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Katie Esposito
Delaware Department of Natural Resources and Environmental Control
Division of Water-Wetlands and Waterways Section
89 Kings Hwy
Dover, DE 19901

**Re: Marcus Hook Industrial Complex Water Quality Certificate
Berths 1A, 2A, 3A, 3B, 3C, Basin 2B/Intake RW5 and Intake RW7
August 2023 Sediment Sampling Results**

Dear Ms. Espositie,

As you are aware, Energy Transfer dredged the berthing areas at their Marcus Hook Terminal (MHT) (Figure 1) in December 2023. Specifically, Energy Transfer performed maintenance dredging at berths 1A, 2A, 3A, 3B, 3C, 2B Basin/Intake RW5 and Intake RW7. Energy Transfer dredged the MHT site according to the following permitted depths, plus 2 feet of overdredge:

- Berth 1A to 42' Mean Low Water (MLW) (Previously Submitted)
- Berth 2A to 36' Mean Low Water (MLW)
- Berth 3A to 40' Mean Low Water (MLW)
- Berth 3B to 13' Mean Low Water (MLW)
- Berth 3C to 40' Mean Low Water (MLW)
- Berth 2B/Intake RW5 to 15' Mean Low Water (MLW)
- Intake RW7 to 20' Mean Low Water (MLW)

Energy Transfer and Weston Solutions, Inc. (Weston), Energy Transfer's environmental consultant, are submitting this information from the 2023 sediment characterization in support of a renewal of the Water Quality Certificate (WQC) and Submerged Land Lease (SLL) with the Department of Natural Resources and Environmental Control (DNREC). In support of future maintenance dredging events, this sediment characterization report will be provided to DNREC as a courtesy when submitted to the agency (typically NJDEP) in the state which will be receiving the material for disposal.

It should be noted that while all Berth locations at the MHT are presented herein, only Berth 3C and Intake RW7 are within Delaware waters.

Weston chose the core locations using recent hydrographic surveys of the dock areas performed by S.T. Hudson Engineers, Inc. (Camden, NJ) on July 10, 2023.

These surveys show that approximately 64,231 cubic yards (cy) needs to be removed from the MHT Berths 2A, 3A, 3B, 3C, 2B Basin/Intake RW5 and Intake RW7 in order to achieve the proposed dredge depths (see Attachment 1 for volume calculations). The Sediment Sampling and Analysis Plan (SSAP) submitted on July 19, 2023, presented the number of cores to be collected

and the appropriate analyses to be conducted, and was approved by the NJDEP on August 15, 2023. A description of this sampling event and a summary of the sediment sample results are presented in this correspondence.

Material dredged from MHT will be disposed of at White's Rehandling Basin, which is owned and operated by Weeks Marine, Inc./American Atlantic. Open clamshell dredging will be conducted to remove the sediment from the berthing areas. Sediment will be transported by scow, bottom-dumped into a subaqueous disposal pit, and then hydraulically moved to an upland disposal basin. White's Rehandling Basin, located in Logan Township, Gloucester County, NJ is an approved disposal basin that has the capacity for the estimated maximum 64,231 cy to be dredged.

August 2023 Sediment Sampling Event

Thirteen (13) sediment cores were collected to characterize the approximately 64,231 cy of sediments currently within the dredge templates. The thirteen cores collected from MHT on August 15 and 16, 2023 were collected by Weston from a motorized sampling platform operated by Aqua Survey Inc. using a modified sediment coring device (Vibracore).

All thirteen initial cores collected were processed into 3 samples and 5 composite samples according to the approved SSAP. This sampling strategy resulted in a total of 8 analytical samples plus a duplicate, matrix spike (MS), and matrix spike duplicate (MSD) samples. Refer to Figure 2 for the core locations. Each core was collected to the design depth of the area to be dredged plus 2 feet of allowable over dredge depth (see Table 1).

Core logs were prepared by Weston of each sediment core collected, and they are provided as Attachment 2. The core logs list the precise collection coordinates as recorded by global positioning system (GPS), the depth of each core, and a physical description of the core. The physical description of each core is provided in Table 2. No distinct strata were observed in any cores and hence none were sub-sampled. Photographs of the individual cores can be found in Attachment 3.

After core collection and logging, each core was homogenized and composited, as applicable, into samples per the sampling plan (see Table 1) and stored in sealed glass jars by Weston field personnel. Samples were stored at 4°C and transported to Test America/Eurofins Laboratories for analysis. Samples were analyzed for the NJDEP required physical and chemical parameters. A field duplicate, matrix spike and matrix spike duplicate were also prepared and analyzed.

Table 1. Sediment Sampling Summary at MHT

Core #	Core Location	Sample Type	Sample to Depth*	Existing Depth	Target Core Length	Collected Core Length	Analytes**
1	Intake RW7	Sample A	20' + 2'	19.2'	2.8'	2.8'	Reduced List
2	Berth 3C	Composite B	40' + 2'	39.4'	2.6'	2.6'	Reduced List
3	Berth 3C	Composite B	40' + 2'	39.1'	2.9'	2.9'	Reduced List
4	Berth 3A	Composite C	40' + 2'	39.2'	2.8'	2.8'	Reduced List
5	Berth 3A	Composite C	40' + 2'	39.2'	2.8'	2.8'	Reduced List
6	Berth 3B	Sample D	13' + 2'	11.3'	3.7'	3.7'	Reduced List
7	Berth 2A	Composite E	36' + 2'	35.0'	3.0'	3.0'	Reduced List
8	Berth 2A	Composite E	36' + 2'	34.7'	3.3'	3.3'	Reduced List
9	Berth 2B	Sample F	15' + 2'	13.5'	3.5'	3.5'	Reduced List
10	Berth 1A	Composite G	42' + 2'	39.0'	3.0'	3.0'	Reduced List
11	Berth 1A	Composite G	42' + 2'	39.3'	2.7'	2.7	Reduced List
12	Berth 1A	Composite H	42' + 2'	39.4'	2.6'	2.6'	Reduced List
13	Berth 1A	Composite H	42' + 2'	38.4'	3.6'	3.6'	Reduced List

*Includes 2' overdredge, as requested by NJDEP.

** Samples analyzed for SVOCs, metals, hexavalent chromium, cyanide, percent moisture, sulfide, grain size, TOC and % moisture.

The sediment sampling procedures were conducted in accordance with *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (NJDEP, 1997), the *Field Sampling Procedures Manual* (NJDEP, 2005), and the approved *Sediment Sampling and Analysis Plan (SSAP) Template (Version 4.0)* as updated by the NJDEP Office of Dredging and Sediment Technology in September 2020.

Analytical Results and Screening of Sediment Samples

Test America analyzed the samples submitted for the applicable NJDEP chemical and physical parameters. All four samples and two composite samples plus the duplicate sample were analyzed for the approved list of parameters (semi volatile organic compounds [SVOCs], target analyte [TAL] metals, trivalent and hexavalent chromium, cyanide, and percent solids and grain size). All four samples and two composite samples were also analyzed for grain size, total organic compounds (TOC) and percent moisture. The method for each parameter is outlined in Table 3.

Table 2. Physical Descriptions of Sediment Cores

Core ID	Physical Description
1	Very loose, dark greyish-brown silt, trace fine sand, trace organics, firmer w/ depth.
2	Very loose, dark greyish-brown silt, trace clay, firmer w/ depth.
3	Very loose, dark greyish silt, fine sand, firmer w/ depth.
4	Very loose, dark greyish-brown silt, trace clay, firmer w/ depth.
5	Dark greyish-brown silt, trace fine sand, firmer w/ depth.
6	Greyish-brown silt, trace fine sand, trace organics, firmer w/ depth.
7	Loose, dark grey silt, trace clay, firmer w/ depth.
8	Dark greyish-brown silt, little fine sand, trace organics, firmer w/ depth.
9	Loose, dark grey silt, some clay, firmer w/ depth.
10	Very loose, dark greyish-brown silt, firmer w/ depth.
11	Very loose, dark greyish-brown silt, some clay, trace gravel, firmer w/ depth.
12	Loose dark greyish-brown silt, some clay, firmer w/ depth.
13	Very loose, dark greyish-brown silt, trace organics, firmer w/ depth.

Table 3. Analytical Parameters and Methods

Test Parameter	Analytical Method
Grain Size	ASTM D422
TCL SVOCs	8270E
TAL Metals/Mercury	6020B/7471B
Hexavalent/Trivalent Chromium	7196A
Cyanide, total	9014
TOC	Lloyd Kahn
Percent Moisture	ASTM D2216
Sulfide	9034

TCL = Target Compound List ASTM = American Society for Testing and Materials
 TAL = Target Analyte List EPA = U.S. Environmental Protection Agency
 TOC = Total Organic Compound SVOCs = Semivolatile Organic Compounds

PHYSICAL CHARACTERIZATION OF SEDIMENTS

Grain Size: Grain size was classified using the ASTM Method D422. MHT sediments were primarily comprised of gravel, sand and silt/clay. The grain size analysis indicated that only sample MHT-1A-Comp G contained gravel (8.6%). Samples ranged from 5.0% sand at location MHT-RW7-Sample A to 12.6% at location MHT-1A-Comp G. Samples ranged from 44.7% silt at location MHT-1A-Comp G to 61.1% silt at location MHT-3B-Sample D. Samples ranged

from 33.6% clay at location MHT-3B-Sample D to 43.1% clay at location MHT-3A-Comp C. The results for the grain size analysis in sediments collected from MHT are provided in Table 4.

Total Organic Carbon (TOC): Sediments at MHT contained TOC concentrations ranging from 30,000 milligrams/kilogram (mg/kg) at location MHT-2A-Comp E to 43,000 mg/kg at location MHT-3B-Sample D. The results for the TOC analysis in sediments are summarized in Table 4.

CHEMICAL CHARACTERIZATION OF BULK SEDIMENTS

Results from the bulk sediment analysis were compared to the most current Delaware Hazardous Substance Cleanup Act Soil Screening Level criteria (November 2023). Table 5 provides a summary of detected concentrations for the bulk sediments collected from MHT. The analytical lab report is provided in Attachment 4 (electronically on the attached thumb drive).

Semivolatile Organic Compounds (SVOCs): Twenty SVOCs were detected in one or more of the sediment samples collected at MHT, as summarized in Table 5. No detected SVOCs concentrations exceeded Delaware Hazardous Substance Cleanup Act Soil Screening Level criteria.

Inorganic Chemicals (Metals and Cyanide): Twenty-three metals plus cyanide were detected in one or more of the sediment samples collected at MHT, as summarized in Table 5. Only detected concentrations of arsenic and cadmium exceeded Delaware Hazardous Substance Cleanup Act Soil Screening Level criteria.

Note that no NJ SRSs have been developed for calcium, total chromium, iron, magnesium, potassium, sodium or thallium, so detected concentrations of these substances could not be compared to screening criteria. Calcium concentrations ranged from 4,200 mg/kg to 5,600 mg/kg. Total chromium concentrations ranged from 45 mg/kg to 53 mg/kg. Iron concentrations ranged from 30,00 mg/kg to 38,000 mg/kg. Magnesium concentrations ranged from 5,300 mg/kg to 6,800 mg/kg. Potassium concentrations ranged from 2,000 mg/kg to 2,700 mg/kg. Sodium concentrations ranged from 350 mg/kg to 650 mg/kg. Thallium concentrations ranged from 0.12 mg/kg to 0.24 mg/kg.

QUALITY ASSURANCE & QUALITY CONTROL

This section documents the data validation for the nine sediment samples including one field duplicate collected for the project.

The data validation was conducted in general accordance with the USEPA National Functional Guidelines for Organic and Inorganic Superfund Methods Data Review (November 2020) and the applicable methods listed above. The results of quality control (QC) data analyzed with site samples were used to assess the overall data reliability. The method and/or laboratory-established control limits were used for assessment.

Samples were analyzed for the parameters below following the stated methods:

- Semivolatile Organic Compounds (SVOC) – SW 846 Method 8270E LL
- Metals – SW 846 Method 6020B
- Mercury (Hg) – SW 846 Method 7471B
- Cyanide, Total & Amenable – SW 846 Method 9014
- Trivalent Chromium – SW846 Method 7196A
- Hexavalent Chromium – SW846 Method 7196A
- Total Organic Carbon (TOC) – Lloyd Kahn Method
- Sulfide, Acid soluble and insoluble –EPA 9034
- Percent Moisture – SM 2540G

General Comment

Nine sediment samples collected on 8/15/2023 and 8/16/2023 by Weston Solutions, Inc. and their requested analyses are summarized in the table below.

SDG No.	Field Sample ID	Lab Sample ID	Analysis
180-160903-1	MHT-3A-COMP C	180-160903-1	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-3A-COMP C-DUP	180-160903-2	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-3C-COMP B	180-160903-3	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-2B-SAMPLE F*	180-160903-4	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-2A-COMP E	180-160903-5	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
180-161013-1	MHT-3B-SAMPLE D	180-161013-1	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-RW7-SAMPLE	180-161013-	SVOC, Metals, Mercury, Cyanide,

SDG No.	Field Sample ID	Lab Sample ID	Analysis
	A	2	Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-1A-COMP H	180-161013-3	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
	MHT-1A-COMP G	180-161013-4	SVOC, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture

*The laboratory inadvertently logged this sample ID as MHT-2B-COMP-F so the incorrect name is reflected in the data package.

The samples were received by the laboratory on 8/16/2023 and 8/17/23 in good condition, properly preserved, and on ice. The shipment cooler temperatures were 3.4 and 3.3 degree Celsius (° C).

All samples were prepared and analyzed within the method required holding times.

The solid contents were greater than (>) 30% for all sediment samples but less than (<) 50%. Therefore, organic data did not require data qualification. Positive and non-detect inorganic results (metals, mercury, cyanide, sulfide, hexavalent chromium, and trivalent chromium) were estimated (J and UJ, respectively) for all samples based on USEPA Region 2 data validation standard operating procedures (SOPs) QA-HWSS-A-009 (ICP-MS metals), -011 (mercury), and -012 (cyanide), Revisions 0, March 2022.

SVOC Analysis

The continuing calibration verification (CCV) 180- 444651/3 failed percent difference (%D) requirements for bis(2-chloroethoxy)methane and 4-nitrophenol. The non-detected bis(2-chloroethoxy)methane and 4-nitrophenol results were estimated (UJ) for all samples.

The associated method blank was free of contamination.

In the associated laboratory control sample (LCS) analysis, the recoveries of twenty-nine (29) of the sixty-four (64) target analytes were below the acceptance limits. The positive and non-detect results of these analytes were estimated (J/UJ) for all samples.

The recoveries of all surrogate compounds were within laboratory control limits.

The matrix spike (MS) and matrix spike duplicate (MSD) analyses were performed on sample MHT-1A-COMP G. The recoveries of benzo[k]fluoranthene, 4-chloroaniline, isophorone, hexachlorocyclopentadiene, atrazine and benzaldehyde failed below laboratory control limits; therefore, these failed analytes were flagged with “F1” qualifiers by the laboratory for sample

MHT-1A-COMP G. The F1 qualifiers were removed and replaced with a J-flag for positive results and an UJ-flag for non-detected results for potential low bias for analytes, benzo[k]fluoranthene, 4-chloroaniline, isophorone, hexachlorocyclopentadiene, atrazine and benzaldehyde. The MS/MSD analyses yielded acceptable relative percent difference (RPD) for all analytes, demonstrating acceptable laboratory precision.

All samples were analyzed undiluted, and all results were reported on a dry-weight basis.

Sample MHT-3A-COMP C-DUP is a field duplicate of MHT-3A-COMP C. Their analyses are considered within control in one of the following conditions.

- When analyte concentrations from both analyses were five times (5x) or more of the corresponding reporting limits (RLs), the RPD is <50%, or
- When either of the analyte concentration from both analyses was non-detect or <5xRL, the absolute difference (Δ) between the two values (RL or concentration) is less than two times (<2x) RL.

The positive results of field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3A-COMP C (RL=0.0094)	MHT-3A-COMP C-DUP (RL=0.010)	RPD (%)	Action
Phenanthrene	0.0030 J	0.0084 J	$\Delta=0.0054$	none
Fluoranthene	0.0068 J	0.019	$\Delta=0.012$	none
Pyrene	0.0058 J	0.017	$\Delta=0.011$	none
Benzo[a]anthracene	0.0069 J	0.013	$\Delta=0.006$	none
Chrysene	0.0094 U	0.017	$\Delta=0.008$	none
Benzo[b]fluoranthene	0.0094 U	0.014	$\Delta=0.005$	none
Benzo[k]fluoranthene	0.0094 U	0.0064 J	$\Delta=0.0030$	none
Benzo[a]pyrene	0.0094 U	0.013	$\Delta=0.004$	none
Indeno[1,2,3-cd]pyrene	0.0094 U	0.0079 J	$\Delta=0.0015$	none
Benzo[g,h,i]perylene	0.0094 U	0.012	$\Delta=0.003$	none

mg/kg – milligram per kilogram
 ND – not detected

RL – reporting limit
 Δ - absolute difference

RPD – relative percent difference

Since the absolute difference was <2xRL for analytes summarized in table above, data qualification action was not required for sample MHT-3A-COMP C and its field duplicate MHT-3A-COMP C-DUP.

Metal and Mercury Analyses

Metal and mercury results had been estimated (J/UJ) due to solid contents <50% for all sediment samples.

The instrument and method blanks were free of metals and mercury contamination with the exception of the continuing calibration blank (CCB), 180-445749/85. Aluminum was detected in this blank at 28.1 mg/L; however, field samples associated with this CCB contained levels of

aluminum above the detection limit and greater than 10x the amount in the blank. Data qualification action was not required.

The analyses of the LCSs yielded acceptable recoveries.

Unless otherwise discussed, further data qualification action was not taken for the following QC results that failed technical requirements.

- Although not spiked, chromium and lead were detected with concentrations greater than (>) the method detection limits (MDL) in the ICSA analysis 180-445749/16, indicating interferant metal elements such as aluminum, calcium, iron, and/or magnesium at high enough concentrations may cause biased high chromium and lead results. Iron and aluminum, two of the major interferant analytes, were detected in all sediment samples at concentrations 1-2 times the ICSA. These not spiked but detected analyte concentrations in sediment samples were > ten times (10x) those of ICSA, suggesting insignificant impact of high iron and aluminum concentrations on chromium and lead, data qualification action was not required.
- The MS and/or MSD analyses on sample MHT-3A-COMP C yielded recoveries outside control limits of 75-125% for antimony, zinc, and mercury. The post digestive spike analysis yielded acceptable recoveries for all analytes. The positive results of these analytes for sample MHT-3A-COMP C were estimated (J) due to low percent solids, therefore no further qualifier was applied. The RPDs of all analytes met the technical requirement of $\leq 35\%$. Recoveries of aluminum, iron, and manganese were also outside control limits; however, their concentrations in sample MHT-3A-COMP C were more than four times (4x) the spike concentrations; therefore, data qualification action was not required.
- The MS and/or MSD analyses on sample MHT-1A-COMP G yielded recoveries below control limits of 75-125% for antimony. The post digestive spike analysis yielded acceptable recoveries for all analytes. The positive antimony result for sample MHT-1A-COMP was estimated (J) due to low percent solids, therefore, no further qualifier was applied. The RPDs of all analytes met the technical requirement of $\leq 35\%$. Recoveries of aluminum, iron, manganese, and zinc were also outside control limits; however, their concentrations in sample MHT-1A-COMP were more than four times (4x) the spike concentrations; therefore, data qualification action was not required.

Field Duplicate

Sample MHT-3A-COMP C-DUP is a field duplicate of MHT-3A-COMP C. Their analyses are considered within control in one of the following conditions.

- When analyte concentrations from both analyses were five times (5x) or more of the corresponding reporting limits (RLs), the RPD is $< 50\%$, or
- When either of the analyte concentration from both analyses was non-detect or $< 5xRL$, the absolute difference (Δ) between the two values (RL or concentration) is less than two times ($< 2x$) RL.

The positive metal and mercury results of field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3A-COMP C	MHT-3A-COMP C-DUP	RPD (%)	Action
Silver	0.30 (RL= 0.23)	0.32 (RL= 0.18)	$\Delta=0.02$	none
Aluminum	16000 (RL= 14)	16000 (RL= 11)	0	none
Arsenic	14 (RL= 0.23)	14 (RL= 0.18)	0	none
Barium	140 (RL= 2.3)	140 (RL= 1.8)	0	none
Beryllium	0.95 (RL= 0.23)	1.1 (RL= 0.18)	$\Delta=0.06$	none
Calcium	4700 (RL= 120)	4600 (RL= 89)	2.2	none
Cadmium	0.63 (RL= 0.23)	0.79 (RL= 0.18)	$\Delta=0.16$	none
Cobalt	15 (RL= 0.12)	16 (RL= 0.089)	6.5	none
Chromium	48 (RL= 0.47)	49 (RL= 0.36)	2.1	none
Copper	34 (RL= 0.70)	39 (RL= 0.53)	13.7	none
Iron	32000 (RL= 12)	33000 (RL= 8.9)	3.1	none
Potassium	2500 (RL= 120)	2400 (RL= 89)	4.1	none
Magnesium	6000 (RL= 120)	6100 (RL= 89)	1.7	none
Manganese	1900 (RL= 1.2)	1600 (RL= 0.89)	17.1	none
Sodium	490 (RL= 120)	490 (RL= 89)	0	none
Nickel	29 (RL= 0.23)	30 (RL= 0.18)	3.4	none
Lead	49 (RL= 0.23)	54 (RL= 0.18)	9.7	none
Antimony	0.38 (RL= 0.47)	0.30 J (RL= 0.36)	$\Delta=0.08$	none
Selenium	0.71 J (RL= 1.2)	0.68 J (RL= 0.89)	$\Delta=0.03$	none
Thallium	0.22 J (RL= 0.23)	0.24 (RL= 0.18)	$\Delta=0.02$	none
Vanadium	41 (RL= 0.23)	42 (RL= 0.18)	2.4	none
Zinc	210 (RL= 3.5)	230 (RL= 2.7)	9.1	none
Mercury	0.16 (RL= 0.046)	0.18 (RL= 0.049)	$\Delta=0.02$	none

mg/kg – milligram per kilogram
 Δ - absolute difference

RL – reporting limit

RPD – relative percent difference

Since the RPD was <50% and absolute difference was <2x RL for analytes summarized in the table above, data qualification action was not required for sample MHT-3A-COMP C and its field duplicate MHT-3A-COMP C-DUP.

Cyanide (Total and Amenable) Analyses

Cyanide results had been estimated (J) due to solid contents <50% for all sediment samples.

Initial and continuing calibration verification analyses met technical requirements. The instrument and method blanks were free of cyanide contamination. The recoveries of LCS analyses were within laboratory control limits.

A matrix spike and matrix spike duplicate were performed on sample MHT-1A-COMP G. All recoveries and the RPD were within acceptance limits.

All sediment samples were analyzed undiluted, and their results were on a dry-weight basis.

Field Duplicate

Sample MHT-3A-COMP C-DUP is a field duplicate of MHT-3A-COMP C. Their analyses are considered within control in one of the following conditions.

- When analyte concentrations from both analyses were five times (5x) or more of the corresponding reporting limits (RLs), the RPD is <50%, or
- When either of the analyte concentration from both analyses was non-detect or <5xRL, the absolute difference (Δ) between the two values (RL or concentration) is less than two times (<2x) RL.

The positive cyanide results of the field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3A-COMP C	MHT-3A-COMP C-DUP	RPD (%)	Action
Cyanide	0.76 (RL= 0.54)	0.82 (RL= 0.51)	$\Delta=0.06$	none

mg/kg – milligram per kilogram RL – reporting limit RPD – relative percent difference
 Δ - absolute difference

Since the absolute difference was <2xRL for cyanide, data qualification action was not required for sample MHT-3A-COMP C and its field duplicate MHT-3A-COMP C-DUP.

Hexavalent and Trivalent Chromium Analyses

Hexavalent chromium non-detected results had been estimated (UJ) due to solid contents <50% for all sediment samples.

Initial and continuing calibration verification analyses met laboratory control limits. The instrument and method blanks were free of hexavalent chromium contamination with the exception of the continuing calibration blank (CCB), 180-444641/4. Hexavalent chromium was detected in this blank at 0.004 mg/L; however, no field samples were associated with this CCB and no data qualification was required.

Hexavalent chromium analysis was performed without dilution for all samples. All results were reported on a dry-weight basis.

Hexavalent chromium was not detected in field duplicate pair MHT-3A-COMP C and MHT-3A-COMP C-DUP. The field precision was deemed acceptable.

Trivalent chromium result was calculated by subtracting hexavalent chromium result from the total chromium result. Since hexavalent chromium was not detected in any sediment samples submitted in this SDG, the trivalent chromium results are those of the total chromium results and were estimated (J) as such due to low solid contents.

Sulfide Analysis

Sulfide results had been estimated (J) due to solid contents <50% for all sediment samples.

Sulfide was detected in the continuing calibration blank (CCB), 180-444190/14 at 1.92 mg/L; however, sulfide was not detected in the sample MHT-2A-COMP E associated with this CCB. No data qualification was required.

Sulfide was detected in the calibration blanks and method blank associated with samples MHT-3B-SAMPLE D, MHT-RW7-SAMPLE A, MHT-1A-COMP H and MHT-1A-COMP G at concentrations >MDL but <RL. Based on professional judgement, positive sulfide results would be estimated (J) for potential high bias for all associated sediment samples because their concentrations, though >RLs, were <10x that of the method blank. However, since the results were previously qualified due to low percent solids, no further qualifier was needed. The B-flag applied by the laboratory was removed during the data review process.

The MS/MSD analyses on sample MHT-1A-COMP G failed sulfide recoveries low, less than laboratory control limits, but with an acceptable RPD. The positive sulfide result was previously estimated (J) for low percent solids, no further qualifier was applied to the sulfide result in sample MHT-1A-COMP G.

Other instrument and batch QC results were within laboratory control limits.

Field Duplicate

Sample MHT-3A-COMP C-DUP is a field duplicate of MHT-3A-COMP C. Their analyses are considered within control in one of the following conditions.

- When analyte concentrations from both analyses were five times (5x) or more of the corresponding reporting limits (RLs), the RPD is <50%, or
- When either of the analyte concentration from both analyses was non-detect or <5xRL, the absolute difference (Δ) between the two values (RL or concentration) is less than two times (<2x) RL.

The positive sulfide results of the field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3A-COMP C	MHT-3A-COMP C-DUP	RPD (%)	Action
Sulfide	36 J (RL= 84)	49 J (RL= 92)	$\Delta=13$	none

mg/kg – milligram per kilogram
 Δ - absolute difference

RL – reporting limit

RPD – relative percent difference

Since the absolute difference was <2xRL for sulfide, data qualification action was not required for sample MHT-3A-COMP C and its field duplicate MHT-3A-COMP C-DUP.

Total Organic Carbon (TOC) Analysis

TOC results had been estimated (J) due to solid contents <50% for all sediment samples.

The instrument and method blanks were free of TOC. The analyses of LCSs yielded acceptable recoveries.

Each sample was analyzed in duplicate without dilution, and the RPD of the duplicate measurements was <20% except for sample MHT-3A-COMP C-DUP which yielded an RPD of 23.65%. The positive TOC result was previously estimated (J) due to low solids and no additional qualifier for non-compliant precision was needed.

The matrix spike and matrix spike duplicate performed on sample MHT-1A-COMP G yielded TOC recoveries below the lower control limit. The RPD was within the acceptance limit. The positive detects for TOC results were estimated (J) for sample, MHT-1A-COMP G due to low percent solids, therefore no further data qualification was needed.

Note that the laboratory report narrative stated, “The reporting limit for Lloyd Kahn TOC analysis is a nominal value and does not reflect adjustments in sample mass processed on an individual basis.” After a requested made for explanation, the laboratory explained that sample mass and associated solid content were used to calculate the TOC result but not the RL due to “a limitation in the either the software or the LIMS.” Since the TOC results in all sediment samples were >10x RLs, the RLs are not critical to end data user.

Field Duplicate

Sample MHT-3A-COMP C-DUP is a field duplicate of MHT-3A-COMP C. Their analyses are considered within control in one of the following conditions.

- When analyte concentrations from both analyses were five times (5x) or more of the corresponding reporting limits (RLs), the RPD is <50%, or
- When either of the analyte concentration from both analyses was non-detect or <5xRL, the absolute difference (Δ) between the two values (RL or concentration) is less than two times (<2x) RL.

The positive TOC results of field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3A-COMP C	MHT-3A-COMP C-DUP	RPD (%)	Action
TOC	34000 (RL= 2800)	37000 (RL= 3100)	8.5	none

mg/kg – milligram per kilogram
 Δ - absolute difference

RL – reporting limit

RPD – relative percent difference

Since the RPD was <50%, data qualification action was not required for TOC for sample MHT-3A-COMP C and its field duplicate MHT-3A-COMP C-DUP.

Overall Assessment

Based on the quality control data presented, this validation review, and the required qualifiers, all the results are acceptable for use with the applied qualifiers.

SUMMARY

Based on the sampling results described above, these sediments do not present a disposal concern. Concentrations of SVOCs, metals, hexavalent and trivalent chromium, and cyanide in bulk sediments from all locations collected at the MHT on August 15 and 16, 2023 were below the lower of Non-Residential Ingestion-Dermal and Non-Residential Inhalation standards (May 2021) and can be disposed of at White's Rehandling Basin.

The major findings of this sediment characterization are as follows:

- Sediment can be dredged from 1A, 2A, 3A, 3B, 3C, 2B Basin/Intake RW5 and Intake RW7, and can be disposed of at White's Rehandling Basin based on analytical data from sediment sampling in August 2023 as described herein.
- The maintenance dredged sediments to be removed from the Delaware River at MHT are mainly comprised of sand and silt/clay.
- Low levels of SVOCs, inorganics, trivalent chromium and cyanide were detected in bulk sediments collected at Marcus Hook Terminal. Only arsenic and cadmium were detected in bulk sediments in concentrations that exceeded Delaware Hazardous Substance Cleanup Act Soil Screening Level criteria.
- All samples were processed within holding times and according to method specifications.

Energy Transfer and Weston are available at any time to clarify or address issues the Department may have regarding this request. Please call me at (908) 565-0888 with any questions. We appreciate the Departments' review and look forward to approval of the enclosed sediment data and the related Water Quality Certificate approval.

Sincerely,

WESTON SOLUTIONS, INC.



Ryan Brown
Project Manager

cc: D. Monk (Energy Transfer)

ATTACHMENT 1
Volume Calculations

ATTACHMENT 2
Core Logs

ATTACHMENT 3
Core Photographs

ATTACHMENT 4
Raw Data on Thumb Drive

FIGURES

TABLES