | 0.5 | 190000 | 0.5 | mg/kg | ND | U | **1.2** | 5 | ND | U | **1.4** | 5 | ND | U | 0.25 | 1 | ND | U | **2.7** | 10 | ND | U | **2.1** | 10 | ND | U | **13** | 5 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 1000 | 190000 | 1000 | mg/kg | 3.7 | | 0.23 | 5 | ND | U | 0.29 | 5 | 0.13 | J | 0.05 | 1 | 66 | | 2.7 | 50 | 2.1 | | 0.41 | 10 | 7.3 | J | 2.5 | 5 |
| Phenol | 108-95-2 | 200 | 33 | 3.3 | 190000 | 200 | mg/kg | ND | U | 0.23 | 5 | ND | U | 0.29 | 5 | ND | U | 0.05 | 1 | ND | U | 0.54 | 10 | ND | U | 0.41 | 10 | ND | U | 2.5 | 5 |
| Pyrene | 129-00-0 | 13 | 2200 | 220 | 190000 | 220 | mg/kg | 1.6 | | 0.23 | 5 | ND | U | 0.29 | 5 | 0.083 | J | 0.05 | 1 | 42 | | 0.54 | 10 | 1.5 | J | 0.41 | 10 | 13 | J | 2.5 | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | NS | NS | 190000 | 190000 | mg/kg | 8110 | | 6.95 | 1 | 26600 | | 8.64 | 1 | 25000 | | 7.56 | 1 | 19100 | | 8.15 | 1 | 12800 | | 6.22 | 1 | 25700 | | 7.57 | 1 |
| Antimony | 7440-36-0 | 0.6 | 27 | 2.7 | 190000 | 2.7 | mg/kg | ND | U | 1.38 | 1 | ND | U | 1.72 | 1 | ND | U | 1.5 | 1 | ND | U | 1.62 | 1 | ND | U | 1.24 | 1 | ND | U | 1.5 | 1 |
| Arsenic | 7440-38-2 | 1 | 29 | 2.9 | 190000 | 2.9 | mg/kg | 8.88 | | 1.31 | 1 | 7.7 | | 1.63 | 1 | 6.82 | | 1.43 | 1 | 21.7 | | 1.54 | 1 | 3.96 | | 1.17 | 1 | 29.8 | | 1.43 | 1 |
| Barium | 7440-39-3 | 200 | 8200 | 820 | 190000 | 820 | mg/kg | 140 | | 0.055 | 1 | 186 | | 0.069 | 1 | 324 | | 0.06 | 1 | 308 | | 0.065 | 1 | 74.9 | | 0.049 | 1 | 114 | | 0.06 | 1 |
| Beryllium | 7440-41-7 | 0.4 | 320 | 32 | 190000 | 32 | mg/kg | 0.452 | J | 0.094 | 1 | 1.18 | | 0.117 | 1 | 1.12 | | 0.102 | 1 | 1.7 | | 0.11 | 1 | 0.59 | J | 0.084 | 1 | 1.1 | | 0.102 | 1 |
| Cadmium | 7440-43-9 | 0.5 | 38 | 3.8 | 190000 | 3.8 | mg/kg | 0.229 | J | 0.193 | 1 | ND | U | 0.241 | 1 | ND | U | 0.211 | 1 | 1.67 | | 0.227 | 1 | 0.876 | | 0.173 | 1 | 0.73 | J | 0.211 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | NS | NS | mg/kg | 19200 | | 8.46 | 1 | 3910 | | 10.5 | 1 | 4350 | | 9.22 | 1 | 3760 | | 9.93 | 1 | 2120 | | 7.58 | 1 | 25900 | | 9.22 | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | NS | NS | mg/kg | 42.1 | | 0.815 | 1 | 51.8 | | 1.01 | 1 | 51.9 | | 0.887 | 1 | 71.4 | | 0.956 | 1 | 27.3 | | 0.729 | 1 | 67.8 | | 0.888 | 1 |
| Cobalt | 7440-48-4 | 3 | 140 | 14 | 190000 | 14 | mg/kg | 5.36 | | 0.262 | 1 | 11.4 | | 0.326 | 1 | 12 | | 0.286 | 1 | 22 | | 0.308 | 1 | 6.88 | | 0.235 | 1 | 4.7 | | 0.286 | 1 |
| Copper | 7440-50-8 | 100 | 43000 | 4300 | 190000 | 4300 | mg/kg | 61.3 | | 0.304 | 1 | 8.22 | | 0.378 | 1 | 13.1 | | 0.331 | 1 | 129 | | 0.357 | 1 | 10.8 | | 0.272 | 1 | 26.1 | | 0.331 | 1 |
| Iron | 7439-89-6 | NS | NS | NS | 190000 | 190000 | mg/kg | 19500 | | 6.5 | 1 | 29500 | | 8.09 | 1 | 29100 | | 7.08 | 1 | 27200 | | 7.63 | 1 | 19600 | | 5.82 | 1 | 18500 | | 7.09 | 1 |
| Lead | 7439-92-1 | 0.5 | 450 | 45 | 190000 | 45 | mg/kg | 115 | | 0.829 | 1 | 17.4 | | 1.03 | 1 | 291 | | 0.902 | 1 | 417 | | 0.972 | 1 | 40.9 | | 0.742 | 1 | 259 | | 0.903 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | #N/A | NS | mg/kg | 9560 | | 3.51 | 1 | 6980 | | 4.36 | 1 | 7020 | | 3.82 | 1 | 3990 | | 4.12 | 1 | 3870 | | 3.14 | 1 | 23000 | | 3.82 | 1 |
| Manganese | 7439-96-5 | 30 | 2000 | 200 | 190000 | 200 | mg/kg | 387 | | 0.108 | 1 | 407 | | 0.134 | 1 | 352 | | 0.117 | 1 | 533 | | 0.126 | 1 | 405 | | 0.096 | 1 | 259 | | 0.117 | 1 |
| Mercury | 7439-97-6 | 0.2 | 10 | 1 | 190000 | 1 | mg/kg | 2.36 | | 0.02 | 5 | 0.0127 | J | 0.005 | 1 | 0.0844 | J | 0.004 | 1 | 1.03 | | 0.005 | 1 | 0.0074 | J | 0.003 | 1 | 0.422 | | 0.004 | 1 |
| Nickel | 7440-02-0 | 10 | 650 | 65 | 190000 | 65 | mg/kg | 67.4 | | 0.262 | 1 | 27.2 | | 0.326 | 1 | 29.7 | | 0.286 | 1 | 41.3 | | 0.308 | 1 | 16 | | 0.235 | 1 | 17.8 | | 0.286 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | #N/A | NS | mg/kg | 1200 | | 24.9 | 1 | 2690 | | 30.9 | 1 | 2320 | | 27.1 | 1 | 2060 | | 29.2 | 1 | 2020 | | 22.2 | 1 | 2790 | | 27.1 | 1 |
| Selenium | 7782-49-2 | 5 | 26 | 2.6 | 190000 | 5 | mg/kg | ND | U | 1.35 | 1 | ND | U | 1.68 | 1 | ND | U | 1.47 | 1 | 2.46 | J | 1.59 | 1 | ND | U | 1.21 | 1 | ND | U | 1.47 | 1 |
| Silver | 7440-22-4 | 10 | 84 | 8.4 | 190000 | 10 | mg/kg | ND | U | 0.249 | 1 | 0.832 | J | 0.309 | 1 | ND | U | 0.271 | 1 | 0.757 | J | 0.292 | 1 | ND | U | 0.222 | 1 | ND | U | 0.271 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | NS | NS | mg/kg | 491 | | 51.5 | 1 | 299 | | 64.1 | 1 | 272 | | 56.1 | 1 | 203 | | 60.4 | 1 | 1150 | | 46.1 | 1 | 921 | | 56.1 | 1 |
| Thallium | 7440-28-0 | 0.2 | 14 | 1.4 | 190000 | 1.4 | mg/kg | ND | U | **2** | 1 | ND | U | **2.49** | 1 | ND | U | **2.18** | 1 | ND | U | **2.35** | 1 | ND | U | **1.79** | 1 | ND | U | **2.18** | 1 |
| Vanadium | 7440-62-2 | 72 | 72000 | 7200 | 190000 | 7200 | mg/kg | 31.1 | | 0.262 | 1 | 59 | | 0.326 | 1 | 55.8 | | 0.286 | 1 | 40.9 | | 0.308 | 1 | 28.7 | | 0.235 | 1 | 73 | | 0.286 | 1 |
| Zinc | 7440-66-6 | 200 | 12000 | 1200 | 190000 | 1200 | mg/kg | 110 | | 0.911 | 1 | 66.7 | | 1.13 | 1 | 91.9 | | 0.992 | 1 | 544 | | 1.07 | 1 | 44.8 | | 0.816 | 1 | 136 | | 0.993 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | NS | NS | NS | % | 29 | | 0.5 | 1 | 41.8 | | 0.5 | 1 | 34.8 | | 0.5 | 1 | 39.5 | | 0.5 | 1 | 19.1 | | 0.5 | 1 | 34.2 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
All soil samples in this table are considered saturated soils.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact

**Table 9**
**Summary of Post-Excavation Soil Analytical Results - VGO Release Area**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | SS-1 | | | | SS-2 | | | | SS-3 | | | | SS-4 | | | | SS-5 | | | | SS-6 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | SS-1 | | | | SS-2 | | | | SS-3 | | | | SS-4 | | | | SS-5 | | | | SS-6 | | | |
| | | | | | | Sample Date | 4/15/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | Grab Soil | | | | Grab Soil | | | | Grab Soil | | | | Grab Soil | | | | Grab Soil | | | | Grab Soil | | | |
| | | | | | | Unit | Result | Q | MDL | DF | Result | Q | MDL | DF | Result | Q | MDL | DF | Result | Q | MDL | DF | Result | Q | MDL | DF | Result | Q | MDL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.01 | | 0.0006 | 1.11 | 0.008 | | 0.0006 | 1.01 | 0.01 | | 0.0006 | 1.06 | 0.01 | | 0.0005 | 0.9 | 0.005 | | 0.0004 | 0.83 | 0.028 | | 0.0005 | 0.84 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.002 | J | 0.001 | 1.11 | ND | | 0.001 | 1.01 | 0.003 | J | 0.001 | 1.06 | 0.023 | | 0.001 | 0.9 | ND | | 0.0009 | 0.83 | 0.002 | J | 0.0009 | 0.84 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | ND | | 0.001 | 1.11 | ND | | 0.001 | 1.01 | ND | | 0.001 | 1.06 | 0.005 | | 0.001 | 0.9 | ND | | 0.0009 | 0.83 | ND | | 0.0009 | 0.84 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 0.06 | | 0.001 | 1.11 | 0.016 | | 0.001 | 1.01 | 0.042 | | 0.001 | 1.06 | 0.77 | | 0.059 | 52.5 | 0.021 | | 0.0009 | 0.83 | 0.018 | | 0.0009 | 0.84 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.013 | | 0.001 | 1.11 | 0.006 | | 0.001 | 1.01 | 0.023 | | 0.001 | 1.06 | 0.033 | | 0.001 | 0.9 | 0.005 | | 0.0009 | 0.83 | 0.007 | | 0.0009 | 0.84 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | 0.23 | | 0.052 | 1.11 | 0.005 | J | 0.001 | 1.01 | 0.029 | | 0.001 | 1.06 | 0.65 | | 0.059 | 52.5 | 0.012 | | 0.0009 | 0.83 | 0.016 | | 0.0009 | 0.84 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | 0.45 | | 0.001 | 48.4 | 0.005 | J | 0.001 | 1.01 | 0.025 | | 0.001 | 1.06 | 0.19 | J | 0.059 | 52.5 | 0.005 | | 0.0009 | 0.83 | 0.011 | | 0.0009 | 0.84 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.011 | | 0.001 | 1.11 | 0.003 | J | 0.001 | 1.01 | 0.014 | | 0.001 | 1.06 | 0.18 | | 0.001 | 0.9 | 0.004 | J | 0.0009 | 0.83 | 0.009 | | 0.0009 | 0.84 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | | 0.0006 | 1.11 | ND | | 0.0006 | 1.01 | ND | | 0.0006 | 1.06 | ND | | 0.0005 | 0.9 | ND | | 0.0004 | 0.83 | 0.002 | J | 0.0005 | 0.84 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | | 0.001 | 1.11 | ND | | 0.001 | 1.01 | ND | | 0.001 | 1.06 | ND | | 0.001 | 0.9 | ND | | 0.0009 | 0.83 | ND | | 0.0009 | 0.84 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | | 0.001 | 1.11 | ND | | 0.001 | 1.01 | ND | | 0.001 | 1.06 | ND | | 0.001 | 0.9 | ND | | 0.0009 | 0.83 | ND | | 0.0009 | 0.84 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | 0.75 | | 0.0072 | 10 | 0.24 | | 0.0075 | 10 | 0.76 | | 0.0072 | 10 | 0.55 | | 0.0075 | 10 | 0.84 | | 0.0072 | 10 | 0.42 | | 0.015 | 20 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 0.75 | | 0.0036 | 10 | 0.53 | | 0.0037 | 10 | 1.8 | | 0.018 | 50 | 0.97 | | 0.0037 | 10 | 1.4 | | 0.0036 | 10 | 0.69 | | 0.0073 | 20 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 0.58 | | 0.0036 | 10 | 0.48 | | 0.0037 | 10 | 1.4 | | 0.018 | 50 | 0.88 | | 0.0037 | 10 | 1 | | 0.0036 | 10 | 0.54 | | 0.0073 | 20 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 0.76 | | 0.0029 | 10 | 0.59 | B | 0.003 | 10 | 1.7 | | 0.014 | 50 | 0.96 | | 0.003 | 10 | 1.4 | | 0.0057 | 20 | 0.8 | B | 0.0058 | 20 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 1.1 | | 0.022 | 10 | 1 | | 0.022 | 10 | 2.3 | | 0.022 | 10 | 1.4 | | 0.022 | 10 | 1.8 | | 0.021 | 10 | 0.94 | | 0.044 | 20 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 3.1 | | 0.022 | 10 | 1.7 | | 0.022 | 10 | 5.5 | | 0.022 | 10 | 3 | | 0.022 | 10 | 4.8 | | 0.021 | 10 | 2.5 | | 0.044 | 20 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | 1.4 | | 0.036 | 10 | 0.2 | | 0.037 | 10 | 0.75 | | 0.036 | 10 | 0.64 | | 0.037 | 10 | 1 | | 0.036 | 10 | 0.46 | | 0.073 | 20 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 3.9 | B | 0.014 | 10 | 0.83 | B | 0.015 | 10 | 3.6 | B | 0.014 | 10 | 2.6 | B | 0.015 | 10 | 4.1 | B | 0.014 | 10 | 1.5 | B | 0.029 | 20 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | ND | | 7.3 | 10 | ND | | 1.2 | 10 | 5.6 | | 0.036 | 10 | ND | | 0.0051 | 10 | 4.5 | | 0.036 | 10 | ND | | 2.3 | 20 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 169 | | 0.622 | 1 | 209 | | 0.664 | 1 | 270 | | 0.648 | 1 | 190 | | 0.667 | 1 | 233 | | 0.638 | 1 | 169 | | 0.651 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 9**
**Summary of Post-Excavation Soil Analytical Results - VGO Release Area**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer Soil to Groundwater 100xGW MSCs (TDS<2,500) | PADEP Non-Residential Used Aquifer Soil to Groundwater Generic MSCs (TDS<2,500) | PADEP Non-Residential Direct Contact (0 - 2 ft bgs) | PADEP Non-Residential Used Aquifer Unsaturated Soil MSCs (TDS<2,500) | Location ID | SS-7 | | | | SS-8 | | | | SS-9 | | | | SS-10 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample ID | SS-7 | | | | SS-8 | | | | SS-9 | | | | SS-10 | | | |
| | | | | | | Sample Date | 4/15/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | |
| | | | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | | | Sample Interval | Grab Soil | | | | Grab Soil | | | | Grab Soil | | | | Grab Soil | | | |
| | | | | | | Unit | Result | Q | MDL | DF | Result | Q | MDL | DF | Result | Q | MDL | DF | Result | Q | MDL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | 71-43-2 | 0.5 | 0.13 | 290 | 0.5 | mg/kg | 0.007 | | 0.0006 | 1.1 | 0.001 | J | 0.0005 | 0.99 | 0.002 | J | 0.0005 | 1.02 | 0.003 | J | 0.0005 | 1 |
| Ethylbenzene | 100-41-4 | 70 | 46 | 10000 | 70 | mg/kg | 0.002 | J | 0.001 | 1.1 | ND | | 0.001 | 0.99 | ND | | 0.001 | 1.02 | ND | | 0.001 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | 350 | 2500 | 10000 | 2500 | mg/kg | 0.003 | J | 0.001 | 1.1 | ND | | 0.001 | 0.99 | ND | | 0.001 | 1.02 | ND | | 0.001 | 1 |
| Naphthalene | 91-20-3 | 10 | 25 | 56000 | 25 | mg/kg | 0.048 | | 0.001 | 1.1 | 0.002 | J | 0.001 | 0.99 | 0.011 | | 0.001 | 1.02 | 0.002 | J | 0.001 | 1 |
| Toluene | 108-88-3 | 100 | 44 | 10000 | 100 | mg/kg | 0.001 | J | 0.001 | 1.1 | ND | | 0.001 | 0.99 | 0.001 | J | 0.001 | 1.02 | ND | | 0.001 | 1 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 6.2 | 35 | 560 | 35 | mg/kg | 0.22 | | 0.001 | 1.1 | ND | | 0.001 | 0.99 | 0.006 | | 0.001 | 1.02 | ND | | 0.001 | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 5.3 | 9.3 | 480 | 9.3 | mg/kg | 0.086 | | 0.001 | 1.1 | ND | | 0.001 | 0.99 | 0.002 | J | 0.001 | 1.02 | ND | | 0.001 | 1 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 1000 | 990 | 8000 | 1000 | mg/kg | 0.024 | | 0.001 | 1.1 | ND | | 0.001 | 0.99 | 0.001 | J | 0.001 | 1.02 | ND | | 0.001 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 2 | 0.28 | 3200 | 2 | mg/kg | ND | | 0.0006 | 1.1 | ND | | 0.0005 | 0.99 | ND | | 0.0005 | 1.02 | ND | | 0.0005 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.005 | 0.0012 | 3.7 | 0.005 | mg/kg | ND | | 0.001 | 1.1 | ND | | 0.001 | 0.99 | ND | | 0.001 | 1.02 | ND | | 0.001 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 0.5 | 0.1 | 86 | 0.5 | mg/kg | ND | | 0.001 | 1.1 | ND | | 0.001 | 0.99 | ND | | 0.001 | 1.02 | ND | | 0.001 | 1 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | 6.6 | 350 | 190000 | 350 | mg/kg | 0.16 | | 0.0078 | 10 | 0.2 | | 0.0068 | 10 | 0.15 | | 0.0068 | 10 | 0.17 | | 0.0067 | 10 |
| Benzo(A)Anthracene | 56-55-3 | 0.36 | 320 | 110 | 110 | mg/kg | 0.3 | | 0.0039 | 10 | 0.27 | | 0.0034 | 10 | 0.42 | | 0.0034 | 10 | 0.35 | | 0.0034 | 10 |
| Benzo(A)Pyrene | 50-32-8 | 0.02 | 46 | 11 | 11 | mg/kg | 0.3 | | 0.0039 | 10 | 0.27 | | 0.0034 | 10 | 0.43 | | 0.0034 | 10 | 0.41 | | 0.0034 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | 0.12 | 170 | 110 | 110 | mg/kg | 0.39 | | 0.0031 | 10 | 0.34 | B | 0.0027 | 10 | 0.47 | B | 0.0027 | 10 | 0.43 | | 0.0027 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.026 | 180 | 170000 | 180 | mg/kg | 0.79 | | 0.023 | 10 | 0.55 | | 0.02 | 10 | 0.81 | | 0.02 | 10 | 0.82 | | 0.02 | 10 |
| Chrysene | 218-01-9 | 0.19 | 230 | 11000 | 230 | mg/kg | 0.79 | | 0.023 | 10 | 0.9 | | 0.02 | 10 | 0.98 | | 0.02 | 10 | 1 | | 0.02 | 10 |
| Fluorene | 86-73-7 | 190 | 3800 | 110000 | 3800 | mg/kg | 0.23 | | 0.039 | 10 | 0.29 | | 0.034 | 10 | 0.19 | | 0.034 | 10 | 0.26 | | 0.034 | 10 |
| Phenanthrene | 85-01-8 | 110 | 10000 | 190000 | 10000 | mg/kg | 0.79 | B | 0.016 | 10 | 1.3 | B | 0.014 | 10 | 1.1 | B | 0.014 | 10 | 1.2 | B | 0.013 | 10 |
| Pyrene | 129-00-0 | 13 | 2200 | 84000 | 2200 | mg/kg | 0.74 | | 0.039 | 10 | ND | | 0.55 | 10 | 0.89 | | 0.034 | 10 | 0.8 | | 0.034 | 10 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | 0.5 | 450 | 1000 | 450 | mg/kg | 440 | | 0.671 | 1 | 96.8 | | 0.61 | 1 | 111 | | 0.592 | 1 | 116 | | 0.601 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration exceeds the PADEP Non-Residential Soil MSC
**10** - Concentration exceeds the PADEP Non-Residential Direct Contact Standard

**Table 10**
**Summary of Shallow Groundwater Analytical Results**
**April 2011**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location | W-1 | | | | W-2 | | | | W-5 | | | | W-6 | | | | W-11 | | | | W-12 | | | | W-15 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | W-1_04272011 | | | | W-2_04262011 | | | | W-5_04262011 | | | | W-6_04262011 | | | | W-11_04262011 | | | | W-12_04262011 | | | | W-15_04262011 | | | |
| | | | Sample Date | 4/27/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | |
| | | | Sample Matrix | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | |
| | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 62 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 4 | | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.05 | ug/l | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 53 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 0.6 | J | 0.5 | 1 | ND | U | 0.5 | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 8 | | 0.5 | 1 | ND | U | 0.5 | 1 |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 3 | | 0.5 | 1 | ND | U | 0.5 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | 3500 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 2 | | 0.5 | 1 | ND | U | 0.5 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 20 | ug/l | 2 | | 0.5 | 1 | ND | U | 0.5 | 1 | 3 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 1 | | 0.5 | 1 | 0.8 | J | 0.5 | 1 |
| Xylenes (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 10 | | 0.5 | 1 | ND | U | 0.5 | 1 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | 1.9 | ug/l | 20 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 1 | J | 1 | 1 | 1 | J | 1 | 1 |
| Fluorene | 86-73-7 | 1900 | ug/l | 13 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 1 | J | 1 | 1 | ND | U | 1 | 1 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 1 | J | 1 | 1 | ND | U | 1 | 1 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | 13 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 |
| Pyrene | 129-00-0 | 130 | ug/l | 37 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 2 | J | 1 | 1 | 2 | J | 1 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Dissolved) | 7439-92-1 | 5 | ug/l | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | 0.072 | J | 0.052 | 1 | ND | U | 0.052 | 1 | 0.18 | J | 0.052 | 1 | 0.96 | J | 0.052 | 1 |

**Notes:**
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

**Qualifiers:**
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

**Table 10**
**Summary of Shallow Groundwater Analytical Results**
**April 2011**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location | W-16 | | | | W-17 | | | | W-20 | | | | W-22 | | | | W-23 | | | | W-25 | | | | W-27 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | W-16_04272011 | | | | W-17_04272011 | | | | W-20_04272011 | | | | W-22_04272011 | | | | W-23_04272011 | | | | W-25_04262011 | | | | W-27_04262011 | | | |
| | | | Sample Date | 4/27/2011 | | | | 4/27/2011 | | | | 4/27/2011 | | | | 4/27/2011 | | | | 4/27/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | |
| | | | Sample Matrix | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | |
| | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 62 | ug/l | ND | U | 0.5 | 1 | 0.9 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 8 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.05 | ug/l | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 53 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 2 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Benzene | 71-43-2 | 5 | ug/l | 0.6 | J | 0.5 | 1 | 0.9 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 12 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 0.5 | 1 | 0.6 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 1 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | 3500 | ug/l | 26 | | 0.5 | 1 | 43 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 1 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 2 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Xylenes (Total) | 1330-20-7 | 10000 | ug/l | 0.6 | J | 0.5 | 1 | 3 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 13 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 1 | J | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 1 | J | 1 | 1 | 1 | J | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 3 | J | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 1 | 1 | 1 | J | 1 | 1 | ND | U | 1 | 1 | 2 | J | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Dissolved) | 7439-92-1 | 5 | ug/l | 0.18 | J | 0.052 | 1 | 0.084 | J | 0.052 | 1 | 3.2 | 0 | 0.052 | 1 | 0.2 | J | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | 0.11 | J | 0.052 | 1 |

**Notes:**
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

**Qualifiers:**
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

**Table 10**
**Summary of Shallow Groundwater Analytical Results**
**April 2011**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location | W-28 | | | | W-29 | | | | W-30 | | | | W-31 | | | | W-32 | | | | W-33 | | | | W-34 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | W-28_04262011 | | | | W-29_04262011 | | | | W-30_04262011 | | | | W-31_04262011 | | | | W-32_04272011 | | | | W-33_04272011 | | | | W-34_04272011 | | | |
| | | | Sample Date | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/27/2011 | | | | 4/27/2011 | | | | 4/27/2011 | | | |
| | | | Sample Matrix | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | |
| | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 62 | ug/l | 1 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 28 | | 0.5 | 1 | 6 | | 0.5 | 1 | 36 | | 5 | 10 | 9 | | 0.5 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.05 | ug/l | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 2 | | 0.5 | 1 | ND | U | **5** | 10 | ND | U | 0.5 | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 53 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 9 | | 0.5 | 1 | 1 | J | 0.5 | 1 | 11 | J | 5 | 10 | 2 | | 0.5 | 1 |
| Benzene | 71-43-2 | 5 | ug/l | 0.5 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 10 | | 0.5 | 1 | 56 | | 0.5 | 1 | 250 | | **5** | 10 | 7 | | 0.5 | 1 |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 5 | | 0.5 | 1 | 1 | | 0.5 | 1 | 13 | | 5 | 10 | 2 | | 0.5 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | 3500 | ug/l | 23 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 9 | | 0.5 | 1 | 8 | | 0.5 | 1 | ND | U | 5 | 10 | 1 | J | 0.5 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 0.5 | 1 | 0.6 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 5 | 10 | ND | U | 0.5 | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | 0.8 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 4 | | 0.5 | 1 | 1 | | 0.5 | 1 | 60 | | 5 | 10 | 11 | | 0.5 | 1 |
| Xylenes (Total) | 1330-20-7 | 10000 | ug/l | 1 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 21 | | 0.5 | 1 | 4 | | 0.5 | 1 | 70 | | 5 | 10 | 19 | | 0.5 | 1 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | 1.9 | ug/l | 2 | J | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | 4 | J | 1 | 1 | 4 | J | 1 | 1 | 6 | | 1 | 1 | ND | U | 1 | 1 |
| Fluorene | 86-73-7 | 1900 | ug/l | 12 | | 1 | 1 | 1 | J | 0.9 | 1 | ND | U | 1 | 1 | 5 | J | 1 | 1 | 12 | | 1 | 1 | 36 | | 1 | 1 | 5 | J | 1 | 1 |
| Naphthalene | 91-20-3 | 100 | ug/l | 3 | J | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | 13 | | 1 | 1 | 24 | | 1 | 1 | 330 | | 5 | 5 | 11 | | 1 | 1 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | 21 | | 1 | 1 | 2 | J | 0.9 | 1 | ND | U | 1 | 1 | 17 | | 1 | 1 | 13 | | 1 | 1 | 66 | | 1 | 1 | 10 | | 1 | 1 |
| Pyrene | 129-00-0 | 130 | ug/l | 8 | | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | 9 | | 1 | 1 | 6 | | 1 | 1 | 16 | | 1 | 1 | 1 | J | 1 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Dissolved) | 7439-92-1 | 5 | ug/l | 0.19 | J | 0.052 | 1 | ND | U | 0.052 | 1 | 0.13 | J | 0.052 | 1 | 6 | 0 | 0.052 | 1 | 0.37 | J | 0.052 | 1 | 0.068 | J | 0.052 | 1 | ND | U | 0.052 | 1 |

**Notes:**
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

**Qualifiers:**
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

**Table 11**
**Summary of Intermediate Groundwater Analytical Results**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location | W-1D | | | | W-9 | | | | W-13 | | | | W-19 | | | | W-26 | | | | W-32D | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | W-1D_04262011 | | | | W-9_04262011 | | | | W-13_04262011 | | | | W-19_04272011 | | | | W-26_04262011 | | | | W-32D_04272011 | | | |
| | | | Sample Date | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/27/2011 | | | | 4/26/2011 | | | | 4/27/2011 | | | |
| | | | Sample Matrix | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | |
| | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 62 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.05 | ug/l | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 53 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | 3500 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 0.6 | J | 0.5 | 1 | ND | U | 0.5 | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | 0.8 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Xylenes (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | ND | U | **10** | 1 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | ND | U | 10 | 1 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | ND | U | 10 | 1 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | ND | U | 10 | 1 |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 | ND | U | 1 | 1 | ND | U | 10 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Dissolved) | 7439-92-1 | 5 | ug/l | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 |

**Notes:**
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

**Qualifiers:**
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
10 - Compound exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500

**Table 12**
**Summary of Surface Water Analytical Results:**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PA Code Chapter 93 Surface Water Human Health Criteria | PA Code Chapter 93 Fish and Aquatic Life CCC | PA Code Chapter 93 Fish and Aquatic Life CMC | Location ID | SWS-1 | | | | SWS-1 | | | | SWS-2 | | | | SWS-2 | | | | SWS-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | SWS-1_040711 | | | | SWS-1_040711 FILTERED | | | | SWS-2_040711 | | | | SWS-2_040711 FILTERED | | | | SWS-3_040711 | | | |
| | | | | | Sample Date | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | |
| | | | | | Sample Matrix | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | |
| | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | ug/l | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | NS | NS | NS | ug/l | ND | U | 0.029 | 1 | -- | -- | -- | -- | ND | U | 0.029 | 1 | -- | -- | -- | -- | ND | U | 0.03 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 0.38 | 3100 | 15000 | ug/l | ND | U | **1** | 1 | -- | -- | -- | -- | ND | U | **1** | 1 | -- | -- | -- | -- | ND | U | **1** | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | NS | NS | NS | ug/l | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 |
| Benzene | 71-43-2 | 1.2 | 130 | 640 | ug/l | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 70000 | 210 | 1100 | ug/l | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 |
| Ethylbenzene | 100-41-4 | 530 | 580 | 2900 | ug/l | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | NS | NS | NS | ug/l | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | NS | NS | NS | ug/l | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 |
| Toluene | 108-88-3 | 1300 | 330 | 1700 | ug/l | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Fluorene | 86-73-7 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Naphthalene | 91-20-3 | NS | 43 | 140 | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Phenanthrene | 85-01-8 | NS | 1 | 5 | ug/l | ND | U | **5** | 1 | -- | -- | -- | -- | ND | U | **5** | 1 | -- | -- | -- | -- | ND | U | **5** | 1 |
| Pyrene | 129-00-0 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum (Dissolved) | 7429-90-5 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 200 | 1 | -- | -- | -- | -- | ND | U | 200 | 1 | -- | -- | -- | -- |
| Aluminum | 7429-90-5 | NS | NS | 750 | ug/l | ND | U | 200 | 1 | -- | -- | -- | -- | ND | U | 200 | 1 | ND | U | 200 | 1 | ND | U | 200 | 1 |
| Antimony (Dissolved) | 7440-36-0 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- |
| Antimony | 7440-36-0 | 5.6 | 220 | 1100 | ug/l | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | **20** | 1 | ND | U | 20 | 1 | ND | U | **20** | 1 |
| Arsenic (Dissolved) | 7440-38-2 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- |
| Arsenic | 7440-38-2 | 10 | 150 | 340 | ug/l | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | **20** | 1 | ND | U | 20 | 1 | ND | U | **20** | 1 |
| Barium (Dissolved) | 7440-39-3 | NS | NS | NS | ug/l | -- | -- | -- | -- | 40.8 | 0 | 5 | 1 | -- | -- | -- | -- | 93.9 | 0 | 5 | 1 | -- | -- | -- | -- |
| Barium | 7440-39-3 | 2400 | 4100 | 21000 | ug/l | 85.3 | 0 | 5 | 1 | -- | -- | -- | -- | 97.2 | 0 | 5 | 1 | 93.9 | 0 | 5 | 1 | 91 | 0 | 5 | 1 |
| Beryllium (Dissolved) | 7440-41-7 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Beryllium | 7440-41-7 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | ND | U | 5 | 1 | ND | U | 5 | 1 |
| Cadmium (Dissolved) | 7440-43-9 | NS | 0.71 | 8.80 | ug/l | -- | -- | -- | -- | ND | U | **5** | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Cadmium | 7440-43-9 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | ND | U | 5 | 1 | ND | U | 5 | 1 |
| Calcium (Dissolved) | 7440-70-2 | NS | NS | NS | ug/l | -- | -- | -- | -- | 67000 | 0 | 200 | 1 | -- | -- | -- | -- | 78000 | 0 | 200 | 1 | -- | -- | -- | -- |
| Calcium | 7440-70-2 | NS | NS | NS | ug/l | 68300 | 0 | 200 | 1 | -- | -- | -- | -- | 75700 | 0 | 200 | 1 | 78000 | 0 | 200 | 1 | 94300 | 0 | 200 | 1 |
| Chromium, Total (Dissolved) | 7440-47-3 | NS | 10.00 | 16.00 | ug/l | -- | -- | -- | -- | ND | U | **15** | 1 | -- | -- | -- | -- | ND | U | 15 | 1 | -- | -- | -- | -- |
| Chromium, Total | 7440-47-3 | NS | NS | NS | ug/l | ND | U | 15 | 1 | -- | -- | -- | -- | ND | U | 15 | 1 | ND | U | 15 | 1 | ND | U | 15 | 1 |
| Cobalt (Dissolved) | 7440-48-4 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Cobalt | 7440-48-4 | NS | 19 | 95 | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | ND | U | 5 | 1 | ND | U | 5 | 1 |
| Copper (Dissolved) | 7440-50-8 | NS | 986.68 | 1684.87 | ug/l | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- |
| Copper | 7440-50-8 | NS | NS | NS | ug/l | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 | ND | U | 10 | 1 | ND | U | 10 | 1 |
| Iron (Dissolved) | 7439-89-6 | NS | NS | NS | ug/l | -- | -- | -- | -- | 268 | 0 | 200 | 1 | -- | -- | -- | -- | 540 | 0 | 200 | 1 | -- | -- | -- | -- |
| Iron | 7439-89-6 | NS | NS | NS | ug/l | 740 | 0 | 200 | 1 | -- | -- | -- | -- | 1850 | 0 | 200 | 1 | 540 | 0 | 200 | 1 | 693 | 0 | 200 | 1 |

**Table 12**
**Summary of Surface Water Analytical Results:**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PA Code Chapter 93 Surface Water Human Health Criteria | PA Code Chapter 93 Fish and Aquatic Life CCC | PA Code Chapter 93 Fish and Aquatic Life CMC | Location ID | SWS-1 | | | | SWS-1 | | | | SWS-2 | | | | SWS-2 | | | | SWS-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | SWS-1_040711 | | | | SWS-1_040711 FILTERED | | | | SWS-2_040711 | | | | SWS-2_040711 FILTERED | | | | SWS-3_040711 | | | |
| | | | | | Sample Date | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | |
| | | | | | Sample Matrix | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | |
| | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Lead (Dissolved) | 7439-92-1 | NS | 3.47 | 215.91 | ug/l | -- | -- | -- | -- | ND | U | **15** | 1 | -- | -- | -- | -- | ND | U | 15 | 1 | -- | -- | -- | -- |
| Lead | 7439-92-1 | NS | NS | NS | ug/l | 19.3 | 0 | 15 | 1 | -- | -- | -- | -- | ND | U | 15 | 1 | ND | U | 15 | 1 | ND | U | 15 | 1 |
| Magnesium (Dissolved) | 7439-95-4 | NS | NS | NS | ug/l | -- | -- | -- | -- | 27500 | 0 | 100 | 1 | -- | -- | -- | -- | 33600 | 0 | 100 | 1 | -- | -- | -- | -- |
| Magnesium | 7439-95-4 | NS | NS | NS | ug/l | 28000 | 0 | 100 | 1 | -- | -- | -- | -- | 32100 | 0 | 100 | 1 | 33600 | 0 | 100 | 1 | 57600 | 0 | 100 | 1 |
| Manganese (Dissolved) | 7439-96-5 | NS | NS | NS | ug/l | -- | -- | -- | -- | 67.3 | 0 | 5 | 1 | -- | -- | -- | -- | 260 | 0 | 5 | 1 | -- | -- | -- | -- |
| Manganese | 7439-96-5 | NS | NS | NS | ug/l | 100 | 0 | 5 | 1 | -- | -- | -- | -- | 310 | 0 | 5 | 1 | 260 | 0 | 5 | 1 | 167 | 0 | 5 | 1 |
| Mercury (Dissolved) | 7439-97-6 | NS | 0.77 | 1.4 | ug/l | -- | -- | -- | -- | ND | U | 0.2 | 1 | -- | -- | -- | -- | ND | U | 0.2 | 1 | -- | -- | -- | -- |
| Mercury | 7439-97-6 | 0.05 | NS | NS | ug/l | ND | U | **0.2** | 1 | -- | -- | -- | -- | ND | U | **0.2** | 1 | ND | U | 0.2 | 1 | ND | U | **0.2** | 1 |
| Nickel (Dissolved) | 7440-02-0 | NS | 188.01 | 1692.75 | ug/l | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- | 18.1 | 0 | 10 | 1 | -- | -- | -- | -- |
| Nickel | 7440-02-0 | 610 | NS | NS | ug/l | ND | U | 10 | 1 | -- | -- | -- | -- | 18.2 | 0 | 10 | 1 | 18.1 | 0 | 10 | 1 | ND | U | 10 | 1 |
| Potassium (Dissolved) | 7440-09-7 | NS | NS | NS | ug/l | -- | -- | -- | -- | 5390 | 0 | 500 | 1 | -- | -- | -- | -- | 5670 | 0 | 500 | 1 | -- | -- | -- | -- |
| Potassium | 7440-09-7 | NS | NS | NS | ug/l | 5430 | 0 | 500 | 1 | -- | -- | -- | -- | 5630 | 0 | 500 | 1 | 5670 | 0 | 500 | 1 | 7250 | 0 | 500 | 1 |
| Selenium (Dissolved) | 7782-49-2 | NS | 4.6 | NS | ug/l | -- | -- | -- | -- | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- |
| Selenium | 7782-49-2 | NS | NS | NS | ug/l | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | ND | U | 20 | 1 | ND | U | 20 | 1 |
| Silver (Dissolved) | 7440-22-4 | NS | NS | 23235308.62 | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Silver | 7440-22-4 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | ND | U | 5 | 1 | ND | U | 5 | 1 |
| Sodium (Dissolved) | 7440-23-5 | NS | NS | NS | ug/l | -- | -- | -- | -- | 18800 | 0 | 1000 | 1 | -- | -- | -- | -- | 19100 | 0 | 1000 | 1 | -- | -- | -- | -- |
| Sodium | 7440-23-5 | NS | NS | NS | ug/l | 18700 | 0 | 1000 | 1 | -- | -- | -- | -- | 18700 | 0 | 1000 | 1 | 19100 | 0 | 1000 | 1 | 22800 | 0 | 1000 | 1 |
| Thallium (Dissolved) | 7440-28-0 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 30 | 1 | -- | -- | -- | -- | ND | U | 30 | 1 | -- | -- | -- | -- |
| Thallium | 7440-28-0 | 0.24 | 13 | 65 | ug/l | ND | U | **30** | 1 | -- | -- | -- | -- | ND | U | **30** | 1 | ND | U | 30 | 1 | ND | U | **30** | 1 |
| Vanadium (Dissolved) | 7440-62-2 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Vanadium | 7440-62-2 | NS | 100 | 510 | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | ND | U | 5 | 1 | ND | U | 5 | 1 |
| Zinc (Dissolved) | 7440-66-6 | NS | 427.94 | 424.46 | ug/l | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | 109 | 0 | 20 | 1 | -- | -- | -- | -- |
| Zinc | 7440-66-6 | NS | NS | NS | ug/l | 29.5 | 0 | 20 | 1 | -- | -- | -- | -- | 138 | 0 | 20 | 1 | 109 | 0 | 20 | 1 | 42.5 | 0 | 20 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lime (As Calcium Carbonate) | 471-34-1 | NS | NS | NS | mg/l | 270 | | 6 | 2 | -- | -- | -- | -- | 327 | | 15 | 5 | -- | -- | -- | -- | 487 | | 15 | 5 |

**Notes:**
DF - Dilution Factor
ug/l - micrograms per kilogram
mg/l - milligrams per kilogram
CCC - Criteria Continous Concentration PA Title 25, Chapter 93.8
CMC - Criteria Maximum Concentration PA Title 25, Chapter 93.8
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
-- - No Data Available

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

**Exceedance Summary:**
**10** - RL exceeds at least on the Surface Water Criteria
**10** - Concentration exceeds the PA Code Chapter 93 Surface Water Human Health Criteria
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CCC
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CMC

**Table 12**
**Summary of Surface Water Analytical Results:**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PA Code Chapter 93 Surface Water Human Health Criteria | PA Code Chapter 93 Fish and Aquatic Life CCC | PA Code Chapter 93 Fish and Aquatic Life CMC | Location ID | SWS-3 | | | | SWS-4 | | | | SWS-4 | | | | SWS-5 | | | | SWS-5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | SWS-3_040711 FILTERED | | | | SWS-4_040711 | | | | SWS-4_040711 FILTERED | | | | SWS-5_040711 | | | | SWS-5_040711 FILTERED | | | |
| | | | | | Sample Date | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | |
| | | | | | Sample Matrix | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | |
| | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 0.029 | 1 | -- | -- | -- | -- | ND | U | 0.03 | 1 | -- | -- | -- | -- |
| 1,2-Dichloroethane | 107-06-2 | 0.38 | 3100 | 15000 | ug/l | -- | -- | -- | -- | ND | U | **1** | 1 | -- | -- | -- | -- | ND | U | **1** | 1 | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- |
| Benzene | 71-43-2 | 1.2 | 130 | 640 | ug/l | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 70000 | 210 | 1100 | ug/l | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- |
| Ethylbenzene | 100-41-4 | 530 | 580 | 2900 | ug/l | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- |
| Isopropylbenzene (Cumene) | 98-82-8 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- | ND | U | 2 | 1 | -- | -- | -- | -- |
| Tert-Butyl Methyl Ether | 1634-04-4 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- |
| Toluene | 108-88-3 | 1300 | 330 | 1700 | ug/l | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- | ND | U | 1 | 1 | -- | -- | -- | -- |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Fluorene | 86-73-7 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Naphthalene | 91-20-3 | NS | 43 | 140 | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Phenanthrene | 85-01-8 | NS | 1 | 5 | ug/l | -- | -- | -- | -- | ND | U | **5** | 1 | -- | -- | -- | -- | ND | U | **5** | 1 | -- | -- | -- | -- |
| Pyrene | 129-00-0 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum (Dissolved) | 7429-90-5 | NS | NS | NS | ug/l | ND | U | 200 | 1 | -- | -- | -- | -- | ND | U | 200 | 1 | -- | -- | -- | -- | ND | U | 200 | 1 |
| Aluminum | 7429-90-5 | NS | NS | 750 | ug/l | -- | -- | -- | -- | ND | U | 200 | 1 | -- | -- | -- | -- | 217 | 0 | 200 | 1 | -- | -- | -- | -- |
| Antimony (Dissolved) | 7440-36-0 | NS | NS | NS | ug/l | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 |
| Antimony | 7440-36-0 | 5.6 | 220 | 1100 | ug/l | -- | -- | -- | -- | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | **20** | 1 | -- | -- | -- | -- |
| Arsenic (Dissolved) | 7440-38-2 | NS | NS | NS | ug/l | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 |
| Arsenic | 7440-38-2 | 10 | 150 | 340 | ug/l | -- | -- | -- | -- | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | **20** | 1 | -- | -- | -- | -- |
| Barium (Dissolved) | 7440-39-3 | NS | NS | NS | ug/l | 82.3 | 0 | 5 | 1 | -- | -- | -- | -- | 124 | 0 | 5 | 1 | -- | -- | -- | -- | 111 | 0 | 5 | 1 |
| Barium | 7440-39-3 | 2400 | 4100 | 21000 | ug/l | -- | -- | -- | -- | 138 | 0 | 5 | 1 | -- | -- | -- | -- | 124 | 0 | 5 | 1 | -- | -- | -- | -- |
| Beryllium (Dissolved) | 7440-41-7 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Beryllium | 7440-41-7 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Cadmium (Dissolved) | 7440-43-9 | NS | 0.71 | 8.80 | ug/l | ND | U | **5** | 1 | -- | -- | -- | -- | ND | U | **5** | 1 | -- | -- | -- | -- | ND | U | **5** | 1 |
| Cadmium | 7440-43-9 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Calcium (Dissolved) | 7440-70-2 | NS | NS | NS | ug/l | 91600 | 0 | 200 | 1 | -- | -- | -- | -- | 119000 | 0 | 200 | 1 | -- | -- | -- | -- | 109000 | 0 | 200 | 1 |
| Calcium | 7440-70-2 | NS | NS | NS | ug/l | -- | -- | -- | -- | 119000 | 0 | 200 | 1 | -- | -- | -- | -- | 110000 | 0 | 200 | 1 | -- | -- | -- | -- |
| Chromium, Total (Dissolved) | 7440-47-3 | NS | 10.00 | 16.00 | ug/l | ND | U | **15** | 1 | -- | -- | -- | -- | ND | U | **15** | 1 | -- | -- | -- | -- | ND | U | **15** | 1 |
| Chromium, Total | 7440-47-3 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 15 | 1 | -- | -- | -- | -- | ND | U | 15 | 1 | -- | -- | -- | -- |
| Cobalt (Dissolved) | 7440-48-4 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Cobalt | 7440-48-4 | NS | 19 | 95 | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Copper (Dissolved) | 7440-50-8 | NS | 986.68 | 1684.87 | ug/l | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 |
| Copper | 7440-50-8 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- |
| Iron (Dissolved) | 7439-89-6 | NS | NS | NS | ug/l | ND | U | 200 | 1 | -- | -- | -- | -- | ND | U | 200 | 1 | -- | -- | -- | -- | ND | U | 200 | 1 |
| Iron | 7439-89-6 | NS | NS | NS | ug/l | -- | -- | -- | -- | 1600 | 0 | 200 | 1 | -- | -- | -- | -- | 1470 | 0 | 200 | 1 | -- | -- | -- | -- |

**Table 12**
**Summary of Surface Water Analytical Results:**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | PA Code Chapter 93 Surface Water Human Health Criteria | PA Code Chapter 93 Fish and Aquatic Life CCC | PA Code Chapter 93 Fish and Aquatic Life CMC | Location ID | SWS-3 | | | | SWS-4 | | | | SWS-4 | | | | SWS-5 | | | | SWS-5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sample ID | SWS-3_040711 FILTERED | | | | SWS-4_040711 | | | | SWS-4_040711 FILTERED | | | | SWS-5_040711 | | | | SWS-5_040711 FILTERED | | | |
| | | | | | Sample Date | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | |
| | | | | | Sample Matrix | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | | Surface Water | | | |
| | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| Lead (Dissolved) | 7439-92-1 | NS | 3.47 | 215.91 | ug/l | ND | U | **15** | 1 | -- | -- | -- | -- | ND | U | **15** | 1 | -- | -- | -- | -- | ND | U | **15** | 1 |
| Lead | 7439-92-1 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 15 | 1 | -- | -- | -- | -- | ND | U | 15 | 1 | -- | -- | -- | -- |
| Magnesium (Dissolved) | 7439-95-4 | NS | NS | NS | ug/l | 56400 | 0 | 100 | 1 | -- | -- | -- | -- | 74700 | 0 | 100 | 1 | -- | -- | -- | -- | 70400 | 0 | 100 | 1 |
| Magnesium | 7439-95-4 | NS | NS | NS | ug/l | -- | -- | -- | -- | 74700 | 0 | 100 | 1 | -- | -- | -- | -- | 69600 | 0 | 100 | 1 | -- | -- | -- | -- |
| Manganese (Dissolved) | 7439-96-5 | NS | NS | NS | ug/l | 8.1 | 0 | 5 | 1 | -- | -- | -- | -- | 197 | 0 | 5 | 1 | -- | -- | -- | -- | 94.3 | 0 | 5 | 1 |
| Manganese | 7439-96-5 | NS | NS | NS | ug/l | -- | -- | -- | -- | 426 | 0 | 5 | 1 | -- | -- | -- | -- | 304 | 0 | 5 | 1 | -- | -- | -- | -- |
| Mercury (Dissolved) | 7439-97-6 | NS | 0.77 | 1.4 | ug/l | ND | U | 0.2 | 1 | -- | -- | -- | -- | ND | U | 0.2 | 1 | -- | -- | -- | -- | ND | U | 0.2 | 1 |
| Mercury | 7439-97-6 | 0.05 | NS | NS | ug/l | -- | -- | -- | -- | ND | U | **0.2** | 1 | -- | -- | -- | -- | ND | U | **0.2** | 1 | -- | -- | -- | -- |
| Nickel (Dissolved) | 7440-02-0 | NS | 188.01 | 1692.75 | ug/l | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 |
| Nickel | 7440-02-0 | 610 | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- | ND | U | 10 | 1 | -- | -- | -- | -- |
| Potassium (Dissolved) | 7440-09-7 | NS | NS | NS | ug/l | 7100 | 0 | 500 | 1 | -- | -- | -- | -- | 11000 | 0 | 500 | 1 | -- | -- | -- | -- | 10300 | 0 | 500 | 1 |
| Potassium | 7440-09-7 | NS | NS | NS | ug/l | -- | -- | -- | -- | 11100 | 0 | 500 | 1 | -- | -- | -- | -- | 10400 | 0 | 500 | 1 | -- | -- | -- | -- |
| Selenium (Dissolved) | 7782-49-2 | NS | 4.6 | NS | ug/l | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | **20** | 1 | -- | -- | -- | -- | ND | U | **20** | 1 |
| Selenium | 7782-49-2 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- |
| Silver (Dissolved) | 7440-22-4 | NS | NS | 23235308.62 | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Silver | 7440-22-4 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Sodium (Dissolved) | 7440-23-5 | NS | NS | NS | ug/l | 21600 | 0 | 1000 | 1 | -- | -- | -- | -- | 18500 | 0 | 1000 | 1 | -- | -- | -- | -- | 17300 | 0 | 1000 | 1 |
| Sodium | 7440-23-5 | NS | NS | NS | ug/l | -- | -- | -- | -- | 17800 | 0 | 1000 | 1 | -- | -- | -- | -- | 17100 | -- | 1000 | 1 | -- | -- | -- | -- |
| Thallium (Dissolved) | 7440-28-0 | NS | NS | NS | ug/l | ND | U | 30 | 1 | -- | -- | -- | -- | ND | U | 30 | 1 | -- | -- | -- | -- | ND | U | 30 | 1 |
| Thallium | 7440-28-0 | 0.24 | 13 | 65 | ug/l | -- | -- | -- | -- | ND | U | **30** | 1 | -- | -- | -- | -- | ND | U | **30** | 1 | -- | -- | -- | -- |
| Vanadium (Dissolved) | 7440-62-2 | NS | NS | NS | ug/l | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 |
| Vanadium | 7440-62-2 | NS | 100 | 510 | ug/l | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- | ND | U | 5 | 1 | -- | -- | -- | -- |
| Zinc (Dissolved) | 7440-66-6 | NS | 427.94 | 424.46 | ug/l | 21.8 | 0 | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 |
| Zinc | 7440-66-6 | NS | NS | NS | ug/l | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- | ND | U | 20 | 1 | -- | -- | -- | -- |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lime (As Calcium Carbonate) | 471-34-1 | NS | NS | NS | mg/l | -- | -- | -- | -- | 614 | | 15 | 5 | -- | -- | -- | -- | 586 | | 15 | 5 | -- | | -- | -- |

**Notes:**
DF - Dilution Factor
ug/l - micrograms per kilogram
mg/l - milligrams per kilogram
CCC - Criteria Continous Concentration PA Title 25, Chapter 93.8
CMC - Criteria Maximum Concentration PA Title 25, Chapter 93.8
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard
-- - No Data Available

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate)

**Exceedance Summary:**
**10** - RL exceeds at least on the Surface Water Criteria
**10** - Concentration exceeds the PA Code Chapter 93 Surface Water Human Health Criteria
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CCC
10 - Concentration exceeds the PA Code Chapter 93 Fish and Aquatic Life CMC

**Table 13**
**Summary of Sediment Analytical Results**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, PA**

| Chemical Name | CAS No | SEL [or equivalent] Ecological Screening Criteria (mg/kg) | | LEL [or equivalent] Ecological Screening Criteria (mg/kg) | | PADEP's Residential Soil MSC: 0-15 ft bgs | Location ID | SED-1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | SED-1_040711 | | | |
| | | | | | | | Sample Date | 4/7/2011 | | | |
| | | | | | | | Sample Matrix | Sediment | | | |
| | | | | | | | Unit | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | | NS | | 130.00 | mg/kg | ND | U | 0.01 | 1.06 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | NS | | NS | | 0.01 | mg/kg | ND | U | 0.01 | 1.06 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | | 0.29 | e | 60.00 | mg/kg | ND | U | 0.01 | 1.06 |
| 1,2-Dichloroethane | 107-06-2 | NS | | 0.26 | e | 0.50 | mg/kg | ND | U | 0.01 | 1.06 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | NS | | NS | | 110.00 | mg/kg | ND | U | 0.01 | 1.06 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | | 1.32 | e | 60.00 | mg/kg | ND | U | 0.01 | 1.06 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | | 0.32 | e | 7.50 | mg/kg | ND | U | 0.01 | 1.06 |
| 1-Methylnaphthalene | 90-12-0 | NS | | NS | | NS | mg/kg | 6 | | 0.31 | 100 |
| Benzene | 71-43-2 | NS | | 0.14 | e | 0.50 | mg/kg | 0.01 | | 0.01 | 1.06 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | NS | | 0.43 | e | 1000.00 | mg/kg | ND | U | 0.01 | 1.06 |
| Ethylbenzene | 100-41-4 | NS | | 0.18 | e | 70.00 | mg/kg | ND | U | 0.01 | 1.06 |
| Isopropylbenzene (Cumene) | 98-82-8 | NS | | NS | | 84.00 | mg/kg | ND | U | 0.01 | 1.06 |
| Tert-Butyl Methyl Ether | 1634-04-4 | NS | | NS | | 2.00 | mg/kg | ND | U | 0.01 | 1.06 |
| Toluene | 108-88-3 | NS | | 1.22 | e | 100.00 | mg/kg | ND | U | 0.01 | 1.06 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | |
| 2,4-Dimethylphenol | 105-67-9 | NS | | 0.30 | e | 73.00 | mg/kg | ND | U | 3.1 | 10 |
| 2,4-Dinitrophenol | 51-28-5 | NS | | 0.01 | e | 7.30 | mg/kg | ND | U | 18 | 10 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | NS | | 0.06 | e | 180.00 | mg/kg | ND | U | 3.1 | 10 |
| 2-Nitrophenol | 88-75-5 | NS | | NS | | 29.00 | mg/kg | ND | U | 3.1 | 10 |
| 6-Methylchrysene | 1705-85-7 | NS | | NS | | NS | mg/kg | ND | U | 3.1 | 10 |
| Anthracene | 120-12-7 | 0.37 | a | 0.22 | c | 35.00 | mg/kg | **0.66** | | 0.031 | 10 |
| Benzenethiol | 108-98-5 | NS | | NS | | NS | mg/kg | ND | U | 18 | 10 |
| Benzo(A)Anthracene | 56-55-3 | 1.48 | a | 0.32 | c | 2.50 | mg/kg | **0.52** | | 0.031 | 10 |
| Benzo(A)Pyrene | 50-32-8 | 1.44 | a | 0.37 | c | 0.57 | mg/kg | **0.54** | | 0.031 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | NS | | 10.40 | e | 4.00 | mg/kg | 0.55 | | 0.031 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.32 | a | 0.17 | c | 18.00 | mg/kg | **0.64** | | 0.031 | 10 |
| Benzo(K)Fluoranthene | 207-08-9 | 1.34 | a | 0.24 | c | 57.00 | mg/kg | ND | U | 3.1 | 10 |
| Benzyl Butyl Phthalate | 85-68-7 | NS | | 1.97 | e | 300.00 | mg/kg | ND | U | 3.1 | 10 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | NS | | 0.18 | e | 13.00 | mg/kg | ND | U | 6.2 | 10 |
| Chrysene | 218-01-9 | 0.46 | a | 0.34 | c | 23.00 | mg/kg | **0.89** | | 0.031 | 10 |
| Dibenz(A,H)Acridine | 226-36-8 | NS | | NS | | NS | mg/kg | ND | U | 3.1 | 10 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.13 | a | 0.06 | c | 0.57 | mg/kg | ND | U | 3.1 | 10 |
| Diethyl Phthalate | 84-66-2 | NS | | NS | | 2900.00 | mg/kg | ND | U | 3.1 | 10 |
| Dimethyl Phthalate | 131-11-3 | NS | | 0.32 | e | NS | mg/kg | ND | U | 3.1 | 10 |
| Di-N-Butyl Phthalate | 84-74-2 | NS | | NS | | 370.00 | mg/kg | ND | U | 3.1 | 10 |
| Di-N-Octylphthalate | 117-84-0 | NS | | NS | | 1000.00 | mg/kg | ND | U | 3.1 | 10 |
| Fluoranthene | 206-44-0 | 1.02 | a | 0.75 | c | 320.00 | mg/kg | ND | U | 3.1 | 10 |
| Fluorene | 86-73-7 | 4.792 | a | 0.19 | c | 300.00 | mg/kg | **0.36** | | 0.031 | 10 |
| Naphthalene | 91-20-3 | NS | | 0.16 | d | 10.00 | mg/kg | **7.7** | | 0.31 | 100 |
| Phenanthrene | 85-01-8 | 0.16 | a | 0.56 | c | 1000.00 | mg/kg | **2.3** | | 0.031 | 10 |
| Phenol | 108-95-2 | NS | | 0.05 | e | 200.00 | mg/kg | ND | U | 3.1 | 10 |
| Pyrene | 129-00-0 | 0.85 | a | 0.49 | c | 220.00 | mg/kg | **1.2** | | 0.031 | 10 |
| **Metals** | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | | NS | | 190000.00 | mg/kg | 15400 | | 36.4 | 1 |
| Antimony | 7440-36-0 | NS | | 2.00 | d | 2.70 | mg/kg | ND | U | 3.64 | 1 |
| Arsenic | 7440-38-2 | 33 | b | 6.00 | c | 2.90 | mg/kg | **24** | | 3.64 | 1 |
| Barium | 7440-39-3 | NS | | NS | | 820.00 | mg/kg | 331 | | 0.909 | 1 |
| Beryllium | 7440-41-7 | NS | | NS | | 32.00 | mg/kg | 1.12 | | 0.909 | 1 |
| Cadmium | 7440-43-9 | 10 | b | 0.60 | c | 3.80 | mg/kg | **2.22** | | 0.909 | 1 |
| Calcium | 7440-70-2 | NS | | NS | | NS | mg/kg | 4150 | | 36.4 | 1 |
| Chromium, Total | 7440-47-3 | 110 | b | 26.00 | c | NS | mg/kg | **89.7** | | 2.73 | 1 |
| Cobalt | 7440-48-4 | NS | | 50.00 | e | 5.00 | mg/kg | 15 | | 0.909 | 1 |
| Copper | 7440-50-8 | 110 | b | 16.00 | c | 4300.00 | mg/kg | **573** | | 1.82 | 1 |
| Iron | 7439-89-6 | 40000 | b | 20000.00 | c | 150000.00 | mg/kg | **44500** | | 36.4 | 1 |
| Lead | 7439-92-1 | 250 | b | 31.00 | c | 45.00 | mg/kg | **3610** | | 13.6 | 5 |
| Magnesium | 7439-95-4 | NS | | NS | | NS | mg/kg | 3370 | | 18.2 | 1 |
| Manganese | 7439-96-5 | 1100 | b | 460.00 | c | 200.00 | mg/kg | **461** | | 0.909 | 1 |
| Mercury | 7439-97-6 | 2 | b | 0.20 | c | 1.00 | mg/kg | **3.59** | | 0.882 | 5 |
| Nickel | 7440-02-0 | 75 | b | 16.00 | c | 65.00 | mg/kg | **45.6** | | 1.82 | 1 |
| Potassium | 7440-09-7 | NS | | NS | | NS | mg/kg | 1780 | | 90.9 | 1 |
| Selenium | 7782-49-2 | NS | | NS | | 5.00 | mg/kg | 5.3 | | 3.64 | 1 |
| Silver | 7440-22-4 | NS | | 1.00 | d | 10.00 | mg/kg | **2.96** | | 0.909 | 1 |
| Sodium | 7440-23-5 | NS | | NS | | NS | mg/kg | 264 | | 182 | 1 |
| Thallium | 7440-28-0 | NS | | NS | | 1.40 | mg/kg | ND | U | 5.46 | 1 |
| Vanadium | 7440-62-2 | NS | | NS | | 1500.00 | mg/kg | 68 | | 0.909 | 1 |
| Zinc | 7440-66-6 | 820 | b | 120.00 | c | 1200.00 | mg/kg | **503** | | 3.64 | 1 |
| **General Chemistry** | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | | NS | | NS | % | 46.1 | | 0.5 | 1 |
| Total Organic Carbon | TOC | 100000 | b | 10000 | c | NS | mg/kg | **302000** | | 18300 | 1 |
| **Grain Size Analysis** | | | | | | | | | | | |
| 0.001 Mm | GS.001MM | NS | | NS | | NS | % passing | 1 | | 1 | 1 |
| 0.002 Mm | GS.002MM | NS | | NS | | NS | % passing | 2 | | 1 | 1 |
| 0.005 Mm | GS.005MM | NS | | NS | | NS | % passing | 6 | | 1 | 1 |
| 0.02 Mm | GS.02MM | NS | | NS | | NS | % passing | 13 | | 1 | 1 |
| 0.05 Mm | GS.05MM | NS | | NS | | NS | % passing | 22 | | 1 | 1 |
| 0.064 Mm | GS.064MM | NS | | NS | | NS | % passing | 28 | | 1 | 1 |
| 0.075 Mm | GS.075MM | NS | | NS | | NS | % passing | 30.7 | | 1 | 1 |
| 0.15 Mm | GS.15MM | NS | | NS | | NS | % passing | 37.3 | | 1 | 1 |
| 0.3 Mm | GS.3MM | NS | | NS | | NS | % passing | 45 | | 1 | 1 |
| 0.6 Mm | GS.6MM | NS | | NS | | NS | % passing | 52.3 | | 1 | 1 |
| 1.18 Mm | GS1.18MM | NS | | NS | | NS | % passing | 60.7 | | 1 | 1 |
| 2.36 Mm | GS2.36MM | NS | | NS | | NS | % passing | 68.8 | | 1 | 1 |
| 3.35 Mm | GS3.35MM | NS | | NS | | NS | % passing | 78.3 | | 1 | 1 |
| 4.75 Mm | GS4.75MM | NS | | NS | | NS | % passing | 84.6 | | 1 | 1 |
| 19 Mm | GS19MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 |
| 37.5 Mm | GS37.5MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 |
| 75 Mm | GS75MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 |

**Notes:**

15 Result is greater than the 'SEL' criteria [as defined by the hierarchy below]
**15** Result is greater than the 'LEL' criteria [as defined by the hierarchy below]
15 Result is greater than the PADEP Residential Soil MSC for surface soils between 0 and 15ft. bgs

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated)
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

The hierarchy for selecting the SEL:
a. Calculated Site Specific SEL using site specific TOC (302,000 mg/kg)
b. Ontario Sediment SEL (if no Site Specific SEL is available)
The hierarchy for selecting the LEL:
c. Ontario Sediment LEL
d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

***Data Qualifiers***

U Compound analyzed but not detected at a level greater than or equal to the MDL.

**Table 13**
**Summary of Sediment Analytical Results**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, PA**

| Chemical Name | CAS No | SEL [or equivalent] Ecological Screening Criteria (mg/kg) | | LEL [or equivalent] Ecological Screening Criteria (mg/kg) | | PADEP's Residential Soil MSC: 0-15 ft bgs | Location ID | SED-2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | SED-2_040711 | | | |
| | | | | | | | Sample Date | 4/7/2011 | | | |
| | | | | | | | Sample Matrix | Sediment | | | |
| | | | | | | | Unit | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | | NS | | 130.00 | mg/kg | ND | U | 0.014 | 1.15 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | NS | | NS | | 0.01 | mg/kg | ND | U | 0.014 | 1.15 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | | 0.29 | e | 60.00 | mg/kg | ND | U | 0.014 | 1.15 |
| 1,2-Dichloroethane | 107-06-2 | NS | | 0.26 | e | 0.50 | mg/kg | ND | U | 0.014 | 1.15 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | NS | | NS | | 110.00 | mg/kg | ND | U | 0.014 | 1.15 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | | 1.32 | e | 60.00 | mg/kg | ND | U | 0.014 | 1.15 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | | 0.32 | e | 7.50 | mg/kg | ND | U | 0.014 | 1.15 |
| 1-Methylnaphthalene | 90-12-0 | NS | | NS | | NS | mg/kg | ND | U | 0.039 | 10 |
| Benzene | 71-43-2 | NS | | 0.14 | e | 0.50 | mg/kg | ND | U | 0.014 | 1.15 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | NS | | 0.43 | e | 1000.00 | mg/kg | ND | U | 0.014 | 1.15 |
| Ethylbenzene | 100-41-4 | NS | | 0.18 | e | 70.00 | mg/kg | ND | U | 0.014 | 1.15 |
| Isopropylbenzene (Cumene) | 98-82-8 | NS | | NS | | 84.00 | mg/kg | ND | U | 0.014 | 1.15 |
| Tert-Butyl Methyl Ether | 1634-04-4 | NS | | NS | | 2.00 | mg/kg | ND | U | 0.014 | 1.15 |
| Toluene | 108-88-3 | NS | | 1.22 | e | 100.00 | mg/kg | ND | U | 0.014 | 1.15 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | |
| 2,4-Dimethylphenol | 105-67-9 | NS | | 0.30 | e | 73.00 | mg/kg | ND | U | 4 | 10 |
| 2,4-Dinitrophenol | 51-28-5 | NS | | 0.01 | e | 7.30 | mg/kg | ND | U | 24 | 10 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | NS | | 0.06 | e | 180.00 | mg/kg | ND | U | 4 | 10 |
| 2-Nitrophenol | 88-75-5 | NS | | NS | | 29.00 | mg/kg | ND | U | 4 | 10 |
| 6-Methylchrysene | 1705-85-7 | NS | | NS | | NS | mg/kg | ND | U | 4 | 10 |
| Anthracene | 120-12-7 | 0.05957 | a | 0.22 | c | 35.00 | mg/kg | ND | U | 0.039 | 10 |
| Benzenethiol | 108-98-5 | NS | | NS | | NS | mg/kg | ND | U | 24 | 10 |
| Benzo(A)Anthracene | 56-55-3 | 0.23828 | a | 0.32 | c | 2.50 | mg/kg | ND | U | 0.039 | 10 |
| Benzo(A)Pyrene | 50-32-8 | 0.23184 | a | 0.37 | c | 0.57 | mg/kg | ND | U | 0.039 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | NS | | 10.40 | e | 4.00 | mg/kg | ND | U | 0.039 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.05152 | a | 0.17 | c | 18.00 | mg/kg | ND | U | 0.039 | 10 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.21574 | a | 0.24 | c | 57.00 | mg/kg | ND | U | 4 | 10 |
| Benzyl Butyl Phthalate | 85-68-7 | NS | | 1.97 | e | 300.00 | mg/kg | ND | U | 4 | 10 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | NS | | 0.18 | e | 13.00 | mg/kg | ND | U | 7.9 | 10 |
| Chrysene | 218-01-9 | 0.07406 | a | 0.34 | c | 23.00 | mg/kg | ND | U | 0.039 | 10 |
| Dibenz(A,H)Acridine | 226-36-8 | NS | | NS | | NS | mg/kg | ND | U | 4 | 10 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.02093 | a | 0.06 | c | 0.57 | mg/kg | ND | U | 4 | 10 |
| Diethyl Phthalate | 84-66-2 | NS | | NS | | 2900.00 | mg/kg | ND | U | 4 | 10 |
| Dimethyl Phthalate | 131-11-3 | NS | | 0.32 | e | NS | mg/kg | ND | U | 4 | 10 |
| Di-N-Butyl Phthalate | 84-74-2 | NS | | NS | | 370.00 | mg/kg | ND | U | 4 | 10 |
| Di-N-Octylphthalate | 117-84-0 | NS | | NS | | 1000.00 | mg/kg | ND | U | 4 | 10 |
| Fluoranthene | 206-44-0 | 0.16422 | a | 0.75 | c | 320.00 | mg/kg | ND | U | 4 | 10 |
| Fluorene | 86-73-7 | 0.771512 | a | 0.19 | c | 300.00 | mg/kg | ND | U | 0.039 | 10 |
| Naphthalene | 91-20-3 | NS | | 0.16 | d | 10.00 | mg/kg | ND | U | 0.039 | 10 |
| Phenanthrene | 85-01-8 | 0.02576 | a | 0.56 | c | 1000.00 | mg/kg | ND | U | 0.039 | 10 |
| Phenol | 108-95-2 | NS | | 0.05 | e | 200.00 | mg/kg | ND | U | 4 | 10 |
| Pyrene | 129-00-0 | 0.13685 | a | 0.49 | c | 220.00 | mg/kg | ND | U | 0.039 | 10 |
| **Metals** | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | | NS | | 190000.00 | mg/kg | 35900 | | 47.5 | 1 |
| Antimony | 7440-36-0 | NS | | 2.00 | d | 2.70 | mg/kg | ND | U | 4.75 | 1 |
| Arsenic | 7440-38-2 | 33 | b | 6.00 | c | 2.90 | mg/kg | **91.7** | | 4.75 | 1 |
| Barium | 7440-39-3 | NS | | NS | | 820.00 | mg/kg | 832 | | 1.19 | 1 |
| Beryllium | 7440-41-7 | NS | | NS | | 32.00 | mg/kg | ND | U | 1.19 | 1 |
| Cadmium | 7440-43-9 | 10 | b | 0.60 | c | 3.80 | mg/kg | **2.03** | | 1.19 | 1 |
| Calcium | 7440-70-2 | NS | | NS | | NS | mg/kg | 166000 | | 238 | 5 |
| Chromium, Total | 7440-47-3 | 110 | b | 26.00 | c | NS | mg/kg | **186** | | 3.56 | 1 |
| Cobalt | 7440-48-4 | NS | | 50.00 | e | 5.00 | mg/kg | 14.2 | | 1.19 | 1 |
| Copper | 7440-50-8 | 110 | b | 16.00 | c | 4300.00 | mg/kg | **425** | | 2.38 | 1 |
| Iron | 7439-89-6 | 40000 | b | 20000.00 | c | 150000.00 | mg/kg | **21300** | | 47.5 | 1 |
| Lead | 7439-92-1 | 250 | b | 31.00 | c | 45.00 | mg/kg | **897** | | 3.56 | 1 |
| Magnesium | 7439-95-4 | NS | | NS | | NS | mg/kg | 31600 | | 23.8 | 1 |
| Manganese | 7439-96-5 | 1100 | b | 460.00 | c | 200.00 | mg/kg | **1140** | | 1.19 | 1 |
| Mercury | 7439-97-6 | 2 | b | 0.20 | c | 1.00 | mg/kg | ND | U | 0.229 | 1 |
| Nickel | 7440-02-0 | 75 | b | 16.00 | c | 65.00 | mg/kg | **207** | | 2.38 | 1 |
| Potassium | 7440-09-7 | NS | | NS | | NS | mg/kg | 1300 | | 119 | 1 |
| Selenium | 7782-49-2 | NS | | NS | | 5.00 | mg/kg | ND | U | 4.75 | 1 |
| Silver | 7440-22-4 | NS | | 1.00 | d | 10.00 | mg/kg | **2.01** | | 1.19 | 1 |
| Sodium | 7440-23-5 | NS | | NS | | NS | mg/kg | 793 | | 238 | 1 |
| Thallium | 7440-28-0 | NS | | NS | | 1.40 | mg/kg | ND | U | 7.13 | 1 |
| Vanadium | 7440-62-2 | NS | | NS | | 1500.00 | mg/kg | 287 | | 1.19 | 1 |
| Zinc | 7440-66-6 | 820 | b | 120.00 | c | 1200.00 | mg/kg | **738** | | 4.75 | 1 |
| **General Chemistry** | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | | NS | | NS | % | 57.9 | | 0.5 | 1 |
| Total Organic Carbon | TOC | 100000 | b | 10000 | c | NS | mg/kg | **16100** | | 6490 | 1 |
| **Grain Size Analysis** | | | | | | | | | | | |
| 0.001 Mm | GS.001MM | NS | | NS | | NS | % passing | ND | U | 1 | 1 |
| 0.002 Mm | GS.002MM | NS | | NS | | NS | % passing | ND | U | 1 | 1 |
| 0.005 Mm | GS.005MM | NS | | NS | | NS | % passing | ND | U | 1 | 1 |
| 0.02 Mm | GS.02MM | NS | | NS | | NS | % passing | 4 | | 1 | 1 |
| 0.05 Mm | GS.05MM | NS | | NS | | NS | % passing | 8.5 | | 1 | 1 |
| 0.064 Mm | GS.064MM | NS | | NS | | NS | % passing | 10.5 | | 1 | 1 |
| 0.075 Mm | GS.075MM | NS | | NS | | NS | % passing | 11.6 | | 1 | 1 |
| 0.15 Mm | GS.15MM | NS | | NS | | NS | % passing | 14.4 | | 1 | 1 |
| 0.3 Mm | GS.3MM | NS | | NS | | NS | % passing | 23.3 | | 1 | 1 |
| 0.6 Mm | GS.6MM | NS | | NS | | NS | % passing | 48.1 | | 1 | 1 |
| 1.18 Mm | GS1.18MM | NS | | NS | | NS | % passing | 65 | | 1 | 1 |
| 2.36 Mm | GS2.36MM | NS | | NS | | NS | % passing | 79 | | 1 | 1 |
| 3.35 Mm | GS3.35MM | NS | | NS | | NS | % passing | 84 | | 1 | 1 |
| 4.75 Mm | GS4.75MM | NS | | NS | | NS | % passing | 88.2 | | 1 | 1 |
| 19 Mm | GS19MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 |
| 37.5 Mm | GS37.5MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 |
| 75 Mm | GS75MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 |

**Notes:**

| | |
|---|---|
| 15 | Result is greater than the 'SEL' criteria [as defined by the hierarchy below] |
| **15** | Result is greater than the 'LEL' criteria [as defined by the hierarchy below] |
| 15 | Result is greater than the PADEP Residential Soil MSC for surface soils between 0 and 15ft. bgs |

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

The hierarchy for selecting the SEL:
a. Calculated Site Specific SEL using site specific TOC (16,100 mg/kg)
b. Ontario Sediment SEL (if no Site Specific SEL is available)

The hierarchy for selecting the LEL:
c. Ontario Sediment LEL
d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

***Data Qualifiers***
U Compound analyzed but not detected at a level greater than or equal to the MDL.

**Table 13**
**Summary of Sediment Analytical Results**
**AOI-10**
**Sunoco Philadelphia Refinery**
**Philadelphia, PA**

| Chemical Name | CAS No | SEL [or equivalent] Ecological Screening Criteria (mg/kg) | | LEL [or equivalent] Ecological Screening Criteria (mg/kg) | | PADEP's Residential Soil MSC: 0-15 ft bgs | Location ID | SED-3 | | | | SED-4 | | | | SED-5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sample ID | SED-3_040711 | | | | SED-4_040711 | | | | SED-5_040711 | | | |
| | | | | | | | Sample Date | 4/7/2011 | | | | 4/7/2011 | | | | 4/7/2011 | | | |
| | | | | | | | Sample Matrix | Sediment | | | | Sediment | | | | Sediment | | | |
| | | | | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | NS | | NS | | 130.00 | mg/kg | 0.007 | | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | 0.035 | | 0.009 | 1.03 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | NS | | NS | | 0.01 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| 1,2-Dichlorobenzene | 95-50-1 | NS | | 0.29 | e | 60.00 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| 1,2-Dichloroethane | 107-06-2 | NS | | 0.26 | e | 0.50 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | NS | | NS | | 110.00 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | 0.015 | | 0.009 | 1.03 |
| 1,3-Dichlorobenzene | 541-73-1 | NS | | 1.32 | e | 60.00 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| 1,4-Dichlorobenzene | 106-46-7 | NS | | 0.32 | e | 7.50 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| 1-Methylnaphthalene | 90-12-0 | NS | | NS | | NS | mg/kg | 0.034 | | 0.024 | 10 | 0.29 | | 0.024 | 10 | 0.18 | | 0.028 | 10 |
| Benzene | 71-43-2 | NS | | 0.14 | e | 0.50 | mg/kg | 0.01 | | 0.006 | 0.81 | 0.032 | | 0.007 | 0.92 | 0.041 | | 0.009 | 1.03 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | NS | | 0.43 | e | 1000.00 | mg/kg | 0.01 | | 0.006 | 0.81 | 0.015 | | 0.007 | 0.92 | 0.31 | | 0.009 | 1.03 |
| Ethylbenzene | 100-41-4 | NS | | 0.18 | e | 70.00 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | 0.024 | | 0.009 | 1.03 |
| Isopropylbenzene (Cumene) | 98-82-8 | NS | | NS | | 84.00 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| Tert-Butyl Methyl Ether | 1634-04-4 | NS | | NS | | 2.00 | mg/kg | ND | U | 0.006 | 0.81 | ND | U | 0.007 | 0.92 | ND | U | 0.009 | 1.03 |
| Toluene | 108-88-3 | NS | | 1.22 | e | 100.00 | mg/kg | ND | U | 0.006 | 0.81 | 0.029 | | 0.007 | 0.92 | 0.34 | | 0.009 | 1.03 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | |
| 2,4-Dimethylphenol | 105-67-9 | NS | | 0.30 | e | 73.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| 2,4-Dinitrophenol | 51-28-5 | NS | | 0.01 | e | 7.30 | mg/kg | ND | U | 14 | 10 | ND | U | 14 | 10 | ND | U | 17 | 10 |
| 2-Methylphenol (O-Cresol) | 95-48-7 | NS | | 0.06 | e | 180.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| 2-Nitrophenol | 88-75-5 | NS | | NS | | 29.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| 6-Methylchrysene | 1705-85-7 | NS | | NS | | NS | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Anthracene | 120-12-7 | 0.20091 | a | 0.22 | c | 35.00 | mg/kg | 0.18 | | 0.024 | 10 | 0.15 | | 0.024 | 10 | 0.15 | | 0.028 | 10 |
| Benzenethiol | 108-98-5 | NS | | NS | | NS | mg/kg | ND | U | 14 | 10 | ND | U | 14 | 10 | ND | U | 17 | 10 |
| Benzo(A)Anthracene | 56-55-3 | 0.80364 | a | 0.32 | c | 2.50 | mg/kg | **0.6** | | 0.024 | 10 | **0.38** | | 0.024 | 10 | 0.28 | | 0.028 | 10 |
| Benzo(A)Pyrene | 50-32-8 | 0.78192 | a | 0.37 | c | 0.57 | mg/kg | 0.37 | | 0.024 | 10 | 0.32 | | 0.024 | 10 | 0.25 | | 0.028 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | NS | | 10.40 | e | 4.00 | mg/kg | 0.64 | | 0.024 | 10 | 0.42 | | 0.024 | 10 | 0.38 | | 0.028 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | 0.17376 | a | 0.17 | c | 18.00 | mg/kg | **0.19** | | 0.024 | 10 | **0.21** | | 0.024 | 10 | **0.18** | | 0.028 | 10 |
| Benzo(K)Fluoranthene | 207-08-9 | 0.72762 | a | 0.24 | c | 57.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Benzyl Butyl Phthalate | 85-68-7 | NS | | 1.97 | e | 300.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Bis(2-Ethylhexyl) Phthalate | 117-81-7 | NS | | 0.18 | e | 13.00 | mg/kg | ND | U | 4.8 | 10 | ND | U | 4.8 | 10 | ND | U | 5.6 | 10 |
| Chrysene | 218-01-9 | 0.24978 | a | 0.34 | c | 23.00 | mg/kg | **1.1** | | 0.024 | 10 | **0.44** | | 0.024 | 10 | **0.35** | | 0.028 | 10 |
| Dibenz(A,H)Acridine | 226-36-8 | NS | | NS | | NS | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Dibenz(A,H)Anthracene | 53-70-3 | 0.07059 | a | 0.06 | c | 0.57 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Diethyl Phthalate | 84-66-2 | NS | | NS | | 2900.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Dimethyl Phthalate | 131-11-3 | NS | | 0.32 | e | NS | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Di-N-Butyl Phthalate | 84-74-2 | NS | | NS | | 370.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Di-N-Octylphthalate | 117-84-0 | NS | | NS | | 1000.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Fluoranthene | 206-44-0 | 0.55386 | a | 0.75 | c | 320.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Fluorene | 86-73-7 | 2.602056 | a | 0.19 | c | 300.00 | mg/kg | 0.046 | | 0.024 | 10 | 0.046 | | 0.024 | 10 | 0.04 | | 0.028 | 10 |
| Naphthalene | 91-20-3 | NS | | 0.16 | d | 10.00 | mg/kg | 0.07 | | 0.024 | 10 | **0.53** | | 0.024 | 10 | **0.68** | | 0.028 | 10 |
| Phenanthrene | 85-01-8 | 0.08688 | a | 0.56 | c | 1000.00 | mg/kg | 0.43 | | 0.024 | 10 | 0.53 | | 0.024 | 10 | 0.46 | | 0.028 | 10 |
| Phenol | 108-95-2 | NS | | 0.05 | e | 200.00 | mg/kg | ND | U | 2.4 | 10 | ND | U | 2.4 | 10 | ND | U | 2.8 | 10 |
| Pyrene | 129-00-0 | 0.46155 | a | 0.49 | c | 220.00 | mg/kg | **1.6** | | 0.024 | 10 | **0.63** | | 0.024 | 10 | 0.41 | | 0.028 | 10 |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | NS | | NS | | 190000.00 | mg/kg | 12300 | | 28.4 | 1 | 14300 | | 28.7 | 1 | 22300 | | 32.9 | 1 |
| Antimony | 7440-36-0 | NS | | 2.00 | d | 2.70 | mg/kg | ND | U | 2.84 | 1 | ND | U | 2.87 | 1 | ND | U | 3.29 | 1 |
| Arsenic | 7440-38-2 | 33 | b | 6.00 | c | 2.90 | mg/kg | **7.48** | | 2.84 | 1 | **21.9** | | 2.87 | 1 | **14.6** | | 3.29 | 1 |
| Barium | 7440-39-3 | NS | | NS | | 820.00 | mg/kg | 236 | | 0.71 | 1 | 96.3 | | 0.716 | 1 | 225 | | 0.822 | 1 |
| Beryllium | 7440-41-7 | NS | | NS | | 32.00 | mg/kg | ND | U | 0.71 | 1 | 0.956 | | 0.716 | 1 | 0.936 | | 0.822 | 1 |
| Cadmium | 7440-43-9 | 10 | b | 0.60 | c | 3.80 | mg/kg | **1.58** | | 0.71 | 1 | **1.26** | | 0.716 | 1 | **1.2** | | 0.822 | 1 |
| Calcium | 7440-70-2 | NS | | NS | | NS | mg/kg | 7130 | | 28.4 | 1 | 6660 | | 28.7 | 1 | 12600 | | 32.9 | 1 |
| Chromium, Total | 7440-47-3 | 110 | b | 26.00 | c | NS | mg/kg | **45.2** | | 2.13 | 1 | **64.7** | | 2.15 | 1 | **66.4** | | 2.47 | 1 |
| Cobalt | 7440-48-4 | NS | | 50.00 | e | 5.00 | mg/kg | 8.29 | | 0.71 | 1 | 7.98 | | 0.716 | 1 | 11.5 | | 0.822 | 1 |
| Copper | 7440-50-8 | 110 | b | 16.00 | c | 4300.00 | mg/kg | **111** | | 1.42 | 1 | **74.4** | | 1.43 | 1 | **109** | | 1.64 | 1 |
| Iron | 7439-89-6 | 40000 | b | 20000.00 | c | 150000.00 | mg/kg | 19300 | | 28.4 | 1 | 19400 | | 28.7 | 1 | **21700** | | 32.9 | 1 |
| Lead | 7439-92-1 | 250 | b | 31.00 | c | 45.00 | mg/kg | **328** | | 2.13 | 1 | **306** | | 2.15 | 1 | **319** | | 2.47 | 1 |
| Magnesium | 7439-95-4 | NS | | NS | | NS | mg/kg | 6940 | | 14.2 | 1 | 3870 | | 14.3 | 1 | 7190 | | 16.4 | 1 |
| Manganese | 7439-96-5 | 1100 | b | 460.00 | c | 200.00 | mg/kg | 236 | | 0.71 | 1 | 375 | | 0.716 | 1 | **508** | | 0.822 | 1 |
| Mercury | 7439-97-6 | 2 | b | 0.20 | c | 1.00 | mg/kg | **0.604** | | 0.139 | 1 | **0.288** | | 0.14 | 1 | **0.524** | | 0.156 | 1 |
| Nickel | 7440-02-0 | 75 | b | 16.00 | c | 65.00 | mg/kg | **31.3** | | 1.42 | 1 | **85.6** | | 1.43 | 1 | **44.1** | | 1.64 | 1 |
| Potassium | 7440-09-7 | NS | | NS | | NS | mg/kg | 2290 | | 71 | 1 | 1670 | | 71.6 | 1 | 1530 | | 82.2 | 1 |
| Selenium | 7782-49-2 | NS | | NS | | 5.00 | mg/kg | ND | U | 2.84 | 1 | ND | U | 2.87 | 1 | ND | U | 3.29 | 1 |
| Silver | 7440-22-4 | NS | | 1.00 | d | 10.00 | mg/kg | 0.969 | | 0.71 | 1 | 0.855 | | 0.716 | 1 | **1.11** | | 0.822 | 1 |
| Sodium | 7440-23-5 | NS | | NS | | NS | mg/kg | 295 | | 142 | 1 | ND | U | 143 | 1 | 188 | | 164 | 1 |
| Thallium | 7440-28-0 | NS | | NS | | 1.40 | mg/kg | ND | U | 4.26 | 1 | ND | U | 4.3 | 1 | ND | U | 4.93 | 1 |
| Vanadium | 7440-62-2 | NS | | NS | | 1500.00 | mg/kg | 50.1 | | 0.71 | 1 | 71.6 | | 0.716 | 1 | 94.7 | | 0.822 | 1 |
| Zinc | 7440-66-6 | 820 | b | 120.00 | c | 1200.00 | mg/kg | **503** | | 2.84 | 1 | **1710** | | 14.3 | 5 | **339** | | 3.29 | 1 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | | NS | | NS | % | 30.3 | | 0.5 | 1 | 30.9 | | 0.5 | 1 | 40.4 | | 0.5 | 1 |
| Total Organic Carbon | TOC | 100000 | b | 10000 | c | NS | mg/kg | **55900** | | 3490 | 1 | **47800** | | 3400 | 1 | **59900** | | 6360 | 1 |
| **Grain Size Analysis** | | | | | | | | | | | | | | | | | | | |
| 0.001 Mm | GS.001MM | NS | | NS | | NS | % passing | ND | U | 1 | 1 | 1 | | 1 | 1 | 2 | | 1 | 1 |
| 0.002 Mm | GS.002MM | NS | | NS | | NS | % passing | ND | U | 1 | 1 | 2 | | 1 | 1 | 8 | | 1 | 1 |
| 0.005 Mm | GS.005MM | NS | | NS | | NS | % passing | 1 | | 1 | 1 | 3.5 | | 1 | 1 | 12.5 | | 1 | 1 |
| 0.02 Mm | GS.02MM | NS | | NS | | NS | % passing | 3 | | 1 | 1 | 9.5 | | 1 | 1 | 22.5 | | 1 | 1 |
| 0.05 Mm | GS.05MM | NS | | NS | | NS | % passing | 7.5 | | 1 | 1 | 13 | | 1 | 1 | 38 | | 1 | 1 |
| 0.064 Mm | GS.064MM | NS | | NS | | NS | % passing | 9 | | 1 | 1 | 14 | | 1 | 1 | 48.5 | | 1 | 1 |
| 0.075 Mm | GS.075MM | NS | | NS | | NS | % passing | 9.5 | | 1 | 1 | 14.9 | | 1 | 1 | 53.9 | | 1 | 1 |
| 0.15 Mm | GS.15MM | NS | | NS | | NS | % passing | 14 | | 1 | 1 | 16.8 | | 1 | 1 | 67.9 | | 1 | 1 |
| 0.3 Mm | GS.3MM | NS | | NS | | NS | % passing | 26.3 | | 1 | 1 | 19.8 | | 1 | 1 | 75.1 | | 1 | 1 |
| 0.6 Mm | GS.6MM | NS | | NS | | NS | % passing | 44.7 | | 1 | 1 | 26.1 | | 1 | 1 | 78.3 | | 1 | 1 |
| 1.18 Mm | GS1.18MM | NS | | NS | | NS | % passing | 54.4 | | 1 | 1 | 37.6 | | 1 | 1 | 80.9 | | 1 | 1 |
| 2.36 Mm | GS2.36MM | NS | | NS | | NS | % passing | 60.7 | | 1 | 1 | 50.5 | | 1 | 1 | 84.9 | | 1 | 1 |
| 3.35 Mm | GS3.35MM | NS | | NS | | NS | % passing | 66.5 | | 1 | 1 | 60.6 | | 1 | 1 | 91.1 | | 1 | 1 |
| 4.75 Mm | GS4.75MM | NS | | NS | | NS | % passing | 74.1 | | 1 | 1 | 72 | | 1 | 1 | 95 | | 1 | 1 |
| 19 Mm | GS19MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 | 100 | | 1 | 1 | 100 | | 1 | 1 |
| 37.5 Mm | GS37.5MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 | 100 | | 1 | 1 | 100 | | 1 | 1 |
| 75 Mm | GS75MM | NS | | NS | | NS | % passing | 100 | | 1 | 1 | 100 | | 1 | 1 | 100 | | 1 | 1 |

**Notes:**

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|---|---|
| 15 | Result is greater than the 'SEL' criteria [as defined by the hierarchy below] |
| **15** | Result is greater than the 'LEL' criteria [as defined by the hierarchy below] |
| 15 | Result is greater than the PADEP Residential Soil MSC for surface soils between 0 and 15ft. bgs |

DF - Dilution Factor
LEL - Low Ecological Level
MDL - Laboratory Method Detection Limit
MSC - Medium Specific Concentration
NS - No standard currently available.
Q - Lab Qualifier if data was not validated)
RL - Laboratory Reporting Detection Limit
SEL - Severe Ecological Level

The hierarchy for selecting the SEL:
a. Calculated Site Specific SEL using site specific TOC (54,533.33 mg/kg)
b. Ontario Sediment SEL (if no Site Specific SEL is available)
The hierarchy for selecting the LEL:
c. Ontario Sediment LEL
d. NOAA ERL Sediment Benchmark (if no Ontario Sediment LEL is available)
e. SD EPA R5 Sediment Benchmark (if no NOAA ERL is available)

***Data Qualifiers***
U Compound analyzed but not detected at a level greater than or equal to the MDL.

**Table 14**
**Summary of Soil Samples Screened for Protection of Indoor Air**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | USEPA-PA Defaults Nonresidential Volatilization to Indoor Air Screening Limit | USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen Screening Limit | Location ID | BH-10-36 | | | | BH-10-37 | | | | BH-10-38 | | | | BH-10-39 | | | | BH-10-40 | | | | BH-10-41 | | | | BH-10-78 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample ID | BH-10-36_0-2' | | | | BH-10-37_0-2' | | | | BH-10-38_0-2' | | | | BH-10-39_0-2' | | | | BH-10-40_0-2' | | | | BH-10-41_0-2' | | | | BH-10-78_0-2' | | | |
| | | | | Sample Date | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | | 4/5/2011 | | | | 4/21/2011 | | | |
| | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 29 | 310 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 0.4 | J | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | 0.014 | | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.29 | 1000 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| 1,2-Dichloroethane | 107-06-2 | 0.83 | 8.3 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 6.4 | 87 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | 0.007 | J | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| Benzene | 71-43-2 | 0.63 | 380 | mg/kg | 0.008 | | 0.0006 | 0.91 | 0.008 | | 0.0006 | 0.93 | ND | U | 9E-04 | 1.52 | 0.12 | J | 0.08 | 121.6 | 0.003 | J | 0.0005 | 0.79 | 0.008 | J | 8E-04 | 1.05 | 0.001 | J | 0.0005 | 0.82 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 77 | 170 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 0.18 | J | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | 0.012 | | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| Ethylbenzene | 100-41-4 | 9.5 | 110 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 0.24 | J | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| Isopropylbenzene (Cumene) | 98-82-8 | 360 | 360 | mg/kg | ND | U | 0.001 | 0.91 | ND | U | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | 2.5 | | 0.16 | 121.6 | ND | U | 0.0009 | 0.79 | ND | U | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 86 | 6400 | mg/kg | ND | U | 0.0006 | 0.91 | ND | U | 0.0006 | 0.93 | ND | U | 9E-04 | 1.52 | ND | U | 0.08 | 121.6 | ND | U | 0.0005 | 0.79 | ND | U | 8E-04 | 1.05 | ND | U | 0.0005 | 0.82 |
| Toluene | 108-88-3 | 110 | 240 | mg/kg | 0.009 | | 0.001 | 0.91 | 0.005 | J | 0.001 | 0.93 | ND | U | 0.002 | 1.52 | ND | U | 0.16 | 121.6 | 0.001 | J | 0.0009 | 0.79 | 0.01 | | 0.002 | 1.05 | ND | U | 0.001 | 0.82 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | NS | NS | mg/kg | 0.46 | J | 0.2 | 5 | 1.9 | | 0.21 | 5 | ND | U | 0.2 | 5 | 12 | | 2.2 | 5 | 4.7 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.43 | | 0.039 | 1 |
| Benzo(A)Anthracene | 56-55-3 | NS | NS | mg/kg | 1.8 | | 0.2 | 5 | 6.5 | | 0.21 | 5 | ND | U | 0.2 | 5 | 22 | | 2.2 | 5 | 11 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.91 | | 0.039 | 1 |
| Benzo(A)Pyrene | 50-32-8 | NS | NS | mg/kg | 1.8 | | 0.2 | 5 | 6.5 | | 0.21 | 5 | ND | U | 0.2 | 5 | 16 | | 2.2 | 5 | 9.2 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.66 | | 0.039 | 1 |
| Benzo(B)Fluoranthene | 205-99-2 | NS | NS | mg/kg | 2.4 | | 0.2 | 5 | 9.3 | | 0.21 | 5 | ND | U | 0.2 | 5 | 25 | | 2.2 | 5 | 12 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.81 | | 0.039 | 1 |
| Benzo(G,H,I)Perylene | 191-24-2 | NS | NS | mg/kg | 1.3 | | 0.2 | 5 | 3.9 | | 0.21 | 5 | ND | U | 0.2 | 5 | 9.9 | J | 2.2 | 5 | 4.8 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.33 | | 0.039 | 1 |
| Chrysene | 218-01-9 | NS | NS | mg/kg | 2.2 | | 0.2 | 5 | 6.2 | | 0.21 | 5 | ND | U | 0.2 | 5 | 23 | | 2.2 | 5 | 10 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.82 | | 0.039 | 1 |
| Fluorene | 86-73-7 | NS | NS | mg/kg | ND | U | 0.2 | 5 | 0.83 | J | 0.21 | 5 | ND | U | 0.2 | 5 | 7 | J | 2.2 | 5 | 1.3 | | 0.19 | 5 | ND | U | 1.2 | 5 | 0.14 | J | 0.039 | 1 |
| Naphthalene | 91-20-3 | NS | NS | mg/kg | 0.39 | J | 0.2 | 5 | 1.1 | | 0.21 | 5 | ND | U | 0.2 | 5 | ND | U | 2.2 | 5 | 0.51 | J | 0.19 | 5 | ND | U | 1.2 | 5 | 0.085 | J | 0.039 | 1 |
| Phenanthrene | 85-01-8 | NS | NS | mg/kg | 1.9 | | 0.2 | 5 | 8.6 | | 0.21 | 5 | 0.24 | J | 0.2 | 5 | 50 | | 2.2 | 5 | 18 | | 0.19 | 5 | ND | U | 1.2 | 5 | 1.3 | | 0.039 | 1 |
| Pyrene | 129-00-0 | NS | NS | mg/kg | 3.1 | | 0.2 | 5 | 10 | | 0.21 | 5 | ND | U | 0.2 | 5 | 51 | | 2.2 | 5 | 20 | | 0.19 | 5 | ND | U | 1.2 | 5 | 1.3 | | 0.039 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | NS | NS | mg/kg | 390 | | 0.0627 | 10 | 540 | | 0.132 | 20 | 11.6 | | 0.012 | 2 | 415 | | 0.068 | 10 | 65.1 | | 0.0121 | 2 | 186 | | 0.039 | 5 | 79.3 | | 0.0123 | 2 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | % | 18.7 | | 0.5 | 1 | 21.8 | | 0.5 | 1 | 16.9 | | 0.5 | 1 | 23.9 | | 0.5 | 1 | 15 | | 0.5 | 1 | 34 | | 0.5 | 1 | 15.3 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Result exceeds the USEPA-PA Default Nonresidential Volatilization to Indoor Air
10 - Result Exceeds the USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen

**Table 14**
**Summary of Soil Samples Screened for Protection of Indoor Air**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | USEPA-PA Defaults Nonresidential Volatilization to Indoor Air Screening Limit | USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen Screening Limit | Location ID | BH-10-79 | | | | BH-10-80 | | | | W-1D | | | | W-29 | | | | W-30 | | | | W-31 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Sample ID | BH-10-79_0-2' | | | | BH-10-80_0-2' | | | | W-1D_0-2' | | | | W-29_0-2' | | | | W-30@0'-2' | | | | W-31@0'-2' | | | |
| | | | | Sample Date | 4/21/2011 | | | | 4/21/2011 | | | | 4/5/2011 | | | | 4/19/2011 | | | | 4/15/2011 | | | | 4/15/2011 | | | |
| | | | | Sample Matrix | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | | Soil | | | |
| | | | | Sample Interval | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | | 0-2 ft bgs | | | |
| | | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 29 | 310 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.95 | 0.004 | J | 0.003 | 1.45 | 0.092 | J | 0.075 | 63.87 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 0.29 | 1000 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | ND | U | 0.075 | 63.87 |
| 1,2-Dichloroethane | 107-06-2 | 0.83 | 8.3 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | ND | U | 0.075 | 63.87 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 6.4 | 87 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.95 | 0.003 | J | 0.003 | 1.45 | 0.086 | J | 0.075 | 63.87 |
| Benzene | 71-43-2 | 0.63 | 380 | mg/kg | 0.004 | J | 0.0005 | 0.8 | 0.009 | | 0.0005 | 0.81 | 0.001 | J | 0.0005 | 0.8 | 0.004 | J | 0.0005 | 0.95 | 0.012 | J | 0.001 | 1.45 | 0.089 | J | 0.037 | 63.87 |
| Dimethyl Benzene/ Xylenes, Total | 1330-20-7 | 77 | 170 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | 0.001 | J | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | 0.14 | J | 0.075 | 63.87 |
| Ethylbenzene | 100-41-4 | 9.5 | 110 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | 0.076 | J | 0.075 | 63.87 |
| Isopropylbenzene (Cumene) | 98-82-8 | 360 | 360 | mg/kg | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | ND | U | 0.001 | 0.95 | ND | U | 0.003 | 1.45 | 0.4 | | 0.075 | 63.87 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 86 | 6400 | mg/kg | ND | U | 0.0005 | 0.8 | ND | U | 0.0005 | 0.81 | ND | U | 0.0005 | 0.8 | ND | U | 0.0005 | 0.95 | ND | U | 0.001 | 1.45 | ND | U | 0.037 | 63.87 |
| Toluene | 108-88-3 | 110 | 240 | mg/kg | 0.001 | J | 0.0009 | 0.8 | 0.001 | J | 0.001 | 0.81 | ND | U | 0.0009 | 0.8 | 0.006 | | 0.001 | 0.95 | 0.004 | J | 0.003 | 1.45 | 0.094 | J | 0.075 | 63.87 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anthracene | 120-12-7 | NS | NS | mg/kg | ND | U | 0.038 | 1 | 0.57 | | 0.04 | 1 | 2.3 | | 0.19 | 5 | 0.83 | | 0.038 | 1 | ND | U | 0.057 | 1 | 0.49 | J | 0.39 | 10 |
| Benzo(A)Anthracene | 56-55-3 | NS | NS | mg/kg | 0.041 | J | 0.038 | 1 | 1.7 | | 0.04 | 1 | 3.7 | | 0.19 | 5 | 0.9 | | 0.038 | 1 | 0.07 | J | 0.057 | 1 | 0.78 | J | 0.39 | 10 |
| Benzo(A)Pyrene | 50-32-8 | NS | NS | mg/kg | 0.046 | J | 0.038 | 1 | 1.4 | | 0.04 | 1 | 2.7 | | 0.19 | 5 | 0.84 | | 0.038 | 1 | ND | U | 0.057 | 1 | 0.59 | J | 0.39 | 10 |
| Benzo(B)Fluoranthene | 205-99-2 | NS | NS | mg/kg | 0.046 | J | 0.038 | 1 | 1.9 | | 0.04 | 1 | 3.7 | | 0.19 | 5 | 0.97 | | 0.038 | 1 | ND | U | 0.057 | 1 | 0.54 | J | 0.39 | 10 |
| Benzo(G,H,I)Perylene | 191-24-2 | NS | NS | mg/kg | ND | U | 0.038 | 1 | 0.79 | | 0.04 | 1 | 1.4 | | 0.19 | 5 | 0.76 | | 0.038 | 1 | ND | U | 0.057 | 1 | ND | U | 0.39 | 10 |
| Chrysene | 218-01-9 | NS | NS | mg/kg | ND | U | 0.038 | 1 | 1.6 | | 0.04 | 1 | 3.2 | | 0.19 | 5 | 1.1 | | 0.038 | 1 | 0.4 | | 0.057 | 1 | 2.6 | | 0.39 | 10 |
| Fluorene | 86-73-7 | NS | NS | mg/kg | ND | U | 0.038 | 1 | 0.15 | J | 0.04 | 1 | 1 | | 0.19 | 5 | 0.14 | J | 0.038 | 1 | ND | U | 0.057 | 1 | ND | U | 0.39 | 10 |
| Naphthalene | 91-20-3 | NS | NS | mg/kg | ND | U | 0.038 | 1 | 0.18 | J | 0.04 | 1 | 0.42 | J | 0.19 | 5 | 1.3 | | 0.038 | 1 | 0.11 | J | 0.057 | 1 | ND | U | 0.39 | 10 |
| Phenanthrene | 85-01-8 | NS | NS | mg/kg | ND | U | 0.038 | 1 | 1.9 | | 0.04 | 1 | 7.9 | | 0.19 | 5 | 1.4 | | 0.038 | 1 | 0.35 | | 0.057 | 1 | 0.51 | J | 0.39 | 10 |
| Pyrene | 129-00-0 | NS | NS | mg/kg | 0.042 | J | 0.038 | 1 | 2.9 | | 0.04 | 1 | 6.9 | | 0.19 | 5 | 1.5 | | 0.038 | 1 | 0.28 | J | 0.057 | 1 | 2.2 | | 0.39 | 10 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | 7439-92-1 | NS | NS | mg/kg | 145 | | 0.0292 | 5 | 234 | | 0.0599 | 10 | 76.5 | | 0.0116 | 2 | 259 | | 0.0575 | 10 | 1990 | | 0.431 | 50 | 955 | | 0.152 | 25 |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moisture, Percent | MOIST | NS | NS | % | 12.6 | | 0.5 | 1 | 16.5 | | 0.5 | 1 | 13.6 | | 0.5 | 1 | 13.9 | | 0.5 | 1 | 42 | | 0.5 | 1 | 14.6 | | 0.5 | 1 |

**Notes:**
DF - Dilution Factor
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
PADEP - Pennsylvania Department of Environmental Protection
RL - Reporting Limit
ND - Not Detected
NS - No Standard

All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Result exceeds the USEPA-PA Default Nonresidential Volatilization to Indoor Air
10 - Result Exceeds the USEPA-PA Defaults Nonresidential PELs Volatilization to Indoor Air Screen

**Table 15**
**Summary of Groundwater Analytical Results Screened for Protection of Indoor Air**
**April 2011**
**AOI 10**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Chemical Name | CAS No | USEPA-PA Defaults NonResidential Volatilization to Indoor Air Screening Limit | Location | W-1 | | | | W-1D | | | | W-2 | | | | W-25 | | | | W-26 | | | | W-27 | | | | W-29 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | W-1_04272011 | | | | W-1D_04262011 | | | | W-2_04262011 | | | | W-25_04262011 | | | | W-26_04262011 | | | | W-27_04262011 | | | | W-29_04262011 | | | |
| | | | Sample Date | 4/27/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | | 4/26/2011 | | | |
| | | | Sample Matrix | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | | Groundwater | | | |
| | | | Unit | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF | Result | Q | RL | DF |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 95-63-6 | 12000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,2-Dibromoethane (Ethylene Dibromide) | 106-93-4 | 1000 | ug/l | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0095 | 1 | ND | U | 0.0094 | 1 |
| 1,2-Dichloroethane | 107-06-2 | 4600 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 10000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Benzene | 71-43-2 | 5900 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Ethylbenzene | 100-41-4 | 45000 | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Isopropylbenzene (Cumene) | 98-82-8 | NS | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Tert-Butyl Methyl Ether | 1634-04-4 | 640000 | ug/l | 2 | | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | 0.6 | J | 0.5 | 1 | ND | U | 0.5 | 1 | 0.6 | J | 0.5 | 1 |
| Toluene | 108-88-3 | NS | ug/l | ND | U | 0.5 | 1 | 0.8 | J | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| Xylenes (Total) | 1330-20-7 | NS | ug/l | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 | ND | U | 0.5 | 1 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chrysene | 218-01-9 | NS | ug/l | 20 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 |
| Fluorene | 86-73-7 | NS | ug/l | 13 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 1 | J | 0.9 | 1 |
| Naphthalene | 91-20-3 | NS | ug/l | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 |
| Phenanthrene | 85-01-8 | NS | ug/l | 13 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | 2 | J | 0.9 | 1 |
| Pyrene | 129-00-0 | NS | ug/l | 37 | | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 1 | 1 | ND | U | 0.9 | 1 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Dissolved) | 7439-92-1 | NS | ug/l | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | ND | U | 0.052 | 1 | 0.11 | J | 0.052 | 1 | ND | U | 0.052 | 1 |

**Notes:**
DF - Dilution Factor
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

**Qualifiers:**
Q - Qualifier
U - Analyte was analyzed but not detected
J - Compound detected but below the reporting limit (the value given is an estimate).

**Exceedance Summary:**
**10** - Result exceeds the PADEP Non-Residential Indoor Air Standard