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September 21, 2022

Ms. Katherine Todoroff
Office of Dredging and Sediment Technology
New Jersey Department of Environmental Protection
Mail Code #501-02A, P.O. Box 420
Trenton, New Jersey 08625-0425
Trenton, NJ 08625-0028

Re: Marcus Hook Industrial Complex Water Quality Certificate
Berths 1A, 2A, 3A, 3B, 3C, Basin 2B/Intake RW5 and Intake RW7
Phase II August 2022 Sediment Sampling Results

Dear Ms. Todoroff,

As you are aware, Energy Transfer (formerly Sunoco) is proposing to dredge the berthing areas at their Marcus Hook Terminal (MHT) (Figure 1) starting as early as late October 2022. Specifically, Energy Transfer plans on maintenance dredging berths 2A, 3A, 3B, 3C, 2B Basin/Intake RW5 and Intake RW7, in addition to berth 1A (data for which was submitted on July 22, 2022). Energy Transfer would like to dredge 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 requesting that the upcoming dredging be performed under New Jersey Department of Environmental Protection (NJDEP) 401 Water Quality Certificate (WQC) and Acceptable Use Determination (AUD) (Permit No. 0809-01 1001.14, CDT210001).

Weston chose the core locations using recent hydrographic surveys of the dock areas performed by S.T. Hudson Engineers, Inc. (Camden, NJ) on June 2, 2022.

These surveys show that approximately 26,825 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 10, 2022, presented the number of cores to be collected and the appropriate analyses to be conducted, and was approved by the NJDEP on June 29, 2022. 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 26,825 cy to be dredged.

August 2022 Sediment Sampling Event

Eight (8) sediment cores were collected to characterize the approximately 26,825 cy of sediments currently within the dredge templates. The eight cores collected from MHT on August 4, 2022 were collected by Weston from a motorized sampling platform operated by Aqua Survey Inc. using a modified sediment coring device (Vibracore).

All eight initial cores collected were processed into 4 samples and 2 composite samples according to the approved SSAP. This sampling strategy resulted in a total of 6 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 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'	17.0'	5.0'	5.0'	Full Suite List
2	Berth 3C	Composite B	40' + 2'	39.7'	2.3'	2.3'	Full Suite List
3	Berth 3C	Composite B	40' + 2'	39.9'	2.1'	2.1'	Full Suite List
4	Berth 3A	Composite C	40' + 2'	39.5'	2.5'	2.5'	Full Suite List
5	Berth 3A	Composite C	40' + 2'	39.7'	2.3'	2.3'	Full Suite List
6	Berth 3B	Sample D	13' + 2'	12.5'	2.5'	2.5'	Full Suite List
7	Berth 2A	Sample E	36' + 2'	35.0'	3.0'	3.0'	Full Suite List
8	Berth 2B	Sample F	15' + 2'	14.1'	2.9'	2.9'	Full Suite List

*Includes 2' overdredge, as requested by NJDEP.
** Samples analyzed for SVOCs, PCB aroclors, pesticides, 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], pesticides, PCB arolcors, 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	Brown silty sand
2	Brown silty sand
3	Grey/brown silty sand, trace gravel
4	Brown soft silty sand
5	Greyish/brown soft silty sand
6	Greyish/brown soft silty sand
7	Grey/brown silty sand, trace gravel
8	Brown/grey soft silty sand

Table 3. Analytical Parameters and Methods

Test Parameter	Analytical Method
Grain Size	ASTM D422
TCL SVOCs	8270E
PCBs (Aroclors)	8082A
TCL Pesticides	8081B
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
TAL = Target Analyte List
TOC = Total Organic Compound
ASTM = American Society for Testing and Materials
EPA = U.S. Environmental Protection Agency
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 rock, sand and silt/clay. The grain size analysis indicated that only sample MHT-RW7-Sample A contained gravel (9.8%). Samples ranged from 2.1% sand at location MHT-3B-Comp C to 9.5% at location MHT-3C-Comp B. Samples ranged from 45.2% silt at location MHT-3C-Comp B to 68.5% silt at location MHT-2B-Sample F. 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 34,700 milligrams/kilogram (mg/kg) at location MHT-3C-Comp B to 46,200 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 New Jersey Soil Remediation Standards (SRS) for Non-Residential Ingestion-Dermal and Non-Residential Inhalation standards (May 2021). 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): Fifteen SVOCs were detected in one or more of the sediment samples collected at MHT, as summarized in Table 5. No detected SVOCs concentrations exceeded NJ Non-Residential Ingestion-Dermal and Non-Residential Inhalation standards.

Pesticides: Twelve pesticides were detected in one or more of the sediment samples collected at MHT, as summarized in Table 5. No detected pesticide concentrations exceeded NJ Non-Residential Ingestion-Dermal and Non-Residential Inhalation standards.

PCBs: Only Aroclor-1254 was detected in one or more of the sediment samples collected at MHT as summarized in Table 5. No concentrations of any PCB exceeded NJ Non-Residential Ingestion-Dermal and Non-Residential Inhalation standards.

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. No detected inorganic chemical concentrations exceeded NJ Non-Residential Ingestion-Dermal and Non-Residential Inhalation standards.

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 3,600 mg/kg to 4,510 mg/kg. Total chromium concentrations ranged from 37.1 mg/kg to 44.3 mg/kg. Iron concentrations ranged from 26,700 mg/kg to 31,200 mg/kg. Magnesium concentrations ranged from 4,580 mg/kg to 5,420 mg/kg. Potassium concentrations ranged from 1,850 mg/kg to 2,360 mg/kg. Sodium concentrations ranged from 219 mg/kg to 340 mg/kg. Thallium concentrations ranged from 0.16 mg/kg to 0.24 mg/kg.

QUALITY ASSURANCE & QUALITY CONTROL

This section documents the data validation for the six 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.

General

1. **Samples**

The following table summarizes the samples for which this data validation is being conducted.

Field Sample ID	Lab Sample ID	Analysis
MHT-RW7-SAMPLE_A	180-142513-1	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
MHT-3C-COMP_B	180-142513-2	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
MHT-3B-SAMPLE_D	180-142513-3	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
MHT-3B-SAMPLE_D-DUP	180-142513-4	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
MHT-2A-SAMPLE_E	180-142513-5	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
MHT-2B-SAMPLE_F	180-142513-6	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture
MHT-3A-Comp_C	180-142513-7	SVOC, Pesticides, PCBs, Metals, Mercury, Cyanide, Trivalent Chromium, Hexavalent Chromium, TOC, Sulfide, Percent Moisture

2. **Holding Times / Sample Receipt**

The samples were received by the laboratory on 8/5/2022 in good condition, properly preserved, and on ice. The shipment cooler temperature was 3.7 degree Celsius (º C).

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

The solid contents were greater than (>) 30% for all sediment samples but less than 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) 180-409123/3 failed percent difference (%D) requirement for di-n-octylphthalate. The non-detect di-n-octylphthalate results were estimated (UJ) for all samples.

The associated method blank was free of contamination.

Except for benzo[k]fluoranthene, bis(2-chloroethyl)ether, bis(2-chloroethoxy)methane, and acetophenone, the associated laboratory control sample (LCS) analysis yielded acceptable recoveries for target analytes. 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-3C-COMP_B. The recoveries of multiple analytes failed below laboratory control limits; therefore, these failed analytes were flagged with "F1" qualifiers by the laboratory for sample MHT-3C-COMP_B. The F1 qualifiers were removed and replaced with a J-flag for positive results and an UJ-flag for non-detect results for potential low bias. 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-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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-3B-SAMPLE_D (RL=0.0093)	MHT-3B-SAMPLE_D-DUP (RL=0.0094)	RPD (%)	Action
Di-n-butyl phthalate	ND (RL=0.046)	0.030 J (RL=0.046)	Δ=0.016	none
Phenanthrene	0.0046 J	0.0052 J	Δ=0.0006	none
Anthracene	ND	0.0024 J	Δ=0.0069	none
Fluoranthene	0.010	0.011	Δ=0.01	none
Pyrene	0.0096	0.0098	Δ=0.0002	none
Benzo[a]anthracene	0.0069 J	0.0063 J	Δ=0.0006	none
Chrysene	0.0070 J	0.0078 J	Δ=0.0008	none
Benzo[b]fluoranthene	0.0083 J	0.0081 J	Δ=0.0002	none

Analyte Concentration (mg/kg)	MHT-3B-SAMPLE_D (RL=0.0093)	MHT-3B-SAMPLE_D-DUP (RL=0.0094)	RPD (%)	Action
Benzo[k]fluoranthene	0.0036 J	0.0041 J	Δ=0.0005	none
Benzo[a]pyrene	0.0067 J	0.0061 J	Δ=0.0006	none
Indeno[1,2,3-cd]pyrene	0.0048 J	ND	Δ=0.0046	none
Benzo[g,h,i]perylene	0.0046 J	0.0049 J	Δ=0.0003	none

mg/kg – milligram per kilogram RL – reporting limit RPD – relative percent difference
ND – not detected Δ - absolute difference

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

PESTICIDE ANALYSIS

The analyses of CCV 180-409320/6 and 180-409320/31 failed the %D requirements for heptachlor and 4,4'-DDT. Positive and non-detect results of these analytes were estimated (J/UJ) for samples MHT-RW7-SAMPLE_A, MHT-3C-COMP_B, MHT-3B-SAMPLE_D, and MHT-3B-SAMPLE_D-DUP.

For the dilution analysis of sample MHT-RW7-SAMPLE_A, the analysis of a closing CCV was not evident. Since this dilution analysis was used to obtain valid quantitation results of 4,4'-DDD and 4,4'-DDT, these two results were estimated (J) for sample MHT-RW7-SAMPLE_A based on professional judgement.

The method blank was free of pesticides contamination.

The recoveries of surrogate compound decachlorobiphenyl (DCB) were within laboratory control limits for all sediment and batch QC samples. However, except for LCS 180-408738/2-B analyzed on 8/19/2022 that yielded acceptable recoveries, the recovery of surrogate compound tetrachloro-m-xylene (TCX) failed low in all sediment and batch QC samples. The failed TCX recoveries were >30% for all but sediment sample MHT-3B-SAMPLE_D-DUP which yielded TCX recoveries <10% on both analytical columns. Positive pesticide results were estimated (J) for all sediment samples for biased low. The non-detect pesticide results were estimated (UJ) for all samples.

The MS/MSD analyses were performed on sample MHT-3C-COMP_B and yielded acceptable recoveries and RPDs for 4,4'-DDE and endosulfan II. The concentrations of 4,4'-DDD and 4,4'-DDT in sample MHT-3C-COMP_B were more than ten times (10x) the spiked concentration, which resulted in high recoveries that were not used for data qualification. The recoveries of the remaining target analytes failed below the laboratory control limits; therefore, their positive and non-detect results were estimated (J/UJ).

The concentrations of 4,4'-DDD and 4,4'-DDT exceeded instrument calibration range in the undiluted analysis of MHT-RW7-SAMPLE_A. A subsequent 25-fold dilution analysis of this sample was performed and used to report quantitated results for these two analytes.

All sample results were reported on a dry-weight basis and adjusted with dilution factor as applicable.

Target Analyte Identification & Quantitation

Since dual columns outfitted with a splitter were used for pesticide analysis, large differences in the numerical results from the dual-columns analyses may be indicative of positive interferences with the higher of the results, which could result from poor separation of target analytes, or the presence of a non-target compound. However, they may also result from other causes. If one result is significantly higher (e.g., RPD >40%), the laboratory is to check the chromatograms to see if an obviously overlapping peak is causing an erroneously high result. If no overlapping peaks were noted, the baseline parameters established by the instrument data system (or operator) during peak integration must be examined. A rising baseline may cause the incorrect integration of the peak for the lower result. As per Method 8000D Paragraph 11.10.4.2, if no anomalies were noted, the chromatographic conditions must be reviewed. If there is no evidence of chromatographic problems, it may be appropriate to report the lower result.

As such, the laboratory reported the higher numeric value as the final result regardless of what the analyte PRD was, except for the following sample results where the dual-columns analysis yielded a RPD >40% and the lower value was reported, in which case the laboratory applied a p-flag to that result to indicate the disparity between two quantitative results.

MHT-RW7-SAMPLE_A: cis-Chlordane, heptachlor epoxide
MHT-3C-COMP_B: aldrin, delta-BHC
MHT-2B-SAMPLE_F: aldrin, gamma-BHC, heptachlor epoxide
MHT-3A-Comp_C: aldrin, endrin, gamma-BHC, heptachlor epoxide

The p-flag was removed during the data review process.

The lower numeric value was also reported for the following sample results, but since their RPDs were <40%, a p-flag was not applied by the laboratory.

MHT-RW7-SAMPLE_A (DL): 4,4’-DDT
MHT-3C-COMP_B: 4,’4-DDD
MHT-3B-SAMPLE_D: endosulfan II
MHT-3B-SAMPLE_D-DUP: cis-Chlordane, endosulfan II

Note that Method 8081B expresses the difference between dual-column results as RPD, calculated as [(absolute difference between the two values)/the mean of the two values]x100%. However, the data validation SOP expresses the difference between dual-column results as percent difference (%D), calculated as [(absolute difference between the two values)/the lower value]x100%. During the data review process, the %D was manually calculated for each reported positive result so that the data qualification criteria specified by the data validation SOP could be followed.

Multiple analyte %Ds in sediment samples were between 26 and 200 therefore warranted estimating those sample results. However, since all positive pesticide results had already been estimated for low surrogate recoveries, further data qualification was not required.

The %D was >200 for the following sample results, therefore their detections were qualified as tentatively identified at approximate concentrations (NJ) based on professional judgement.

MHT-RW7-SAMPLE_A: heptachlor epoxide
MHT-3C-COMP_B: delta-BHC, aldrin
MHT-3B-SAMPLE_D: beta-BHC
MHT-2B-SAMPLE_F: heptachlor epoxide

Field Duplicate

Sample MHT-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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 pesticide results of field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3B-SAMPLE_D (RL=0.00012)	MHT-3B-SAMPLE_D-DUP (RL=0.0094)	RPD (%)	Action
4,4'-DDD	0.0041 J	0.0020	Δ=0.016	none
4,4'-DDE	0.0028 J	0.0014	Δ=0.0006	none
4,4'-DDT	0.0034 J	0.0014	Δ=0.0069	none
Aldrin	0.00011 J	0.000052 J	Δ=0.01	none
cis-Chlordane	0.00056 J	0.00035	Δ=0.0002	none
beta-BHC	0.00016 J	0.000090 J	Δ=0.0006	none
Dieldrin	0.0012 J	R	Δ=0.0008	none
Endosulfan II	0.00038 J	0.00026	Δ=0.0002	none
Endrin	0.00062 J	0.00034	Δ=0.0005	none
gamma-BHC (Lindane)	0.00016 J	0.000087 J	Δ=0.0006	none
trans-Chlordane	0.0011 J	0.00061	Δ=0.0046	none
			Δ=0.0003	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-3B-SAMPLE_D and its field duplicate MHT-3B-SAMPLE_D-DUP.

PCB (AS AROCLOR) ANALYSIS

A closing CCV was not evident for the PCB analytical sequence. Based on professional judgement, positive and non-detect Aroclor results were estimated (J/UJ), respectively, for all samples but MHT-3C-COMP_B.

The method blank was free of pesticides contamination, and the LCS analysis yielded acceptable recoveries for PCB-1016 and PCB-1260, the spiked target analytes.

The recoveries of surrogate compounds were within laboratory control limits for sediment and batch QC samples with the following exceptions. The recovery of decachlorobiphenyl (DCB) exceeded laboratory control limits of 30-150% for samples MHT-3C-COMP_B, MHT-2A-SAMPLE_E, and MHT-3A-Comp_C. Positive PCB-1254 result was estimated (J) for sample MHT-3C-COMP_B for potential high bias. Further data qualification action was not required for samples MHT-2A-SAMPLE_E and MHT-3A-Comp_C because their Aroclor results were already estimated for lack of the closing CCV analysis.

The MS/MSD analyses were performed on sample MHT-3C-COMP_B and yielded acceptable recoveries for PCB-1016 and PCB-1260. However, the PRDs of PCB-1016 and PCB-1260 exceeded the laboratory control limit of 30%. Since PCB-1016 and PCB-1260 were not detected in sample MHT-3C-COMP_B, data qualification action was unnecessary. The F2-flag, applied by the laboratory to signify non-compliant precision, was removed during the data review process. Further data qualification action was not required for PCB-1254 because it had already been estimated due to high surrogate recovery.

Target Analyte Identification & Quantitation

Sediment samples were analyzed undiluted, and their results were reported on a dry-weight basis with the higher numeric value of the dual-column results used for reporting purposes.

As in the case as pesticide analysis, the difference between dual-column results for PCB analysis was expressed in RPD as Method 8082A specified. Since the data validation SOP expresses the difference as %D, such value was manually calculated. The %D was <25 for all but samples MHT-RW7-SAMPLE_A and MHT-3A-Comp_C. As such, positive PCB-1254 results were estimated (J) for these two samples. Since both results had been estimated for other non-compliant QC results, further action was not required.

For samples MHT-RW7-SAMPLE_A, MHT-3B-SAMPLE_D-DUP, and MHT-2A-SAMPLE_E, only three out of five PCB-1254 peaks were detected on the RTX-CLP II column, suggesting that a weathered PCB-1254 pattern. Therefore, the presence of PCB-1254 was qualified as tentatively identified (N) for these three samples.

Field Duplicate

Sample MHT-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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 PCB-1254 results of field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3B-SAMPLE_D (RL=0.0012)	MHT-3B-SAMPLE_D-DUP (RL=0.0012)	RPD (%)	Action
PCB-1254	0.0060 J	0.0025 NJ	Δ=0.0035	estimate

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

Since the absolute difference of PCB-1254 was >2xRL, the PCB-1254 results deemed incomparable between the field duplicate pair MHT-3B-SAMPLE_D and MHT-3B-SAMPLE_D-DUP. Since both PCB-1254 results had been estimated for other non-compliant QC results, further data qualification action was not taken.

METAL & MERCURY ANALYSES

Metal and mercury results had been estimated (J/UJ) due to solid contents <50% for all sediment samples. Unless otherwise discussed, further data qualification action was not taken for the following QC results that failed technical requirements.

- Various instrument blanks contained aluminum, antimony, and/or lead at concentrations <RLs. Since these analyte concentrations in all sediment samples were >RLs, data qualification action was unnecessary.
- Although not spiked, multiple analytes were detected in the analysis of ICSA solution at concentrations > method detection limit (MDL). Iron, one of the major interferent analytes, was detected in all sediment samples at concentrations about twice those of ICSA. These not spiked but detected analyte concentrations in sediment samples were > ten time (10x) those of ICSA, suggesting insignificant impact of high iron concentration on these analytes except for silver. Since silver concentrations in all sediment samples were <10x that of ICSA, its results needed to be estimated (J) for potential high bias.
- The MS/MSD analyses on sample MHT-3C-COMP_B yielded recoveries less than control limits of 75-125% for sodium, antimony, and selenium. Positive results of these analytes needed to be estimated (J) for sample MHT-3C-COMP_B. The RPDs of all analytes met technical requirement of ≤35%.
- The serial dilution analysis performed on sample MHT-3C-COMP_B yielded %D>10 for aluminum, calcium, chromium, iron, potassium, magnesium, vanadium, and zinc. The positive results of these analytes needed to be estimated (J).

Field Duplicate

Sample MHT-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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-3B-SAMPLE_D	MHT-3B-SAMPLE_D-DUP	RPD (%)	Action
Silver	0.28 (RL= 0.17)	0.30 (RL= 0.19)	Δ=0.02	none
Aluminum	13900 (RL= 10)	15900 (RL= 11.5)	13.4	none
Arsenic	10.5 (RL= 0.17)	12.1 (RL= 0.19)	14.2	none
Barium	146 (RL= 1.7)	157 (RL= 1.9)	7.3	none
Beryllium	1.1 (RL= 0.17)	1.2 (RL= 0.19)	8.7	none
Calcium	4090 (RL= 83.0)	4510 (RL= 95.7)	9.8	none
Cadmium	0.87 (RL= 0.17)	0.86 (RL= 0.19)	Δ=0.01	none
Cobalt	14.7 (RL= 0.083)	16.2 (RL= 0.096)	9.7	none
Chromium	37.1 (RL= 0.33)	43.4 (RL= 0.38)	15.7	none
Copper	35.2 (RL= 0.50)	38.7 (RL= 0.57)	9.5	none
Iron	27800 (RL= 8.3)	31200 (RL= 9.6)	11.5	none
Potassium	1850 (RL= 83.0)	2200 (RL= 95.7)	17.3	none
Magnesium	4700 (RL= 83.0)	5290 (RL= 95.7)	11.8	none
Manganese	1340 (RL= 0.83)	1460 (RL= 0.96)	8.6	none
Sodium	250 (RL= 83.0)	290 (RL= 95.7)	14.8	none
Nickel	25.7 (RL= 0.17)	28.5 (RL= 0.19)	10.3	none
Lead	48.2 (RL= 0.17)	53.5 (RL= 0.19)	10.4	none
Antimony	0.50 (RL= 0.33)	0.67 (RL= 0.38)	Δ=0.17	none
Selenium	0.68 J (RL= 0.83)	0.78 J (RL= 0.96)	Δ=0.10	none
Thallium	0.24 (RL= 0.17)	0.25 (RL= 0.19)	Δ=0.01	none
Vanadium	31.6 (RL= 0.17)	36.7 (RL= 0.19)	14.9	none
Zinc	214 (RL= 0.83)	233 (RL= 0.96)	8.5	none
Mercury	0.20 (RL= 0.034)	0.21 (RL= 0.037)	4.9	none

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

Since the PRD was <50% and absolute difference was <2xRL for analytes summarized in table above, data qualification action was not required for sample MHT-3B-SAMPLE_D and its field duplicate MHT-3B-SAMPLE_D-DUP.

CYANIDE (TOTAL AND AMENABLE) ANALYSIS

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.

The MS/MSD analyses on sample MHT-3C-COMP_B failed cyanide recoveries low, less than laboratory control limits, but acceptable RPD. Positive cyanide result was estimated (J) for sample MHT-3C-COMP_B for potential low bias.

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

Field Duplicate

Sample MHT-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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-3B-SAMPLE_D	MHT-3B-SAMPLE_D-DUP	RPD (%)	Action
Cyanide	1.9 (RL= 0.56)	1.0 (RL= 0.57)	Δ=0.9	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-3B-SAMPLE_D and its field duplicate MHT-3B-SAMPLE_D-DUP.

HEXAVALENT AND TRIVALENT CHROMIUM ANALYSIS

Initial and continuing calibration verification analyses met laboratory control limits. The instrument and method blanks were free of hexavalent contamination.

Although the hexavalent chromium recoveries of reference material analyses were within control limits (10.0-107.9%), they were all around 40%. Data qualification action was unnecessary.

The MS analyses performed on sample MHT-3C-COMP_B failed soluble and insoluble hexavalent chromium recoveries. The recovery of the post-digestion spike (PDS) analysis of the same sample also failed low for hexavalent chromium. The reanalyses of MHT-3C-COMP_B, its MS, and the PDS yielded similar results. Their recoveries are summarized below.

Percent Recovery (%R)	Initial Analysis	Reanalysis

Percent Recovery (%R)	Initial Analysis		Reanalysis	
	Soluble Cr(VI)	Insoluble (VI)	Soluble Cr(VI)	Insoluble (VI)
MHT-3C-COMP_B-MS (control limit: 75-125)	-0.2	31	-0.4	31
MHT-3C-COMP_B-PDS (control limit: 85-115)	11		3	

Cr(VI) – hexavalent chromium

An oxidation reduction potential (ORP) test was performed. The Eh/pH phase diagram showed the matrix to exhibit a reducing potential, thus incapable of supporting accurate hexavalent chromium analysis. Based on professional judgement, the non-detected hexavalent chromium result estimated (UJ) for sample MHT-3C-COMP_B for potential low bias.

Hexavalent chromium analysis was performed without dilution except for sample MHT-2B-SAMPLE_F that was analyzed with a 5-fold dilution, thus elevated reporting limit. All results were on a dry-weight basis.

Hexavalent chromium was not detected in field duplicate pair MHT-3B-SAMPLE_D and MHT-3B-SAMPLE_D-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 was detected in the initial calibration blank and method blank at concentrations >MDL but <RL. Based on professional judgement, positive sulfide results were estimated (J) for potential high bias for all sediment samples because their concentrations, though >RLs, were <10x that of method blank. The B-flag applied by the laboratory was removed during the data review process.

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

Field Duplicate

Sample MHT-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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 field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3B-SAMPLE_D	MHT-3B-SAMPLE_D-DUP	RPD (%)	Action
Sulfide	105 (RL= 82.1)	149 (RL= 84.2)	Δ=44	none

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

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

TOTAL ORGANIC CARBON (TOC) ANALYSIS

The instrument and method blanks were free of TOC. The analyses of LCS, MS, and MSD yielded acceptable recoveries and RPD.

Each sample was analyzed in duplicate without dilution, and the RPD of the duplicate measurements was <20% except for sample MHT-2A-SAMPLE_E which yielded an RPD of 21.31%. Positive TOC result was estimated (J) for non-compliant precision; its bias direction could not be determined.

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 was due to "a limitation in the either the software or the LIMS". Since the TOC results in all sediment samples were >10xRLs, the RLs are not critical to end data user.

Field Duplicate

Sample MHT-3B-SAMPLE_D-DUP is a field duplicate of MHT-3B-SAMPLE_D. 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 field duplicate pair are summarized below.

Analyte Concentration (mg/kg)	MHT-3B-SAMPLE_D	MHT-3B-SAMPLE_D-DUP	RPD (%)	Action
TOC	46200 (RL= 2800)	44900 (RL= 2850)	2.9	none

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

Since the RPD was <50%, data qualification action was not required TOC for sample MHT-3B-SAMPLE_D and its field duplicate MHT-3B-SAMPLE_D-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, pesticides, PCBs, metals, hexavalent and trivalent chromium, and cyanide in bulk sediments from all locations collected at the MHT on August 4, 2022 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 2A, 3A, 3B, 3C, 2B Basin/Intake RW5 and Intake RW7, in addition to berth 1A (data for which was submitted on July 22, 2022) and can be disposed of at White's Rehandling Basin based on analytical data from sediment sampling in August 2022 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, pesticides, Aroclor 1260, inorganics, trivalent chromium and cyanide were detected in bulk sediments collected at Marcus Hook Terminal. However, no compounds were detected in bulk sediments in concentrations that exceeded NJ SRS for Non-residential settings.
- 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)
D. Caplan (USACE)
R. Montgomerie (USEPA)
USFWS
NMFS

TABLES

Table 4 - Sediment Physical Data - Berths 2A, 2B, 3A, 3B, 3C, and Intake RW7
Energy Transfer - Marcus Hook Terminal
August 2022

Client SampleID:		MHT-RW7-Sample_A	MHT-3C-COMP B	MHT-3A-COMP C	MHT-3B-SAMPLE D	MHT-2A-SAMPLE E	MHT-2B-SAMPLE F
Laboratory ID:		180-142513-1	180-142513-2	180-142513-7	180-142513-3	180-142513-5	180-142513-6
Sampling Date:		8/4/2022	8/4/2022	8/4/2022	8/4/2022	8/4/2022	8/4/2022
GRAIN SIZE AND TOTAL ORGANIC CARBON							
Percent Gravel	%	0.0	9.8	0.0	0.0	0.0	0.0
Percent Coarse Sand	%	0.0	4.8	0.3	0.0	0.0	0.0
Percent Medium Sand	%	1.0	1.4	1.5	0.0	0.3	0.1
Percent Fine Sand	%	2.0	3.3	7.6	2.1	3.4	2.3
Percent Total Sand	%	3.0	9.5	9.4	2.1	3.7	2.4
Percent Silt	%	46.4	45.2	59.4	63.1	64.2	68.5
Percent Clay	%	50.6	35.5	31.2	34.8	32.1	29.1
Total Organic Carbon	PPM	40,500	34,700	35,400	46,200	40,000	45,200

Table 5 - Sediment Analytical Data - Berths 2A, 2B, 3A, 3B, 3C and Intake RW7 - SVOCs, Pesticides, PCBs, Metals and Wet Chemistry
Energy Transfer - Marcus Hook Terminal
August 2022

Client ID	NJ SRS 7:26D	NJ SRS 7:26D	MHT-RW7-SAMPLE_A			MHT-3C-COMP_B			MHT-3A-COMP_C			MHT-3B-SAMPLE_D			MHT-3B-SAMPLE_D-DUP			MHT-2A-SAMPLE_E			MHT-2B-SAMPLE_F		
Lab Sample ID	Ingestion-Dermal	Inhalation	180-142513-1			180-142513-2			180-142513-7			180-142513-3			180-142513-4			180-142513-5			180-142513-6		
Sampling Date	Table 2	Table 4	08/04/2022 08:25:00			08/04/2022 10:00:00			08/04/2022 14:00:00			08/04/2022 10:20:00			08/04/2022 10:22:00			08/04/2022 10:50:00			08/04/2022 11:30:00		
	Nonresidential	Nonresidential																					
SEMIVOLATILE ORGANIC COMPOUNDS (mg/kg)			Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL	Result	Q	MDL
1,1'-Biphenyl	450	NA	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.017	U	0.017	0.016	U	0.016	0.016	U	0.016
2,2'-oxybis[1-chloropropane]	52,000	NA	0.0030	U	0.0030	0.0031	U	0.0031	0.0033	U	0.0033	0.0034	U	0.0034	0.0035	U	0.0035	0.0033	U	0.0033	0.0032	U	0.0032
2,4,5-Trichlorophenol	91,000	NA	0.014	U	0.014	0.014	UJ	0.014	0.015	U	0.015	0.016	U	0.016	0.016	U	0.016	0.015	U	0.015	0.015	U	0.015
2,4,6-Trichlorophenol	230	NA	0.013	U	0.013	0.014	UJ	0.014	0.015	U	0.015	0.015	U	0.015	0.016	U	0.016	0.015	U	0.015	0.014	U	0.014
2,4-Dichlorophenol	2,700	NA	0.0031	U	0.0031	0.0032	UJ	0.0032	0.0034	U	0.0034	0.0036	U	0.0036	0.0036	U	0.0036	0.0034	U	0.0034	0.0033	U	0.0033
2,4-Dimethylphenol	18,000	NA	0.014	U	0.014	0.014	U	0.014	0.015	U	0.015	0.016	U	0.016	0.016	U	0.016	0.015	U	0.015	0.014	U	0.014
2,4-Dinitrophenol	1,800	NA	0.25	U	0.25	0.26	U	0.26	0.27	U	0.27	0.29	U	0.29	0.29	U	0.29	0.28	U	0.28	0.27	U	0.27
2,4-Dinitrotoluene	NA	NA	0.024	U	0.024	0.025	UJ	0.025	0.026	U	0.026	0.028	U	0.028	0.028	U	0.028	0.026	U	0.026	0.026	U	0.026
2-Chloronaphthalene	67,000	NA	0.0019	U	0.0019	0.0019	UJ	0.0019	0.0020	U	0.0020	0.0021	U	0.0021	0.0022	U	0.0022	0.0020	U	0.0020	0.0020	U	0.0020
2-Chlorophenol	6,500	NA	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.017	U	0.017	0.016	U	0.016	0.016	U	0.016
2-Methylnaphthalene	3,300	NA	0.0019	U	0.0019	0.0020	UJ	0.0020	0.0021	U	0.0021	0.0022	U	0.0022	0.0023	U	0.0023	0.0021	U	0.0021	0.0021	U	0.0021
2-Methylphenol	4,600	NA	0.012	U	0.012	0.012	UJ	0.012	0.013	U	0.013	0.013	U	0.013	0.013	U	0.013	0.013	U	0.013	0.012	U	0.012
2-Nitroaniline	NA	NA	0.019	U	0.019	0.019	UJ	0.019	0.020	U	0.020	0.021	U	0.021	0.021	U	0.021	0.020	U	0.020	0.020	U	0.020
2-Nitrophenol	NA	NA	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.017	U	0.017	0.016	U	0.016	0.016	U	0.016
3,3'-Dichlorobenzidine	5.7	NA	0.038	U	0.038	0.039	UJ	0.039	0.041	U	0.041	0.043	U	0.043	0.044	U	0.044	0.041	U	0.041	0.040	U	0.040
3-Nitroaniline	NA	NA	0.010	U	0.010	0.010	UJ	0.010	0.011	U	0.011	0.012	U	0.012	0.012	U	0.012	0.011	U	0.011	0.011	U	0.011
4,6-Dinitro-2-methylphenol	NA	NA	0.070	U	0.070	0.071	U	0.071	0.076	U	0.076	0.080	U	0.080	0.081	U	0.081	0.077	U	0.077	0.074	U	0.074
4-Bromophenyl phenyl ether	NA	NA	0.017	U	0.017	0.017	UJ	0.017	0.019	U	0.019	0.020	U	0.020	0.020	U	0.020	0.019	U	0.019	0.018	U	0.018
4-Chloro-3-methylphenol	NA	NA	0.014	U	0.014	0.014	UJ	0.014	0.015	U	0.015	0.016	U	0.016	0.016	U	0.016	0.016	U	0.016	0.015	U	0.015
4-Chloroaniline	13	NA	0.011	U	0.011	0.011	UJ	0.011	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012	0.012	U	0.012	0.011	U	0.011
4-Chlorophenyl phenyl ether	NA	NA	0.014	U	0.014	0.014	UJ	0.014	0.015	U	0.015	0.015	U	0.015	0.016	U	0.016	0.015	U	0.015	0.014	U	0.014
4-Methylphenol	9,100	NA	0.012	U	0.012	0.012	U	0.012	0.013	U	0.013	0.014	U	0.014	0.014	U	0.014	0.013	U	0.013	0.013	U	0.013
4-Nitroaniline	130	NA	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.017	U	0.017	0.016	U	0.016	0.016	U	0.016
4-Nitrophenol	NA	NA	0.029	U	0.029	0.029	U	0.029	0.031	U	0.031	0.032	U	0.032	0.033	U	0.033	0.031	U	0.031	0.030	U	0.030
Acenaphthene	50,000	NA	0.0023	U	0.0023	0.0024	UJ	0.0024	0.0025	U	0.0025	0.0027	U	0.0027	0.0027	U	0.0027	0.0026	U	0.0026	0.0025	U	0.0025
Acenaphthylene	NA	NA	0.0025	J	0.0018	0.0018	UJ	0.0018	0.0020	J	0.0019	0.0020	U	0.0020	0.0021	U	0.0021	0.0019	U	0.0019	0.0019	U	0.0019
Acetophenone	130,000	NA	0.014	UJ	0.014	0.015	UJ	0.015	0.016	UJ	0.016	0.016	UJ	0.016	0.017	UJ	0.017	0.016	UJ	0.016	0.015	UJ	0.015
Anthracene	250,000	NA	0.0052	J	0.0021	0.0031	J	0.0021	0.0032	J	0.0023	0.0024	U	0.0024	0.0024	J	0.0024	0.0026	J	0.0023	0.0022	U	0.0022
Atrazine	3,200	NA	0.018	U	0.018	0.018	U	0.018	0.019	U	0.019	0.020	U	0.020	0.021	U	0.021	0.019	U	0.019	0.019	U	0.019
Benzaldehyde	910	NA	0.0050	U	0.0050	0.0051	UJ	0.0051	0.0054	U	0.0054	0.0057	U	0.0057	0.0058	U	0.0058	0.0055	U	0.0055	0.0053	U	0.0053
Benzo[a]anthracene	23	370,000	0.0075	J	0.0037	0.0071	J	0.0037	0.010		0.0040	0.0069	J	0.0042	0.0063	J	0.0042	0.0072	J	0.0040	0.0053	J	0.0039
Benzo[a]pyrene	2.3	16,000	0.0088		0.0035	0.0086	J	0.0036	0.0093		0.0038	0.0067	J	0.0040	0.0061	J	0.0041	0.0073	J	0.0038	0.0056	J	0.0037
Benzo[b]fluoranthene	23	370,000	0.0098		0.0020	0.0095	J	0.0020	0.011		0.0022	0.0083	J	0.0023	0.0081	J	0.0023	0.0089		0.0022	0.0080	J	0.0021
Benzo[g,h,i]perylene	NA	NA	0.0080	J	0.0018	0.0054	J	0.0018	0.0061	J	0.0019	0.0046	J	0.0020	0.0049	J	0.0020	0.0050	J	0.0019	0.0048	J	0.0019
Benzo[k]fluoranthene	230	NA	0.0036	J	0.0024	0.0047	J	0.0025	0.0050	J	0.0026	0.0036	J	0.0028	0.0041	J	0.0028	0.0031	J	0.0027	0.0032	J	0.0026
Bis(2-chloroethoxy)methane	2,700	NA	0.015	UJ	0.015	0.015	UJ	0.015	0.016	UJ	0.016	0.017	UJ	0.017	0.017	UJ	0.017	0.016	UJ	0.016	0.016	UJ	0.016
Bis(2-chloroethyl)ether	3.3	NA	0.0015	UJ	0.0015	0.0015	UJ	0.0015	0.0016	UJ	0.0016	0.0017	UJ	0.0017	0.0017	UJ	0.0017	0.0016	UJ	0.0016	0.0016	UJ	0.0016
Bis(2-ethylhexyl) phthalate	180	NA	0.043	U	0.043	0.044	UJ	0.044	0.047	U	0.047	0.049	U	0.049	0.050	U	0.050	0.047	U	0.047	0.046	U	0.046
Butyl benzyl phthalate	1300	NA	0.028	U	0.028	0.028	UJ	0.028	0.030	U	0.030	0.032	U	0.032	0.032	U	0.032	0.031	U	0.031	0.030	U	0.030
Caprolactam	460,000	1,300	0.027	U	0.027	0.027	U	0.027	0.029	U	0.029	0.030	U	0.030	0.031	U	0.031	0.029	U	0.029	0.028	U	0.028
Carbazole	NA	NA	0.0019	U	0.0019	0.0019	UJ	0.0019	0.0021	U	0.0021	0.0022	U	0.0022	0.0022	U	0.0022	0.0021	U	0.0021	0.0020	U	0.0020
Chrysene	2,300	NA	0.0096		0.0045	0.0085	J	0.0046	0.011		0.0049	0.0070	J	0.0051	0.0078	J	0.0052	0.0084	J	0.0049	0.0068	J	0.0048
Dibenz(a,h)anthracene	2.3	37,000	0.0052	U	0.0052	0.0053	UJ	0.0053	0.0056	U	0.0056	0.0059	U	0.0059	0.0060	U	0.0060	0.0057	U	0.0057	0.0055	U	0.0055
Dibenzofuran	NA	NA	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.017	U	0.017	0.016	U	0.016	0.016	U	0.016
Diethyl phthalate	730,000	NA	0.014	U	0.014	0.014	UJ	0.014	0.015	U	0.015	0.016	U	0.016	0.016	U	0.016	0.016	U	0.016	0.015	U	0.015
Dimethyl phthalate	NA	NA	0.016	U	0.016	0.016	UJ	0.016	0.017	U	0.017	0.018	U	0.018	0.018	U	0.018	0.017	U	0.017	0.017	U	0.017
Di-n-butyl phthalate	91,000	NA	0.018	U	0.018	0.039	J	0.018	0.025	J	0.019	0.020	U	0.020	0.030	J	0.021	0.032	J	0.019	0.028	J	0.019
Di-n-octyl phthalate	9,100	NA	0.024	UJ	0.024	0.024	U	0.024	0.026	UJ	0.026	0.027	UJ	0.027	0.027	UJ	0.027	0.026	UJ	0.026	0.025	UJ	0.025
Fluoranthene	33,000	NA	0.012		0.0021	0.011	J	0.0022	0.016		0.0023	0.010		0.0024	0.011		0.0025	0.013		0.0023	0.0091		0.0023
Fluorene	33,000	NA	0.0016	U	0.0016	0.0016	UJ	0.0016	0.0017	U	0.0017	0.0018	U	0.0018	0.0018	U	0.0018	0.0017	U	0.0017	0.0017	U	0.0017
Hexachlorobenzene	2.3	NA	0.0029	U	0.0029	0.0030	UJ	0.0030	0.0032	U	0.0032	0.0033	U	0.0033	0.0034	U	0.0034	0.0032	U	0.0032	0.0031	U	0.0031

Table 5 - Sediment Analytical Data - Berths 2A, 2B, 3A, 3B, 3C and Intake RW7 - SVOCs, Pesticides, PCBs, Metals and Wet Chemistry
Energy Transfer - Marcus Hook Terminal
August 2022

Client ID	NJ SRS 7:26D	NJ SRS 7:26D	MHT-RW7-SAMPLE_A			MHT-3C-COMP_B			MHT-3A-COMP_C			MHT-3B-SAMPLE_D			MHT-3B-SAMPLE_D-DUP			MHT-2A-SAMPLE_E			MHT-2B-SAMPLE_F		
Lab Sample ID	Ingestion-Dermal	Inhalation	180-142513-1			180-142513-2			180-142513-7			180-142513-3			180-142513-4			180-142513-5			180-142513-6		
Sampling Date	Table 2	Table 4	08/04/2022 08:25:00			08/04/2022 10:00:00			08/04/2022 14:00:00			08/04/2022 10:20:00			08/04/2022 10:22:00			08/04/2022 10:50:00			08/04/2022 11:30:00		
	Nonresidential	Nonresidential																					
Hexachlorobutadiene	47	NA	0.0024	U	0.0024	0.0024	UJ	0.0024	0.0026	U	0.0026	0.0027	U	0.0027	0.0027	U	0.0027	0.0026	U	0.0026	0.0025	U	0.0025
Hexachlorocyclopentadiene	7,800	NA	0.0042	U	0.0042	0.0042	U	0.0042	0.0045	U	0.0045	0.0047	U	0.0047	0.0048	U	0.0048	0.0045	U	0.0045	0.0044	U	0.0044
Hexachloroethane	91	NA	0.014	U	0.014	0.015	UJ	0.015	0.015	U	0.015	0.016	U	0.016	0.017	U	0.017	0.016	U	0.016	0.015	U	0.015
Indeno[1,2,3-cd]pyrene	23	370,000	0.0062	J	0.0040	0.0045	J	0.0041	0.0049	J	0.0044	0.0048	J	0.0046	0.0047	U	0.0047	0.0044	U	0.0044	0.0043	J	0.0043
Isophorone	2,700	NA	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.018	U	0.018	0.017	U	0.017	0.016	U	0.016
Naphthalene	34,000	27	0.0016	U	0.0016	0.0028	J	0.0016	0.0017	U	0.0017	0.0018	U	0.0018	0.0018	U	0.0018	0.0017	U	0.0017	0.0017	U	0.0017
Nitrobenzene	2,600	36	0.015	U	0.015	0.015	UJ	0.015	0.016	U	0.016	0.017	U	0.017	0.017	U	0.017	0.016	U	0.016	0.016	U	0.016
N-Nitrosodi-n-propylamine	0.36	NA	0.0028	U	0.0028	0.0028	UJ	0.0028	0.0030	U	0.0030	0.0031	U	0.0031	0.0032	U	0.0032	0.0030	U	0.0030	0.0029	U	0.0029
N-Nitrosodiphenylamine	520	NA	0.014	U	0.014	0.014	U	0.014	0.015	U	0.015	0.015	U	0.015	0.016	U	0.016	0.015	U	0.015	0.014	U	0.014
Pentachlorophenol	4.4	NA	0.065	U	0.065	0.066	U	0.066	0.071	U	0.071	0.074	U	0.074	0.076	U	0.076	0.071	U	0.071	0.069	U	0.069
Phenanthrene	NA	NA	0.0063	J	0.0022	0.0057	J	0.0022	0.0060	J	0.0024	0.0046	J	0.0025	0.0052	J	0.0025	0.0071	J	0.0024	0.0047	J	0.0023
Phenol	270,000	NA	0.012	U	0.012	0.012	U	0.012	0.013	U	0.013	0.014	U	0.014	0.014	U	0.014	0.013	U	0.013	0.013	U	0.013
Pyrene	25,000	NA	0.013		0.0019	0.011	J	0.0020	0.014		0.0021	0.0096		0.0022	0.0098		0.0022	0.012		0.0021	0.0091		0.0020
Total Concentration	NA	NA	0.0925			0.1209			0.1235			0.0661			0.0957			0.1066			0.0889		
PESTICIDES (mg/kg)																							
4,4'-DDD	11	NA	0.056	J	0.00053	0.0046	J	0.000021	0.0076	J	0.000023	0.0041	J	0.000024	0.0020	J	0.000025	0.0034	J	0.000022	0.0050	J	0.000023
4,4'-DDE	11	NA	0.0029	J	0.000021	0.0027	J	0.000021	0.0030	J	0.000022	0.0028	J	0.000024	0.0014	J	0.000024	0.0026	J	0.000021	0.0035	J	0.000022
4,4'-DDT	9.5	NA	0.030	J	0.0018	0.0065	J	0.000073	0.00025	J	0.000078	0.0034	J	0.000083	0.0014	J	0.000085	0.0016	J	0.000074	0.00063	J	0.000077
Aldrin	0.21	NA	0.00013	J	0.000031	0.000091	JN	0.000032	0.000066	J	0.000034	0.00011	J	0.000036	0.000052	J	0.000037	0.00011	J	0.000032	0.00010	J	0.000033
alpha-BHC	0.41	NA	0.000025	UJ	0.000025	0.000025	UJ	0.000025	0.000027	UJ	0.000027	0.000028	UJ	0.000028	0.000029	UJ	0.000029	0.000025	UJ	0.000025	0.000026	UJ	0.000026
beta-BHC	1.4	NA	0.00018	J	0.000028	0.000028	UJ	0.000028	0.000030	UJ	0.000030	0.00016	JN	0.000032	0.000090	J	0.000032	0.000028	UJ	0.000028	0.000030	UJ	0.000030
cis-Chlordane	NA	NA	0.00040	J	0.000025	0.000026	UJ	0.000026	0.00065	J	0.000027	0.00056	J	0.000029	0.00035	J	0.000030	0.000026	UJ	0.000026	0.000027	UJ	0.000027
delta-BHC	NA	NA	0.000093	J	0.000032	0.000041	JN	0.000032	0.000035	UJ	0.000035	0.000037	UJ	0.000037	0.000037	UJ	0.000037	0.000033	UJ	0.000033	0.000034	UJ	0.000034
Dieldrin	0.16	NA	0.00098	J	0.000025	0.000026	UJ	0.000026	0.000027	UJ	0.000027	0.0012	J	0.000029	0.000030	UJ	0.000030	0.000026	UJ	0.000026	0.000027	UJ	0.000027
Endosulfan I	7,800	NA	0.000027	UJ	0.000027	0.000028	UJ	0.000028	0.000030	UJ	0.000030	0.000031	UJ	0.000031	0.000032	UJ	0.000032	0.000028	UJ	0.000028	0.000029	UJ	0.000029
Endosulfan II	7,800	NA	0.000022	UJ	0.000022	0.000023	UJ	0.000023	0.000024	UJ	0.000024	0.00038	J	0.000025	0.00026	J	0.000026	0.000023	UJ	0.000023	0.000024	UJ	0.000024
Endosulfan sulfate	NA	NA	0.000047	UJ	0.000047	0.000047	UJ	0.000047	0.000050	UJ	0.000050	0.000053	UJ	0.000053	0.000054	UJ	0.000054	0.000048	UJ	0.000048	0.000049	UJ	0.000049
Endrin	270	NA	0.00054	J	0.000019	0.000019	UJ	0.000019	0.00027	J	0.000020	0.00062	J	0.000022	0.00034	J	0.000022	0.000019	UJ	0.000019	0.00040	J	0.000020
Endrin aldehyde	NA	NA	0.000036	UJ	0.000036	0.000036	UJ	0.000036	0.000039	UJ	0.000039	0.000041	UJ	0.000041	0.000042	UJ	0.000042	0.000037	UJ	0.000037	0.000038	UJ	0.000038
Endrin ketone	NA	NA	0.000014	UJ	0.000014	0.00011	J	0.000014	0.000015	UJ	0.000015	0.000016	UJ	0.000016	0.000016	UJ	0.000016	0.000014	UJ	0.000014	0.000015	UJ	0.000015
gamma-BHC (Lindane)	2.8	NA	0.00012	J	0.000026	0.000026	UJ	0.000026	0.000057	J	0.000028	0.00016	J	0.000030	0.000087	J	0.000030	0.000027	UJ	0.000027	0.000071	J	0.000028
Heptachlor	0.81	NA	0.000032	UJ	0.000032	0.000032	UJ	0.000032	0.000034	UJ	0.000034	0.000036	UJ	0.000036	0.000037	UJ	0.000037	0.000032	UJ	0.000032	0.000034	UJ	0.000034
Heptachlor epoxide	0.4	NA	0.000027	JN	0.000026	0.000026	UJ	0.000026	0.000036	J	0.000028	0.000029	UJ	0.000029	0.000030	UJ	0.000030	0.000026	UJ	0.000026	0.000028	J	0.000027
Methoxychlor	4,600	NA	0.000039	UJ	0.000039	0.000040	UJ	0.000040	0.000043	UJ	0.000043	0.000045	UJ	0.000045	0.000046	UJ	0.000046	0.000040	UJ	0.000040	0.000042	UJ	0.000042
Toxaphene	2.3	NA	0.0027	UJ	0.0027	0.0028	UJ	0.0028	0.0030	UJ	0.0030	0.0031	U	0.0031	0.0032	UJ	0.0032	0.0028	UJ	0.0028	0.0029	UJ	0.0029
trans-Chlordane	NA	NA	0.000024	UJ	0.000024	0.000024	UJ	0.000024	0.000025	UJ	0.000025	0.0011	J	0.000027	0.00061	J	0.000027	0.000024	UJ	0.000024	0.000025	UJ	0.000025
PCBs (mg/kg)																							
PCB-1016	1.1	NA	0.00033	UJ	0.00033	0.00033	U	0.00033	0.00036	UJ	0.00036	0.00038	UJ	0.00038	0.00038	UJ	0.00038	0.00035	UJ	0.00035	0.00035	UJ	0.00035
PCB-1221	1.1	NA	0.00036	UJ	0.00036	0.00036	U	0.00036	0.00039	UJ	0.00039	0.00041	UJ	0.00041	0.00042	UJ	0.00042	0.00039	UJ	0.00039	0.00039	UJ	0.00039
PCB-1232	1.1	NA	0.00025	UJ	0.00025	0.00025	U	0.00025	0.00027	UJ	0.00027	0.00028	UJ	0.00028	0.00029	UJ	0.00029	0.00027	UJ	0.00027	0.00027	UJ	0.00027
PCB-1242	1.1	NA	0.00015	UJ	0.00015	0.00015	U	0.00015	0.00016	UJ	0.00016	0.00017	UJ	0.00017	0.00017	UJ	0.00017	0.00016	UJ	0.00016	0.00016	UJ	0.00016
PCB-1248	1.1	NA	0.00024	UJ	0.00024	0.00025	U	0.00025	0.00027	UJ	0.00027	0.00028	UJ	0.00028	0.00029	UJ	0.00029	0.00027	UJ	0.00027	0.00026	UJ	0.00026
PCB-1254	1.1	NA	0.0032	JN	0.00030	0.0074	J	0.00031	0.014	J	0.00033	0.0060	J	0.00035	0.0025	JN	0.00036	0.011	JN	0.00033	0.0045	J	0.00033
PCB-1260	1.1	NA	0.00029	UJ	0.00029	0.00029	U	0.00029	0.00031	UJ	0.00031	0.00033	UJ	0.00033	0.00034	UJ	0.00034	0.00031	UJ	0.00031	0.00031	UJ	0.00031

Table 5 - Sediment Analytical Data - Berths 2A, 2B, 3A, 3B, 3C and Intake RW7 - SVOCs, Pesticides, PCBs, Metals and Wet Chemistry
Energy Transfer - Marcus Hook Terminal
August 2022

Client ID	NJ SRS 7:26D	NJ SRS 7:26D	MHT-RW7-SAMPLE_A			MHT-3C-COMP_B			MHT-3A-COMP_C			MHT-3B-SAMPLE_D			MHT-3B-SAMPLE_D-DUP			MHT-2A-SAMPLE_E			MHT-2B-SAMPLE_F		
Lab Sample ID	Ingestion-Dermal	Inhalation	180-142513-1			180-142513-2			180-142513-7			180-142513-3			180-142513-4			180-142513-5			180-142513-6		
Sampling Date	Table 2	Table 4	08/04/2022 08:25:00			08/04/2022 10:00:00			08/04/2022 14:00:00			08/04/2022 10:20:00			08/04/2022 10:22:00			08/04/2022 10:50:00			08/04/2022 11:30:00		
	Nonresidential	Nonresidential																					
METALS (mg/kg)																							
Aluminum	NA	NA	13600	J	5.4	15600	J	6.7	14200	J	6.4	13900	J	7.0	15900	J	8.1	14300	J	5.8	15400	J	6.5
Antimony	520	NA	0.43	J	0.13	0.36	J	0.17	0.44	J	0.16	0.50	J	0.18	0.67	J	0.20	0.42	J	0.15	0.49	J	0.16
Arsenic	19	5,200	11.1	J	0.074	12.0	J	0.091	10.6	J	0.087	10.5	J	0.096	12.1	J	0.11	10.3	J	0.079	11.6	J	0.089
Barium	260,000	NA	132	J	0.78	114	J	0.96	129	J	0.92	146	J	1.0	157	J	1.2	139	J	0.84	144	J	0.94
Beryllium	2,600	9,300	0.95	J	0.092	0.97	J	0.11	1.0	J	0.11	1.1	J	0.12	1.2	J	0.14	1.0	J	0.098	1.1	J	0.11
Cadmium	1,100	12,000	0.69	J	0.071	0.52	J	0.088	0.70	J	0.084	0.87	J	0.093	0.86	J	0.11	0.76	J	0.077	0.81	J	0.086
Calcium	NA	NA	3900	J	26.0	3600	J	32.1	3880	J	30.7	4090	J	33.8	4510	J	39.0	3730	J	27.9	4230	J	31.4
Chromium	NA	NA	38.2	J	0.23	44.3	J	0.28	40.2	J	0.27	37.1	J	0.30	43.4	J	0.34	37.6	J	0.24	42.7	J	0.27
Cobalt	390	2,500	13.6	J	0.046	13.4	J	0.057	14.0	J	0.054	14.7	J	0.060	16.2	J	0.069	14.8	J	0.049	15.1	J	0.055
Copper	52,000	NA	32.3	J	0.26	30.8	J	0.32	34.7	J	0.31	35.2	J	0.34	38.7	J	0.39	34.4	J	0.28	38.0	J	0.32
Iron	NA	NA	26800	J	6.1	30600	J	7.5	27400	J	7.2	27800	J	7.9	31200	J	9.1	26700	J	6.5	29600	J	7.4
Lead	800	NA	44.4	J	0.084	41.6	J	0.10	46.0	J	0.099	48.2	J	0.11	53.5	J	0.13	49.1	J	0.090	52.1	J	0.10
Magnesium	NA	NA	4580	J	5.8	5420	J	7.1	4850	J	6.8	4700	J	7.5	5290	J	8.7	4590	J	6.2	5010	J	7.0
Manganese	31,000	400,000	1400	J	0.55	1280	J	0.68	1320	J	0.65	1340	J	0.71	1460	J	0.82	1370	J	0.59	1060	J	0.66
Mercury	390	NA	0.20	J	0.022	0.19	J	0.022	0.18	J	0.019	0.20	J	0.022	0.21	J	0.024	0.19	J	0.023	0.20	J	0.026
Nickel	26,000	93,000	24.6	J	0.12	26.4	J	0.15	25.2	J	0.14	25.7	J	0.16	28.5	J	0.18	25.7	J	0.13	27.6	J	0.14
Potassium	NA	NA	1890	J	18.5	2360	J	22.8	2030	J	21.8	1850	J	24.1	2200	J	27.7	1910	J	19.8	2120	J	22.3
Selenium	6,500	NA	0.64	J	0.16	0.64	J	0.19	0.55	J	0.18	0.68	J	0.20	0.78	J	0.23	0.70	J	0.17	0.69	J	0.19
Silver	6,500	NA	0.25	J	0.036	0.22	J	0.044	0.25	J	0.042	0.28	J	0.046	0.30	J	0.054	0.27	J	0.038	0.31	J	0.043
Sodium	NA	NA	256	J	32.6	340	J	40.3	268	J	38.5	250	J	42.5	290	J	49.0	219	J	35.0	235	J	39.4
Thallium	NA	NA	0.16	J	0.089	0.18	J	0.11	0.18	J	0.11	0.24	J	0.12	0.25	J	0.13	0.18	J	0.096	0.20	J	0.11
Vanadium	6,500	800,000	32.4	J	0.12	39.6	J	0.15	34.2	J	0.14	31.6	J	0.16	36.7	J	0.18	31.9	J	0.13	35.4	J	0.14
Zinc	390,000	NA	189	J	0.61	170	J	0.76	193	J	0.73	214	J	0.80	233	J	0.92	205	J	0.66	224	J	0.74
WET CHEMISTRY (mg/kg)																							
Cr (III) (mg/kg)	120,000	NA	38.2	J	0.21	44.3	J	0.21	40.2	J	0.21	37.1	J	0.21	43.4	J	0.21	37.6	J	0.21	42.7	J	0.21
Cr (VI) (mg/kg)	240	20	0.53	UJ	0.53	0.53	UJ	0.53	0.57	UJ	0.57	0.59	UJ	0.59	0.62	UJ	0.62	0.56	UJ	0.56	2.8	UJ	2.8
Cyanide, Total (mg/kg)	780	NA	0.59	J	0.49	0.50	J	0.44	0.69	J	0.52	1.9	J	0.56	1.0	J	0.57	1.5	J	0.42	0.88	J	0.48
Sulfide (mg/kg)	NA	NA	110	J	24.2	101	J	24.4	165	J	26.2	105	J	27.4	149	J	28.1	114	J	26.5	116	J	25.6
Total Organic Carbon	NA	NA	40500	J	2390	34700	J	2410	35400	J	2570	46200	J	2720	44900	J	2770	40000	J	2590	45200	J	2540

Notes:
% = Percent
Comp = Composite Sample
mg/kg = milligrams/kilogram
NA = No Criteria specified in current NJ SRS
Q = Qualifier
MDL = Method Detection Limit

Qualifier Definition:
J - The analyte was detected below the limit of quantitation but greater than the established Limit of Detection (LOD). These results should be considered estimated.
U - The compound was analyzed for but not detected.
N - Presumtively detected
Shading indicates the detected concentration exceeds Current NJDEP Non Residential Ingestion-Dermal (Table 2)
Shading indicates the detected concentration exceeds Current NJDEP Non-Residential Inhalation (Table 4).

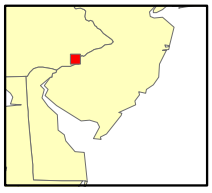
Criteria Source:
N.J.A.C. 7:26D Remediation Standards, N.J.S.A. 13:1D-1 et seq., 58:10-23.11a et seq.,
58:10A-1 et seq. and 58:10B-1 et seq., amended May 17, 2021.

FIGURES

Quad Source: ESRI, Mapping Service
USGS 2013. Marcus Hook PA, NJ, Del
USGS Quad, 1967. Revised 1970

N
W E
S

0 2,500 5,000 Feet



Quadrangle Location

Figure 1
Site Location Map -
Energy Transfer
Marcus Hook Terminal
Delaware River
Marcus Hook, Pennsylvania

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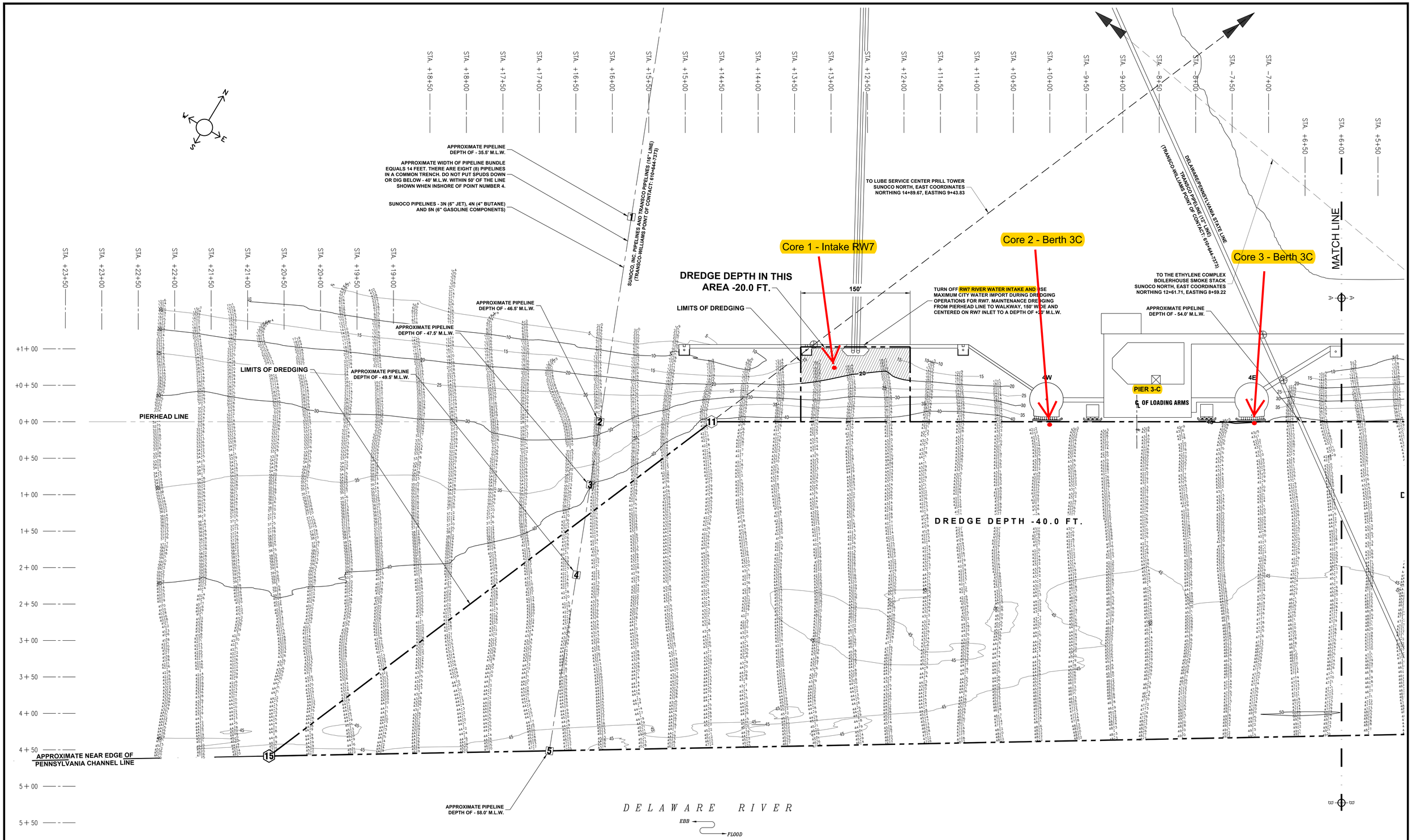


NOTES

1. HORIZONTAL CONTROL IS BASED ON NEW JERSEY 2900 STATE PLANE COORDINATES, NAD83, AS ESTABLISHED IN THE FIELD AND SOLELY FOR THE USE OF THIS HYDROGRAPHIC SURVEY.
2. ALL SOUNDINGS WERE TAKEN USING AN APPLANIX POS-MV, HYPACK 16A SOFTWARE, AND AN ODOM CV-200 DEPTH SOUNDER.
3. TIDES WERE COLLECTED WITH BOTH LEICA GS18 UTILIZING A SMARTNET NETWORK SOLUTION AND HOBO DATA LOGGERS. CORRECTIONS TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AND CONVERTED TO MEAN LOWER LOW WATER (M.L.L.W.) WHICH IS 3.00' BELOW NAVD88. NAVD88 CONVERSION OF 3.00' OBTAINED FROM THE ARMY CORP OF ENGINEERS.
4. SOUNDINGS WERE TAKEN ON TUESDAY, MAY 31, 2022.
5. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS CONDUCTED ON THE DATES INDICATED, AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
6. THE DECIMAL POINT (.) DENOTES THE SOUNDING LOCATION.
7. SOUNDINGS ARE REFERENCED TO MEAN LOWER LOW WATER (M.L.L.W.) AND ARE EXPRESSED IN FEET AND TENTHS OF A FOOT.
8. CONTOURS WERE INTERPOLATED WITH TRIMBLE NAVIGATION LIMITED SOFTWARE, TERRAMODEL VERSION 10.11.
9. CROSS HATCHING INDICATES AREAS THAT ARE ABOVE THE SPECIFIED MINIMUM DREDGE DEPTH.
10. DREDGE LIMITS WERE PROVIDED BY SUNOCO LOGISTICS' DRAWING "E_MHRF_C580001R00".
11. CHANNEL LOCATIONS WERE PROVIDED BY THE UNITED STATES ARMY CORPS OF ENGINEERS' DRAWINGS, "AAOA11PS.dwg" & "AAOA12PS.dwg".

LEGEND

LIMITS OF DREDGING

SITE PLAN

SCALE: 1" = 50.0'

0 50 100 150

DATUM CHART

LOCAL BENCHMARK – BRASS DISK AT MOORING CELL 3W +12.07 (M.L.L.W.)

NAVD 88 +3.0 (M.L.L.W.)

MEAN LOWER LOW WATER 0.0

12.07'

"Drawings issued in electronic form are provided for the convenience of the recipient and are used at the sole risk of the user. Reliance may be placed only on hard copies of drawings issued by S.T. Hudson Engineers. In the event of any discrepancy, the hard copy will govern."

S. T. HUDSON ENGINEERS, INC.
PROFESSIONAL ENGINEERS & CONSULTANTS
900 Dudley Avenue
Cherry Hill, N.J. 08002
856-342-6600
Fax No. 856-342-8323

drawn	STAFF	date	6/6/2022
checked	SD	FILE	E-1177
drftg. approval	TK		

contract 22-119

MARCUS HOOK INDUSTRIAL COMPLEX

CONDITION HYDROGRAPHIC SURVEY

dwg. no. 2of4 rev. 0

OLD DRAWING NO.

REV.	DATE	APP#	DESCRIPTION	APPROVAL

ENGINEERING RECORD

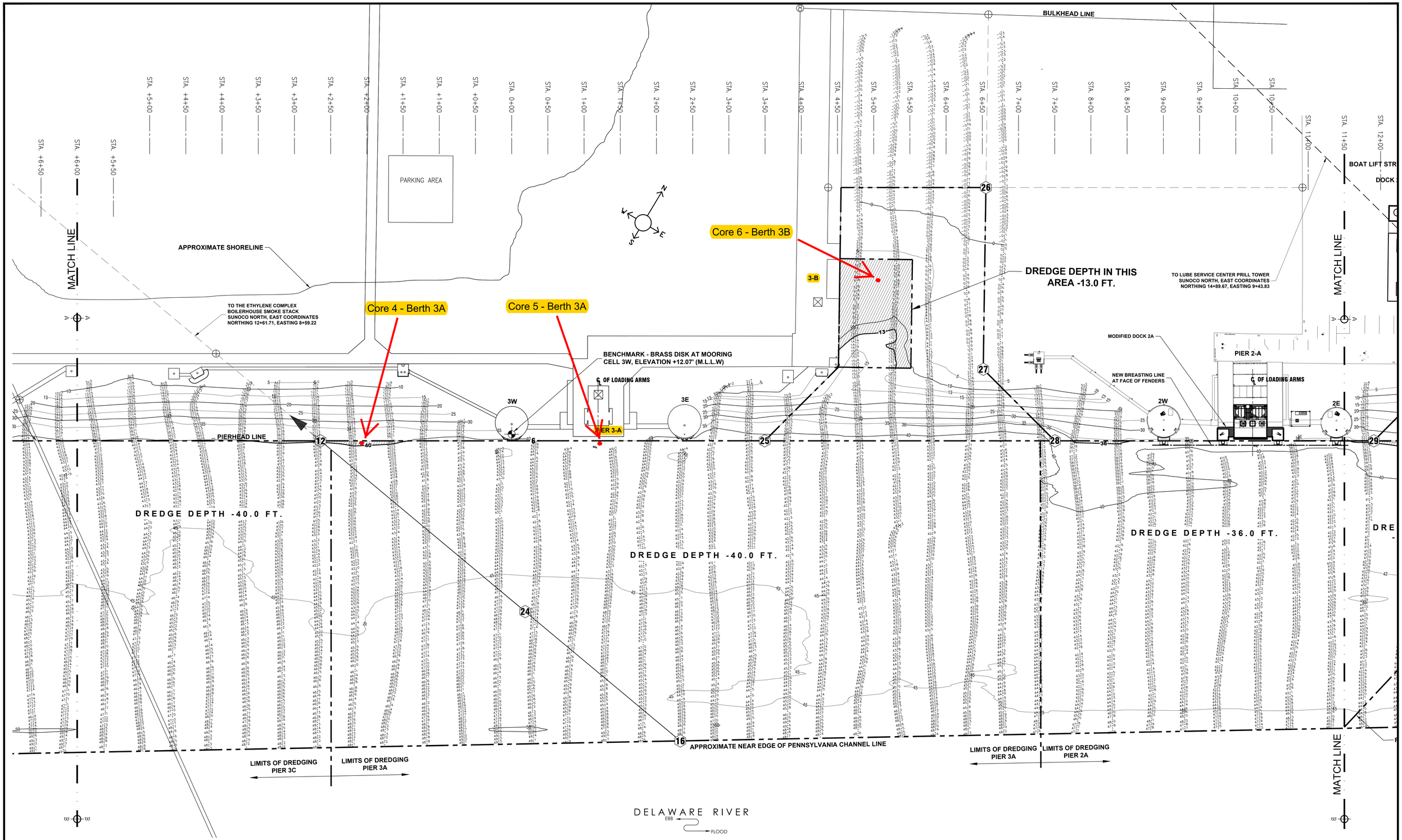
DRAWN BY	GMN
CHECKED BY	
APPROVED BY	
DATE	9/12/01
SCALE	1" = 50'-0"

ENERGY TRANSFER PARTNERS

MARCUS HOOK INDUSTRIAL COMPLEX
SURVEY TEMPLATE
SHEET 2

TOWNSHIP OF MARCUS HOOK

DWG. NO.



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LEGEND

LIMITS OF DREDGING

SITE PLAN

SCALE: 1" = 50.0'

0 50 100 150

DATUM CHART

LOCAL BENCHMARK – BRASS DISK AT MOORING CELL 3W +12.07 (M.L.L.W.)

NAVD 88 +3.0 (M.L.L.W.)

MEAN LOWER LOW WATER 0.0

12.07'

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drawn	STAFF	date	6/6/2022
checked	SD	FILE	E-1177
drftg. approval	TK		

contract 22-119

MARCUS HOOK INDUSTRIAL COMPLEX

CONDITION HYDROGRAPHIC SURVEY

dwg. no. 3of4 | rev. 0

OLD DRAWING NO.

DWG. NO.

ENGINEERING RECORD

DRAWN BY	GMN
CHECKED BY	
APPROVED BY	
DATE	9/12/01
SCALE	1" = 50'-0"

REV.	DATE	APP#	DESCRIPTION	APPROVAL

ENERGY TRANSFER PARTNERS

MARCUS HOOK INDUSTRIAL COMPLEX
SURVEY TEMPLATE
SHEET 3
TOWNSHIP OF MARCUS HOOK

RW5 RIVER WATER INTAKE STRUCTURE

BULKHEAD LINE

Core 8 - 2B Basin

BULKHEAD LINE

STA. 11+50 | STA. 12+00 | STA. 12+50 | STA. 15+50 | STA. 16+00 | STA. 16+50 | STA. 17+00 | STA. 17+50 | STA. 18+00 | STA. 18+50 | STA. 19+00 | STA. 19+50 | STA. 20+00 | STA. 20+50 | STA. 21+00 | STA. 21+50 | STA. 22+00 | STA. 22+50 | STA. 23+00 | STA. 23+50 | STA. 24+00 | STA. 24+50 | STA. 25+00 | STA. 25+50 | STA. 26+00 | STA. 26+50 | STA. 27+00 | STA. 27+50 | STA. 28+00 | STA. 28+50 | STA. 29+00 | STA. 29+50

+4+00 | +3+50 | +3+00 | +2+50 | +2+00 | +1+50 | +1+00 | +0+50 | 0+00 | 0+50 | 1+00 | 1+50 | 2+00 | 2+50 | 3+00 | 3+50 | 4+00 | 4+50 | 5+00

BOAT LIFT STRUCTURE

DOCK 2-B

DOCK 1-B

DREDGE DEPTH -15.0 FT.

TO LUBE SERVICE CENTER PRILL TOWER
SUNOCO NORTH, EAST COORDINATES
NORTHING 14+89.67, EASTING 9+43.83

CORNER OF MAIN OFFICE BUILDING
SUNOCO NORTH, EAST COORDINATES
NORTHING 11+14.5285, EASTING 22+98.3552

MATCH LINE

RW6

Core 7 - Berth 2A

PIER 1-A

2E | 1W | 1E

29 | 13 | 14 | 17 | 18

PIERHEAD LINE

LIMITS OF DREDGING

DREDGE DEPTH -36.0 FT.

DREDGE DEPTH -42.0 FT.

APPROXIMATE NEAR EDGE OF PENNSYLVANIA CHANNEL LINE

REVISED DREDGE LIMITS JAN. 2018

MATCH LINE

DELAWARE RIVER

EBB

FLOOD

SITE PLAN

SCALE: 1" = 50.0'

0 50 100 150

NOTES

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LEGEND

LIMITS OF DREDGING

DATUM CHART

LOCAL BENCHMARK – BRASS DISK AT MOORING CELL 3W +12.07 (M.L.L.W.)

NAVD 88 +3.0 (M.L.L.W.)

MEAN LOWER LOW WATER 0.0

12.07'

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drawn	STAFF	date	6/6/2022
checked	SD	FILE	E-1177
drftg. approval	TK	contract	22-119

MARCUS HOOK INDUSTRIAL COMPLEX

CONDITION HYDROGRAPHIC SURVEY

dwg. no. 4of4 | rev. 0

OLD DRAWING NO.

DWG. NO.

ENGINEERING RECORD

DRAWN BY	GMN
CHECKED BY	
APPROVED BY	
DATE	9/12/01
SCALE	1" = 50'+0"

REV.	DATE	APP#	DESCRIPTION	APPROVAL

ENERGY TRANSFER PARTNERS

MARCUS HOOK INDUSTRIAL COMPLEX
SURVEY TEMPLATE
SHEET 4

TOWNSHIP OF MARCUS HOOK

ATTACHMENT 1
Volume Calculations

TABLE No. 1
ENERGY TRANSFER MARCUS HOOK
DREDGE VOLUME SUMMARY
MAY 2022

SITE: **ENERGY TRANSFER**

Marcus Hook Terminal
Marcus Hook, PA
June 2, 2022
22-119

DESCRIPTION	DESIGN DEPTH	"BEFORE DREDGE" VOLUME SUMMARY Materials within pay prism						"AFTER DREDGE" VOLUME SUMMARY Materials remaining within pay prism						TOTAL PAY QUANTITY (C.Y.)
		SURVEY DATE	REQUIRED (C.Y.)	OVERDEPTH (C.Y.)	3:1 Side Slopes	3:1 Side Slopes 2' O.D.	TOTAL (C.Y.)	SURVEY DATE	REQUIRED (C.Y.)	OVERDEPTH (C.Y.)	3:1 Side Slopes	3:1 Side Slopes 2' O.D.	TOTAL REMAINING (C.Y.)	
A Berth 3C	40.0'	5/31/2022	1	731	3,050	2,824	6,606		0	0	0	0	0	0
B Berth 3A	40.0'	5/31/2022	3	836	5,774	2,884	9,497		0	0	0	0	0	0
C Berth 2A	36.0'	5/31/2022	35	410	1,680	1,869	3,994		0	0	0	0	0	0
D Berth 1A	42.0'	5/31/2022	798	8,965	19,015	5,529	34,307		0	0	0	0	0	0
E Berth 3B	13.0'	5/31/2022	2,267	1,314	437	351	4,369		0	0	0	0	0	0
F RW7 Intake	20.0'	5/31/2022	345	414	0	0	759		0	0	0	0	0	0
G 2B Basin	15.0'	5/31/2022	194	1,406	0	0	1,600		0	0	0	0	0	0
	TOTALS		3,643	14,076	29,956	13,457	61,132		0	0	0	0	0	0

1. All volumes calculated via in-place measurements.
2. Volume quantities calculated using HYPACK ver. 2019 ALL Format.
3. Limits of dredging shown on STHE Condition Survey Drawing **E-1177**.

S. T. Hudson Engineers, Inc.
900 Dudley Avenue
Cherry Hill, NJ 08002

ATTACHMENT 2
Core Logs

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	0803	Crew:	JP	
Coordinates:	N	355169.8	E	232795.8		Vessel:	Prattis	
Core # :	1	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			22.0		Core Penetration Length (ft.):		9.0		
Measured Water Depth [MWD] [ft.]:			20.5		Recovered Core Length (ft.):		6.5		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			3.7		Sample Length Retained (ft.):		5.0		
Corrected Depth @ MLLW [ft.]:			16.8		Core Volume Retained (gal.):		-		
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y) / N		
Corrected Depth @ MLW [ft.]:			17.0						
Required Sample Core Length [SCL] [ft.]:			5.0						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Brown silty sand
Bottom 6.5		

# of containers:					
Type of container:	bucket	hardliner	cup	other	

Conditions: Hot

Comments: Core to client.

Core Volumes

Nominal core-barrel diameter		EST. Volume
3.0"		.25 gal/ft
3.5"	8.0"	.33 gal/ft
(4.0")		.50 gal/ft

Liner Type: (Soft) Hard

Vibracorer: (P3) P5 VT6 Other

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	0910	Crew:	JP	
Coordinates:	N	355216.8	E	233009.1		Vessel:	Prattis	
Core # :	2	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			42.0		Core Penetration Length (ft.):		3.0	5.0	
Measured Water Depth [MWD] [ft.]:			42.1		Recovered Core Length (ft.):		0.0	4.0	
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			2.6		Sample Length Retained (ft.):		-	2.3	
Corrected Depth @ MLLW [ft.]:			39.5		Core Volume Retained (gal.):		-	-	
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y)	N	
Corrected Depth @ MLW [ft.]:			39.7						
Required Sample Core Length [SCL] [ft.]:			2.3						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Brown silty sand
Bottom 4.0		

# of containers:				
Type of container:	bucket	hardliner	cup	other

Conditions: Hot

Comments: Core to client. First deployment hit refusal, felt like a rock. Second deployment successful.

Core Volumes

Nominal core-barrel diameter	EST. Volume
3.0"	.25 gal/ft
3.5" 8.0"	.33 gal/ft
(4.0")	.50 gal/ft

Liner Type: (Soft) Hard

Vibracorer: (P3) P5 VT6 Other

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	0934	Crew:	JP	
Coordinates:	N	355447.8	E	233416.1		Vessel:	Prattis	
Core # :	3	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			42.0		Core Penetration Length (ft.):		6.0		
Measured Water Depth [MWD] [ft.]:			42.0		Recovered Core Length (ft.):		2.5		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			2.3		Sample Length Retained (ft.):		2.1		
Corrected Depth @ MLLW [ft.]:			39.7		Core Volume Retained (gal.):		-		
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y) / N		
Corrected Depth @ MLW [ft.]:			39.9						
Required Sample Core Length [SCL] [ft.]:			2.1						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Grey/Brown silty sand, trace gravel
Bottom 2.5		

					Core Volumes	
# of containers:					Nominal core-barrel	
Type of container:	bucket	hardliner	cup	other	diameter	EST. Volume
Conditions:					3.0"	.25 gal/ft
					3.5" 8.0"	.33 gal/ft
Comments: Core to client.					(4.0")	.50 gal/ft
					Liner Type: (Soft) Hard	
					Vibracorer: (P3) P5 VT6 Other	

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	1358	Crew:	JP	
Coordinates:	N	355547.3	E	233576.8		Vessel:	Prattis	
Core # :	4	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			42.0		Core Penetration Length (ft.):		5.0		
Measured Water Depth [MWD] [ft.]:			40.4		Recovered Core Length (ft.):		2.5		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			1.1		Sample Length Retained (ft.):		2.5		
Corrected Depth @ MLLW [ft.]:			39.3		Core Volume Retained (gal.):		-		
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y) / N		
Corrected Depth @ MLW [ft.]:			39.5						
Required Sample Core Length [SCL] [ft.]:			2.5						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Brown soft silty sand
Bottom 2.5		

					Core Volumes	
# of containers:					Nominal core-barrel	
Type of container:	bucket	hardliner	cup	other	diameter	EST. Volume
Conditions: Hot					3.0"	.25 gal/ft
					3.5" 8.0"	.33 gal/ft
Comments: Core to client.					(4.0")	.50 gal/ft
					Liner Type: (Soft) Hard	
					Vibracorer: (P3) P5 VT6 Other	

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	1323	Crew:	JP	
Coordinates:	N	355716.8	E	233868.1		Vessel:	Prattis	
Core # :	5	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			42.0		Core Penetration Length (ft.):		4.0		
Measured Water Depth [MWD] [ft.]:			40.0		Recovered Core Length (ft.):		2.4		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			0.5		Sample Length Retained (ft.):		2.3		
Corrected Depth @ MLLW [ft.]:			39.5		Core Volume Retained (gal.):		-		
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y) N		
Corrected Depth @ MLW [ft.]:			39.7						
Required Sample Core Length [SCL] [ft.]:			2.3						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Greyish Brown soft silty sand
Bottom 2.4		

# of containers:				
Type of container:	bucket	hardliner	cup	other

Conditions:

Comments: Core to client.

Core Volumes

Nominal core-barrel diameter	EST. Volume
3.0"	.25 gal/ft
3.5" 8.0"	.33 gal/ft
(4.0")	.50 gal/ft

Liner Type: (Soft) Hard

Vibracorer: (P3) P5 VT6 Other

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	1017	Crew:	JP	
Coordinates:	N	356145.6	E	234299.4		Vessel:	Prattis	
Core # :	6	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			15.0		Core Penetration Length (ft.):		8.5		
Measured Water Depth [MWD] [ft.]:			14.1		Recovered Core Length (ft.):		5.7		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			1.8		Sample Length Retained (ft.):		2.5		
Corrected Depth @ MLLW [ft.]:			12.3		Core Volume Retained (gal.):		-		
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y) / N		
Corrected Depth @ MLW [ft.]:			12.5						
Required Sample Core Length [SCL] [ft.]:			2.5						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Greyish Brown soft silty sand
Bottom 5.7		

# of containers:					
Type of container:	bucket	hardliner	cup	other	

Conditions:

Comments: Core to client.

Core Volumes

Nominal core-barrel diameter	EST. Volume
3.0"	.25 gal/ft
3.5" 8.0"	.33 gal/ft
(4.0")	.50 gal/ft

Liner Type: (Soft) Hard

Vibracorer: (P3) P5 VT6 Other

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	1036	Crew:	JP	
Coordinates:	N	356425.8	E	235033.7		Vessel:	Prattis	
Core # :	7	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			38.0		Core Penetration Length (ft.):		6.5		
Measured Water Depth [MWD] [ft.]:			36.3		Recovered Core Length (ft.):		3.9		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			1.5		Sample Length Retained (ft.):		3.0		
Corrected Depth @ MLLW [ft.]:			34.8		Core Volume Retained (gal.):		-		
+ MLW Adjustment [ft.}			0.2		Collected to Project Depth:		(Y) / N		
Corrected Depth @ MLW [ft.]:			35.0						
Required Sample Core Length [SCL] [ft.]:			3.0						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Grey/Brown soft silty sand, trace gravel
Bottom 3.9		

					Core Volumes	
# of containers:					Nominal core-barrel	
Type of container:	bucket	hardliner	cup	other	diameter	EST. Volume
Conditions:					3.0"	.25 gal/ft
					3.5" 8.0"	.33 gal/ft
Comments: Core to client.					(4.0")	.50 gal/ft
					Liner Type: (Soft) Hard	
					Vibracorer: (P3) P5 VT6 Other	

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

Box Core

MLW #td ver 030615

AQUA SURVEY, INC.

SEDIMENT CORE LOG

Client :	Weston Solutions, Inc.		Project :	Delaware River - Marcus Hook		Logger:	WR	
Job#:	42-112	Date:	8/4/22	Time:	1116	Crew:	JP	
Coordinates:	N	356874.2	E	234919.8		Vessel:	Prattis	
Core # :	8	Zone: NJ	Datum	NAD 83		Deploy:	1	2	3
Project Depth (incl. 2.0ft. Overdredge) [PD] [ft] MLW::			17.0	Core Penetration Length (ft.):			7.0		
Measured Water Depth [MWD] [ft.]:			14.9	Recovered Core Length (ft.):			4.5		
Tide Adjust [TA] (+/- ft. from MLLW) [ft.]:			1.0	Sample Length Retained (ft.):			2.9		
Corrected Depth @ MLLW [ft.]:			13.9	Core Volume Retained (gal.):			-		
+ MLW Adjustment [ft.}			0.2	Collected to Project Depth:			(Y) / N		
Corrected Depth @ MLW [ft.]:			14.1						
Required Sample Core Length [SCL] [ft.]:			2.9						

All Length Measurements are in Decimal Feet

Sample Interval (ft.)	Sample Id #	Description
Top 0.0		
		Brown/Grey soft silty sand
Bottom 4.5		

# of containers:				
Type of container:	bucket	hardliner	cup	other

Conditions: Hot

Comments: Core to client.

Core Volumes

Nominal core-barrel diameter	EST. Volume
3.0"	.25 gal/ft
3.5" 8.0"	.33 gal/ft
(4.0")	.50 gal/ft

Liner Type: (Soft) Hard

Vibracorer: (P3) P5 VT6 Other

Live Organisms Present	Y	N
Oil Present	Y	N
Odor Present	Y	N
Debris Present	Y	N
Within 10% of Req'd Core Length	Y	N
Photo	Y	N

Pushcorer Slambar

Eckman Ponar: Standard / Petite

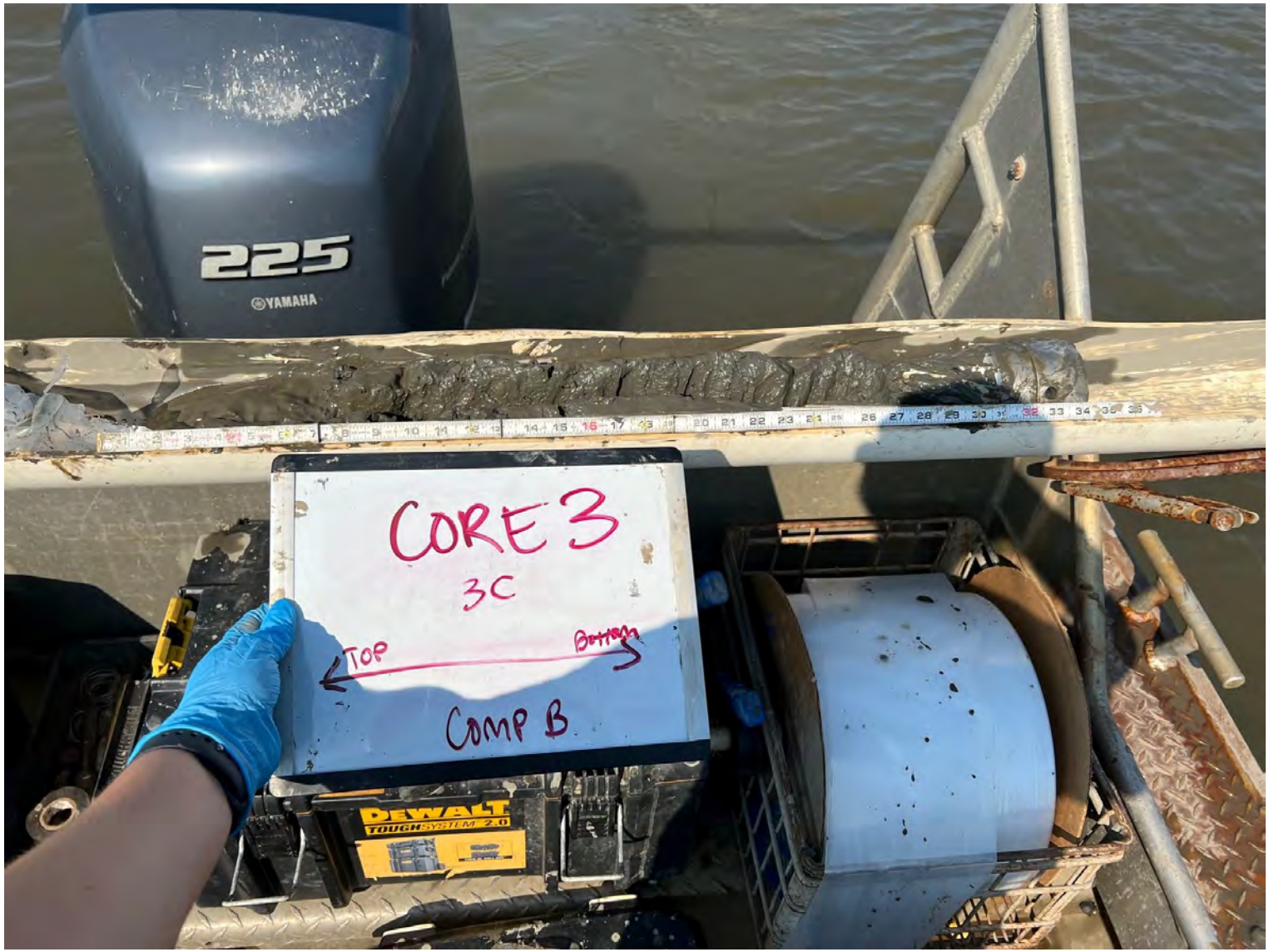
Box Core

MLW #td ver 030615

ATTACHMENT 3
Core Photographs

Core 1 – Sample A (Intake RW7)

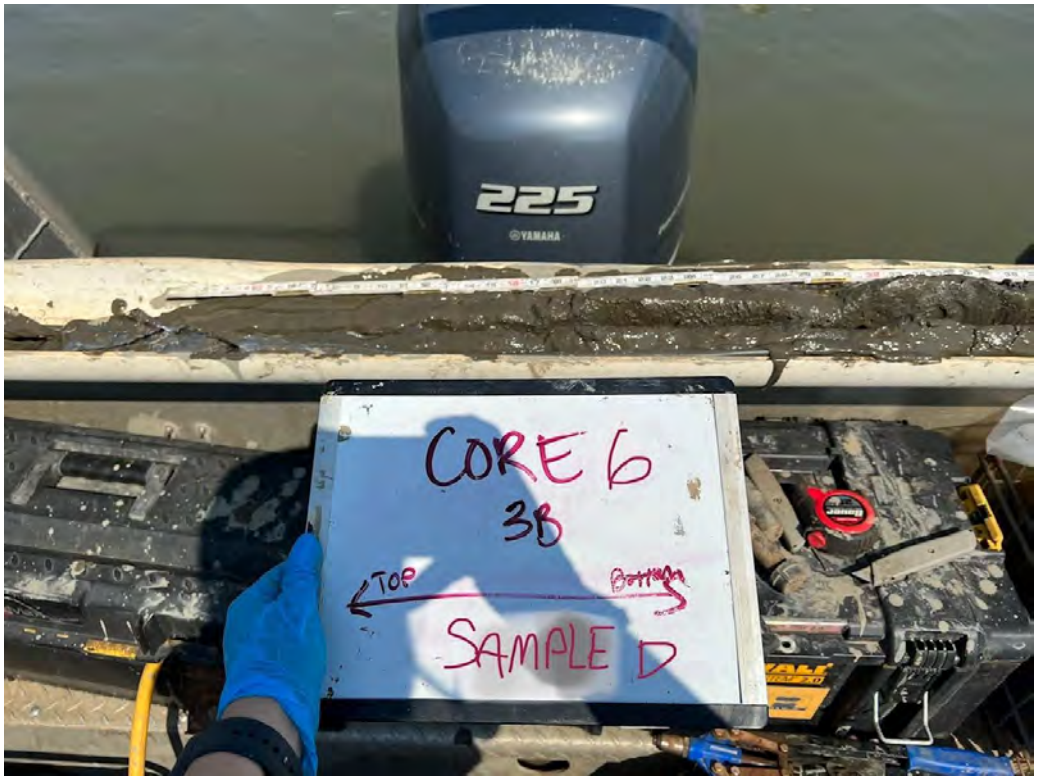
Core 2 – Comp B (Berth 3C)



Core 3 – Comp B (Berth 3C)

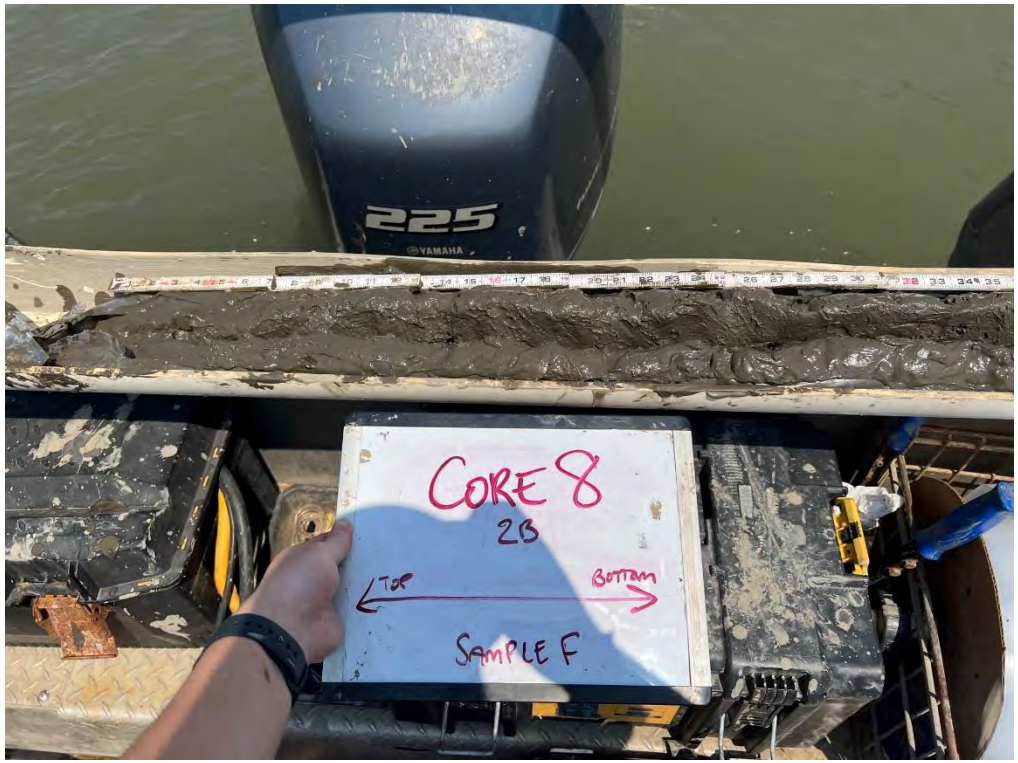
Core 4 – Comp C (Berth 3A)

Core 5 – Comp C (Berth 3A)



Core 6 – Sample D (Berth 3B)

Core 7 – Sample E (Berth 2A)



Core 8 – Sample F (Berth 2B)

ATTACHMENT 4
Raw Data on CD