ATTACHMENT 2

Index to Key Correspondence

September 19, 2019	USEPA and NJDEP revised SFSAP approval letter
August 21, 2019	TRC letter to USEPA regarding August 7, 2019 Meeting and Presentation of the Revised SFSAP
July 2, 2019	Response to USEPA's March 1, 2019 Comments on SFSAP and SFSAP submission
March 1, 2019	USEPA/NJDEP Comment Letter on Nov. 2018 SFSAP
November 15, 2018	Submission of response to August 31, 2018 comments and SFSAP to USEPA
August 31, 2018	USEPA issues comments regarding Chevron Waterbody Sediment Sampling and additional investigation to meet RFI requirements.
March 24, 2017	NJDEP letter regarding the November 2016 SEER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

SEP 19 2019

Robert Mancini
Project Manager, Refining Business Unit
Chevron Environmental Management Company
1200 State Street
Perth Amboy, New Jersey 08861

Re: August 7, 2019 Meeting and Presentation of the Revised Supplemental Field Sampling & Analysis Plan (RSFSAP) – Arthur Kill, Spa Spring Creek, & Woodbridge Creek, Response to September 6, 2019 EPA and NJDEP Comments, dated September 12, 2019
Former Chevron Perth Amboy Facility
Perth Amboy, Middlesex County, New Jersey
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have completed our review of the August 7, 2019 Meeting and Presentation of the Revised Supplemental Field Sampling & Analysis Plan – Arthur Kill, Spa Spring Creek, & Woodbridge Creek, Response to September 6, 2019 EPA and NJDEP Comments, dated September 12, 2019, submitted for the Former Chevron Perth Amboy Facility, in Perth Amboy, Middlesex County, New Jersey. The August 2019 RSFSAP was submitted by Chevron Environmental Management Company pursuant to the Resource Conservation and Recovery Act (RCRA), Hazardous and Solid Waste Amendments (HSWA) Permit of 2013, and the NJDEP Technical Requirements for Site Remediation, N.J.A.C. 7:26E. We provided comments to the RSFSAP on September 6, 2019. Chevron responded to these comments on September 12, 2019. We find Chevron's responses to our comments acceptable and hereby approve the RSFSAP, including the field sampling start-up and implementation proposed schedule.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at vargas.ricardito@epa.gov.

Sincerely,

Ricardito Vargas
Project Manager
Land and Redevelopment Programs Branch

cc: Charles Zielinski, NJDEP (electronic copy only)

41 Spring Street, Suite 102
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T 908.988.1700
TRCcompanies.com

August 21, 2019

United States Environmental Protection Agency-Region 2
290 Broadway
New York, New York 10007-1866

Attn: Mr. Ricardito Vargas, Project Manager

Subject: August 7, 2019 Meeting and Presentation of the Revised Supplemental Field Sampling and Analysis Plan-Arthur Kill, Spa Spring Creek, and Woodbridge Creek
Former Chevron Perth Amboy Facility
1200 Maurer Road, Perth Amboy – Middlesex County
Facility EPA ID #: NJD081982902
TRC Project No. 326731/890

Dear Mr. Vargas:

On behalf of Chevron Environmental Management Company (Chevron) TRC Companies, Inc. (TRC) has prepared this letter and attachments to provide additional information and clarifications regarding specific comments made by the United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP) on the revised Supplemental Field Sampling and Analysis Plan (SFSAP, July 2019) prepared for the above-referenced Chevron Facility (the Facility).

Chevron and TRC presented the revised SFSAP at a meeting attended by representatives of Chevron, the USEPA, NJDEP, and Buckeye Pipeline Company on August 7, 2019. The objective of the meeting was to resolve any issues of concern to the USEPA and the NJDEP regarding the SFSAP and expedite its review and approval. The SFSAP proposes collection and analysis of sediment samples from Spa Spring Creek and Woodbridge Creek which are the waterbodies adjacent to the Facility. The July 2019 SFSAP was revised from the original submission in November 2018 to address the agencies' concerns as noted in their joint comment letter to Chevron of March 1, 2019. In addition to presenting the revised SFSAP, the meeting included a presentation of the Facility's operational and remedial history and the industrial history and character of the surrounding region, and specifically the Woodbridge Creek watershed. The USEPA and NJDEP raised additional questions and concerns during the meeting, several of which concerned Chevron's responses to earlier comments by USEPA/NJDEP that were discussed in the July 2, 2019 Response to Comments (RTC) letter prepared by TRC (submitted with the SFSAP as a companion document). Other than the specific concerns raised during the meeting and discussed further herein, it is our understanding that the SFSAP is acceptable to the agencies without further comment.

Issues Addressed During August 7, 2019 Meeting

The USEPA and the NJDEP identified several specific issues regarding the SFSAP that were further discussed at the August 7, 2019 meeting, including:

- Sediment sampling protocol details regarding sample interval selection in the field
- Potential data gaps (sample intervals, analytical parameters and related spreadsheet)
- Contaminated sediment delineation
- Light, Non-Aqueous Phase Liquid (LNAPL) areas proximal to the waterways
- Chevron's responses (July 2, 2019) to USEPA Comments 4 and 7 (March 1, 2019 comment letter)
- NJDEP's meeting comments regarding sample data (SED-06, SED-09)

The specific issues are further discussed below with the associated responses, as agreed upon at the meeting. In addition to the specific items listed above and discussed at the meeting, TRC identified typographic errors in the notes to SFSAP Figure 2A (attached), which were corrected on the revised, attached Figure 2A.

<u>Sediment Sampling Protocol</u>
The USEPA and NJDEP had several concerns with the sampling proposed in the SFSAP, e.g., apparent data gaps in proposed sampling intervals and laboratory analysis. At the meeting the USEPA noted that some of these concerns were previously presented by the USEPA on a spreadsheet summarizing sediment analytical results/depths and describing potential data gaps. Further discussion regarding the review of data gaps is described below in the following section under "Sediment Sample Data Gaps".

A summary of the sample interval selection criteria proposed sampling is presented below. As described and discussed during the meeting, sample depth interval selection will be based on a combination of pre-determined intervals and field indicators of contamination (e.g., odors, elevated volatile vapors, staining, etc.) if observed in sediment cores. Sediment intervals exhibiting similar indicators in new and proposed borings will be sampled and analyzed as discussed at the meeting, and described as follows:

Determination of Sample Intervals for Selected Prior Sediment Boring Locations Sampled in 2002/2014

- Advance each boring to refusal or to 20 feet, whichever is first encountered;
- Record observations of sediment lithology, possible contamination, and other physical characteristics for the entire core;
- Screen the entire core for field indicators of contamination (detectable indicators of contamination: e.g., odors, elevated VOCs detected with field instruments, staining, etc.);
- Collect sediment from each 0-0.5-foot interval for analysis of EPH, and if needed, any

parameters missing from among the established analytical suite (i.e., TCL VOCs/BNs, EPH, TAL Metals).
- Collect sediment from 2-2.5 feet or from the discrete interval exhibiting the worst-case conditions based on field screening and analyze for the parameters noted above.

Determination of Sample Intervals for New Sample Locations

- Advance each boring to refusal or to 20 feet, whichever is first encountered;
- Record observations of sediment lithology, possible contamination, and other physical characteristics for the entire core;
- Screen the entire core for field indicators of contamination (detectable indicators of contamination: e.g., odors, elevated VOC vapors detected with field instruments, staining, etc.);
- Collect sediment from each 0-0.5-foot interval for analysis of the established analytical suite (i.e., TCL VOCs/BNs, EPH, TAL Metals)
- Collect sediment from the 2-2.5-foot interval or from the discrete interval exhibiting the worst-case conditions based on field screening and analyze for the parameters noted above.

The physical parameters including pH, TOC, and grain size determination will also be analyzed as shown on the Spreadsheet and revised Table 1 (see discussion below). It was determined that the sediment in previously-sampled areas is adequately characterized with respect to these parameters (i.e., pH, TOC, and grain size). However, samples will be collected for analysis of these parameters from selected depth intervals in the new sediment borings, i.e., borings along transects SED-22 through SED 25, from SED-WCBG-1 to WCBG-8, and where possible from borings in Spa Spring Creek.

<u>Sediment Sample Data Gaps</u>

As a result of the meeting, TRC conducted an evaluation of the existing data and objectives of the proposed sampling based on the discussion at the meeting and agency comments. The USEPA raised a question about the potential for using a spreadsheet that was previously sent to Chevron and TRC as an example of summarizing sediment data for data gap review. TRC reviewed the last version of the spreadsheet, which was incomplete, and evaluated other options for use of a spreadsheet to evaluate sediment sampling plan data gaps. The attached Sediment Data Gap Analysis Spreadsheet ("the Spreadsheet"; Attachment 1) was developed by TRC to aid data gap identification and indicate how the proposed sampling will fill data gaps. The Spreadsheet lists each sediment sampling location and related information including:

- Sample number/depth interval;
- Historical analytical parameters completed at <u>prior</u> sediment sample locations/intervals, and proposed analysis for selected sampling intervals to address data gaps; and,
- Proposed analysis at <u>new</u> sediment sample locations/intervals.

TRC discussed and demonstrated the use of the Spreadsheet with Mr. Ricky Vargas of the USEPA during a Skype teleconference on August 14, 2019. Mr. Vargas indicated that the Spreadsheet

would be useful for identifying potential data gaps; an electronic version of the Spreadsheet (in Excel) is being forwarded via email. An electronic copy of the Spreadsheet is also included with this submission in Attachment 1 on CDROM.

In addition to the Spreadsheet (Attachment 1), Table 1 from the SFSAP has been revised to reflect the sampling changes noted in this letter (see Attachment 2). Figures 2, and 2A of the SFSAP have also been revised and are attached. The attached, revised versions of the Figures and Tables were updated to be consistent with the data gaps and proposed sampling to fill those gaps indicated per the Spreadsheet.

Physical Delineation

As noted at the meeting, the focus of the waterway investigation is to characterize and delineate the contaminated soft sediment in Spa Spring Creek and Woodbridge Creek that exists above the strata underlying the creek beds (i.e., above the underlying till/alluvium), as supported by the following:

- The extent of soft sediment is defined horizontally by the banks of each waterway and vertically by refusal on the underlying till/alluvium;
- The bathymetric survey and lithologic profile for the mouth of Woodbridge Creek, as presented on the Bathymetric Survey and lithologic profile included in the (November 2016 Supplemental Ecological Evaluation Report [SEER], indicates that soft sediment does not extend into the Arthur Kill; and,
- The absence of soft sediment in the Arthur Kill is attributable to tidal scouring, periodic dredging/channel deepening, and large vessel propeller effects.

The laboratory sample analytical results provide a basis for characterization of the soft sediments within the limits of the waterways. However, except for in the upstream direction, the delineation of waterway soft sediment is a function of the physical waterway limits (e.g., banks) and the extent of the downstream limit of the soft sediment (i.e., based on presence/absence and bathymetry, per the SEER). These details and supporting data will be included in a final sediment investigation report ("the final sediment report").

Light, Non-Aqueous Phase Liquid (LNAPL)

The LNAPL areas proximal to the waterways were presented at the meeting on Facility maps and discussed with respect to their current status. It was noted that the LNAPL areas have been significantly reduced in mass and extent, that LNAPL is immobile, and that the reduced LNAPL areas are not current sources of sediment contamination to adjacent waterways. The following was stated in the July 2, 2019 RTC letter:

The LNAPL areas were previously defined, are currently undergoing remediation, and as stated in the 2003 BEE, "Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear to be complete."

It should be noted that the above text refers to the then current LNAPL conditions, which have further improved (reduced) over the intervening 16 years. However, the text was not intended to dismiss the possible historical LNAPL mobility or related potential discharges no longer evident today. This will be clarified in a final sediment report that will include the results of the sediment sampling obtained from implementation of the SFSAP.

Cross Sections

As discussed with the NJDEP at the meeting, lithologic cross-sections will be prepared for selected areas of the Facility and included in the final sediment report.

Specific Responses to March 1, 2019 Comments by USEPA/NJDEP

The NJDEP noted that clarification was needed regarding Chevron's responses to Comment Nos. 4 and 7 in the Response to Comments (RTC) letter submitted with the revised SFSAP on July 2, 2019. For convenience, the USEPA's Comments 4 and 7 and Chevron's responses are re-stated, below followed by supplemental discussion.

USEPA Comment 4. Section 2.1 Sample Collection, Page 5, Table 1 and Figure 2: The document states, "In summary the proposed sample locations were selected to ...revisit previously sampled locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed." However, it is unclear if this goal will be achieved since the previous sample locations/intervals were not referenced in the document, in any form, for direct comparison. Further review of the document suggests that few samples will be collected at depth (greater than 0.5 ft. samples) for any contaminant of concern (COC). The document should be revised to include a table comparing past sampling intervals/depths to those proposed herein, so that we can confirm that the sampling program is adequate to sufficiently delineate the impacts to the waterbodies.

RTC-Response 4: The Revised Table 1 provides a comparative summary and the location of proposed and historical samples, depths, and analytical parameters. Regarding the depth of proposed sampling, it should be noted that the biologically active zone, or benthic zone is defined by the NJDEP as 0-0.5 feet and would be of primary concern with respect to sediment impacts. It was also agreed at the September 17, 2018 meeting and in the subsequent November 2018 responses to the USEPA's August 2018 comment letter that further sampling (i.e., of "hotspots") is not necessary to meet the requirements of the 2013 HSWA permit, and that the existing and proposed samples adequately characterize and delineate contaminants in sediment. Further, petroleum constituent analysis (i.e., Volatile Organic Compounds [VOCs]; Base Neutral Compounds [BNs]) has been completed throughout the waterways to various depths in and below

the benthic zone. The horizontal, downstream and bank-to-bank physical limit of contaminated sediments in Woodbridge Creek was determined by completing a bathymetric survey and bottom profile analysis. The bathymetric survey revealed a steep submarine escarpment at the Woodbridge Creek/Arthur Kill confluence (Figure 6 of Attachment 1), indicating the terminus of soft sediments at the contact with the Arthur Kill. Therefore, further sampling to define the vertical/horizontal extent of EPH or other contaminants beyond that proposed in the SFSAP is not warranted.

Comment 4 Discussion: It is our understanding that the USEPA's request for clarification pertains to the data gap concerns noted above. We believe that these data gaps are addressed by the enclosed Spreadsheet, and the revised tables and figures included with this letter. The Spreadsheet identifies additional depth intervals where re-sampling of sediment is warranted for specific parameters. Therefore, additional sampling and analysis will be performed as appropriate, and laboratory sample analytical results will be provided in the final sediment report.

<u>USEPA Comment 7</u>. Section 2.1 Sample Collection, Data Gap Samples EPH Analysis at Existing Boring Locations, Page 6: The document states, "Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not analyzed previously." However, a review of the document suggests the proposed additional EPH analysis is generally limited to the shallow 0 to 0.5 ft. interval where analysis was conducted for other COCs. Further review of the available data suggests that collection of subsurface (at-depth) samples were previously limited in scope, such that the majority of samples were not analyzed for extractable petroleum hydrocarbons (EPH) or other COCs below 0 to 0.5 ft. interval including, but not limited to: SED-01 A/B/C; SED-2C, SED-3A, SED- 4B; SED-05A/B/C, SED-06A/C, SED-07A/B/C; SED-08A/C; SED-09B; SED-lOA/B, SED-11C, etc. The document should be revised to include additional at-depth (below 0.5 ft.) sample collection/analysis for EPH at all historic and proposed sample locations/transects. In addition, please specify if/when the samples hit bedrock and the corresponding depth.

<u>RTC-Response 7</u>: Please refer to Response 4. It was agreed at the September 17, 2018 meeting and in the November 2018 RTC that "Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously." The proposed additional sample depths are provided in revised Table 1. No other additional sampling is proposed. The USEPA's request for information on depth to bedrock appears to be a misunderstanding, since bedrock was not encountered during sampling, whereas refusal was encountered. The vertical limit of soft sediment in Woodbridge Creek coincides with the top of the underlying glacial till, which is sufficiently competent and refused the Vibracore drilling stem. As reported in Section 2 of the SEER (Attachment 1), bedrock was encountered in terrestrial borings from 65-85 feet below grade, well below the bed of Woodbridge Creek.

Comment 7 Discussion: The USEPA's concerns noted in Comment 7 are similar to those mentioned in Comment 4 regarding data gaps, and the response is similar. The existing data were reviewed for all sediment samples, including the specific samples noted by the USEPA in this comment. As noted under the Comment 4 discussion, additional depth intervals were identified where additional sampling and analysis will be performed, and all related data will be provided in the final sediment report. Regarding the USEPA's request on specifying the depth to bedrock, it was agreed at the meeting that Chevron would provide the depth to refusal, where encountered, whether on bedrock or other competent material. Complete boring logs and stratigraphic cross-sections will be provided with the final sediment report.

Analytical Results (Refer to USEPA Comment5/RTC Response 5)

During the meeting, the NJDEP noted an apparent discrepancy regarding the total concentrations of polycyclic aromatic hydrocarbons (PAHs) reported for samples SED-06-B and SED-09-C in the above-referenced response. The total PAHs reported for sediment samples SED-06-B and SED-09-C in the RTC were 0.71 mg/kg and 69.85 mg/kg, respectively, whereas the actual total PAH concentrations for these samples were 2.15 mg/kg and 140 mg/kg, respectively. The higher upstream concentrations of PAHs at the SED-09 transect, and the associated EPH concentration of 27,000 mg/kg versus those detected at SED-06 suggest a source of contamination other than the Facility. The laboratory sample analytical results for PAHs in sediments are summarized in Table 9-8 of the 2003 BEE included in Attachment 3 and on Figure 4.

As a result of our review of this issue, TRC identified several minor discrepancies regarding the data presentation in Tables 9-8, and on Figure 4 and Table IV of the 2016 SEER, though none that would change the sediment characterization. Specifically, analytical results for benzo(a)anthracene and benzo(a)pyrene were incorrectly shown on Figure 4, as they appear to have been switched in the data boxes, but they were correctly shown on Table IV of the SEER. The PAHs shown on Figure 4 for sample SED-01-C were below the Effects Range Low (ER-L) and Effects Range Moderate (ER-M) ESC but shown incorrectly as above these criteria (bolded/highlighted text). These inconsistencies have been corrected in the revised Table IV and Table 9-8, and the revised Figure 4, which are included in Attachments 3 and 4, respectively.

We trust that this letter and attachments address the USEPA's questions and concerns raised during the August 7, 2019 meeting. As noted at the meeting, Chevron respectfully requests an expedited review and approval by the end of August, which is necessary in order to complete the RFI for the surface water bodies and meet the RCRA 2020 goal.

Please contact the undersigned if you have any questions or if you require any additional information.

Sincerely,

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908-988-1626

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Cc: Charlie Zelinsky, NJDEP
Robert Mancini, Chevron
Todd Frantz, Parsons

Chevron_PA_RFI_SedWP_Rev_Aug_21_2019

ATTACHMENT 1:

SEDIMENT DATA GAP ANALYSIS SPREADSHEET
(PAPER COPY AND CDROM)

Sediment Data Gap Analysis Spreadsheet
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-01-A	SED-01-A/0-6	3967881	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Woodbridge Creek	SED-01-A	SED-01-A/6-12	3967880	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Woodbridge Creek	SED-01-A	SED-01-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-01-B	SED-01-B/0-6	3967883	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Woodbridge Creek	SED-01-B	SED-01-B/6-12	3967882	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Woodbridge Creek	SED-01-B	SED-01-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-01-C	SED-01-C/0-6	3967905	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		
Woodbridge Creek	SED-01-C	SED-01-C/6-12	3967904	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Woodbridge Creek	SED-01-C	SED-01-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-02-A	SED-02-A/0-6	3967892	SEDIMENT	0.0	0.5	12/20/2002	Existing	X		X		X
Woodbridge Creek	SED-02-A	SED-02-A/6-12	3967891	SEDIMENT	0.5	1.0	12/20/2002	Existing				X	
Woodbridge Creek	SED-02-A(R)	SED-02-A(R)/0-6		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-02-A(R)	SED-02-A(R)/6-12		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-02-A(R)	SED-02-A(R)	JB62621-2	SEDIMENT	6.0	6.5	3/21/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-02-B	SED-02-B/0-6	3967889	SEDIMENT	0.0	0.5	12/20/2002	Existing	X		X		X
Woodbridge Creek	SED-02-B	SED-02-B/6-12	3967887	SEDIMENT	0.5	1.0	12/20/2002	Existing				X	
Woodbridge Creek	SED-02-B(R)	SED-02-B(R)/0-6		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-02-B(R)	SED-02-B(R)/6-12		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-02-B(R)	SED-02-B(R)	JB62621-1	SEDIMENT	3.5	4.0	3/21/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-02-C	SED-02-C/0-6	3967894	SEDIMENT	0.0	0.5	12/20/2002	Existing	X		X		X
Woodbridge Creek	SED-02-C	SED-02-C/6-12	3967893	SEDIMENT	0.5	1.0	12/20/2002	Existing				X	
Woodbridge Creek	SED-02-C(R)	SED-02-C(R)/0-6		SEDIMENT	0.0	0.5		Proposed	X		X		X
Woodbridge Creek	SED-02-C(R)	SED-02-C(R)/6-12		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-02-C(R)	SED-02-C(R)/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X-FD	X-FD	X-FD	X-FD	
Woodbridge Creek	SED-03-A	SED-03-A/0-6	3967919	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-03-A	SED-03-A/6-12	3967918	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-03-A	SED-03-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-03-B	SED-03-B/0-6	3967857	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-03-B	SED-03-B/6-12	3967856	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-03-B	SED-03-B(R)	JB62513-7	SEDIMENT	1.5	2.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-B	SED-03-B(R)	JB62513-8	SEDIMENT	4.5	5.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C/0-6	3967921	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-03-C	SED-03-C/6-12	3967920	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-03-C	SED-03-C/12-18	3967922	SEDIMENT	1.0	1.5	12/19/2002	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C(R)	JB62513-5	SEDIMENT	1.5	2.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C/30-36	3967923	SEDIMENT	2.5	3.0	12/19/2002	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C(R)	JB62513-6	SEDIMENT	6.0	6.5	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-04-A	SED-04-A/0-6	3967911	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-04-A	SED-04-A/6-12	3967910	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-04-A	SED-04-A/39-45	3967912	SEDIMENT	3.3	3.8	12/19/2002	Existing	X	X	X	X	X[1]
Woodbridge Creek	SED-04-B	SED-04-B/0-6	3967915	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-04-B	SED-04-B/6-12	3967914	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-04-B	SED-04-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	

Sediment Data Gap Analysis Spreadsheet
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-04-C	SED-04-C/0-6	3967917	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-04-C	SED-04-C/6-12	3967916	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-04-C	SED-04-C(R)	JB62513-4	SEDIMENT	1.5	2.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-04-C	SED-04-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-05-A	SED-05-A/0-6	3967907	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-05-A	SED-05-A/6-12	3967906	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-05-A	SED-05-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-05-B	SED-05-B/0-6	3967909	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-05-B	SED-05-B/6-12	3967908	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-05-B	SED-05-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-05-C	SED-05-C/0-6	3967855	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-05-C	SED-05-C/6-12	3967854	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-05-C	SED-05-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-06-A	SED-06-A/0-6	3967875	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-06-A	SED-06-A/6-12	3967874	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-06-A	SED-06-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-06-B	SED-06-B/0-6	3967879	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-06-B	SED-06-B/6-12	3967878	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-06-B	SED-06-B(R)	JB62513-3	SEDIMENT	4.0	4.5	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-06-C	SED-06-C/0-6	3967867	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-06-C	SED-06-C/6-12	3967866	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-06-C	SED-06-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-09-A	SED-09-A/0-6	3967877	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-09-A	SED-09-A/6-12	3967876	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-09-A	SED-09-A(R)	JB62513-1	SEDIMENT	3.0	3.5	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-09-B	SED-09-B/0-6	3967869	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-09-B	SED-09-B/6-12	3967868	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-09-B	SED-09-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-09-C	SED-09-C/0-6	3967864	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-09-C	SED-09-C/6-12	3967863	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-09-C	SED-09-C/33-39	3967865	SEDIMENT	2.8	3.3	12/19/2002	Existing	X	X	X	X	X
Woodbridge Creek	SED-09-C	SED-09-C(R)	JB62513-2	SEDIMENT	4.5	5.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-10-A	SED-10-A/0-6	3967871	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-10-A	SED-10-A/6-12	3967870	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-10-A	SED-10-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-10-B	SED-10-B/0-6	3967873	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-10-B	SED-10-B/6-12	3967872	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-10-B	SED-10-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-10-C	SED-10-C/0-6	3967862	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-10-C	SED-10-C/6-12	3967861	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-10-C	SED-10-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-19-B	SED-19-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-19-B	SED-19-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-19-B	SED-19-B	JB62621-3	SEDIMENT	6.0	6.5	3/21/2014	Existing	X	X	X	X	X

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Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-19-C	SED-19-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-19-C	SED-19-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-19-C	SED-19-C	JB62621-4	SEDIMENT	7.5	8.0	3/21/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-22-A	SED-22-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-22-A	SED-22-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-22-A	SED-22-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-22-B	SED-22-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-22-B	SED-22-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-22-B	SED-22-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-22-C	SED-22-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-22-C	SED-22-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-22-C	SED-22-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-23-A	SED-23-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-23-A	SED-23-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-23-A	SED-23-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-23-B	SED-23-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-23-B	SED-23-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-23-B	SED-23-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-23-C	SED-23-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-23-C	SED-23-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-23-C	SED-23-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-24-A	SED-24-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-24-A	SED-24-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-24-A	SED-24-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-24-B	SED-24-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-24-B	SED-24-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-24-B	SED-24-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-24-C	SED-24-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-24-C	SED-24-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-24-C	SED-24-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-25-A	SED-25-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-25-A	SED-25-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-25-A	SED-25-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-25-B	SED-25-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-25-B	SED-25-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-25-B	SED-25-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-25-C	SED-25-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-25-C	SED-25-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-25-C	SED-25-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-1	SED-WCBG-1/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-1	SED-WCBG-1/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	X
Woodbridge Creek	SED-WCBG-1	SED-WCBG-1/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-2	SED-WCBG-2/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-2	SED-WCBG-2/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	

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Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-WCBG-2	SED-WCBG-2/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-3	SED-WCBG-3/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-3	SED-WCBG-3/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-3	SED-WCBG-3/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-4	SED-WCBG-4/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-4	SED-WCBG-4/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-4	SED-WCBG-4/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-5	SED-WCBG-5/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-5	SED-WCBG-5/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-5	SED-WCBG-5/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-6	SED-WCBG-6/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-6	SED-WCBG-6/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-6	SED-WCBG-6/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-7	SED-WCBG-7/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-7	SED-WCBG-7/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-7	SED-WCBG-7/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-8	SED-WCBG-8/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-8	SED-WCBG-8/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-8	SED-WCBG-8/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-07-A	SED-07-A/0-6	3967897	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-07-A	SED-07-A/6-12	3967896	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-07-A	SED-07-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-07-B	SED-07-B/0-6	3967859	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-07-B	SED-07-B/6-12	3967858	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-07-B	SED-07-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-07-C	SED-07-C/0-6	3967901	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-07-C	SED-07-C/6-12	3967900	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-07-C	SED-07-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-08-A	SED-08-A/0-6	3967903	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-08-A	SED-08-A/6-12	3967902	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-08-A	SED-08-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-08-C	SED-08-C/0-6	3967885	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-08-C	SED-08-C/6-12	3967884	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-08-C	SED-08-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-11-C	SED-11-C/0-6	3967899	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-11-C	SED-11-C/6-12	3967898	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-11-C	SED-11-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-20-A	SED-20-A	JB60857-1	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X
Spa Spring Creek	SED-20-A	SED-20-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-20-C	SED-20-C	JB60857-2	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X
Spa Spring Creek	SED-20-C	SED-20-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-21-A	SED-21-A	JB60857-4	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X
Spa Spring Creek	SED-21-A	SED-21-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-21-C	SED-21-C	JB60857-3	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X

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Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Spa Spring Creek	SED-21-C	SED-21-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-SSBG-1	SED-SSBG-1/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-1	SED-SSBG-1/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-SSBG-2	SED-SSBG-2/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-2	SED-SSBG-2/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-SSBG-3	SED-SSBG-3/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-3	SED-SSBG-3/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-SSBG-4	SED-SSBG-4/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-4	SED-SSBG-4/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD

X	= previously analyzed
[1]	= previously analyzed for Grain Size only
X	= Proposed sample analysis
X - FD	= Proposed sample analysis with interval determined by field screening

Total Proposed # of Samples:	BN	EPH	Metals	VOC	pH/TOC/Grain Size
	86	150	87	82	49

ATTACHMENT 2:

REVISED SUPPLEMENTAL FIELD SAMPLING and ANALYSIS PLAN
TABLE 1

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-WCBG-1[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-2[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	2.0-2.5	EPH, VOCs, SVOCs, Metals					
SED-WCBG-3[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-4[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-5[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-6[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-7[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-8[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-01-A	0.0-0.5	EPH	Woodbridge Creek	SED-01-A	0.0-0.5	Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was originally collected to address downstream impacts from offsite sources. The transect is adjacent to the former Hess and Shell Facilities and is not bordered by Chevron on either side.
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-01-B	0.0-0.5	EPH	Woodbridge Creek	SED-01-B	0.0-0.5	Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-01-C	0.0-0.5	EPH	Woodbridge Creek	SED-01-C	0.0-0.5	Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-02-A(R)	0.0-0.5	EPH	Woodbridge Creek	SED-02-A (see explanation)	0.0-0.5	BN and Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was originally collected to address downstream impacts from onsite sources. This includes a former discharge trench which sewerage from the two former administrations buildings and runoff from AOC 50 (Bulk Station) discharged into. These samples are offset from their original locations due to underground utilities.The transect is adjacent to the former Hess and Shell Facilities and is not bordered by Chevron on either side. See utilities shown in the inset on Figure 2A.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	6.0-6.5	BNs, Metals, VOCs			6.0-6.5	Grain Size, TOC, pH, EPH	
SED-02-B(R)	0.0-0.5	EPH	Woodbridge Creek	SED-02-B (see explanation)	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	3.5-4.0	BNs, Metals, VOCs			3.5-4.0	Grain Size, TOC, pH, EPH	
SED-02-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-02-C (see explanation)	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-03-A	0.0-0.5	EPH	Woodbridge Creek	SED-03-A	0.0-0.5	BN and Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was located downstream from SWMU 7, 16, 17, 18 (TEL Burials Areas), 24 (TEL Weathering Area), 31 (Effluent Treatment Plant), 41 (Drying Area) and PAOC 21 (Colonial Pipeline). It is adjacent to SWMU 40 (Old Pond). Aerial photos indicate that the No.1 Separator, which is described as API Separator #1 in the January 1965 Interstate Sanitation Commission Report titled Location of City Sewers Adjacent to Industrial Plants Bordering the Arthur Kill in New Jersey (ISC Sewer Report), was connected to SWMU 40 and discharged directly adjacent to this location. This area also addresses impacts from the SWMU 40 LNAPL Areas.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-03-B(R)	0.0-0.5	EPH	Woodbridge Creek	SED-03-B	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	1.5-2.0	BNs, Metals, VOCs			1.5-2.0	Grain Size, TOC, pH EPH	
	4.5-5.0	BNs, Metals, VOCs			4.5-5.0	Grain Size, TOC, pH EPH	
SED-03-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-03-C	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	1.0-1.5	EPH			1.0-1.5	Grain Size, TOC, pH, EPH	
	1.5-2.0	BNs, Metals, VOCs			1.5-2.0	VOCs	
	2.5-3.0	EPH			2.5-3.0	VOCs, BNs, Metals	
	6.0-6.5	BNs, Metals, VOCs			6.0-6.5	Grain Size, TOC, pH, EPH	
SED-04-A	0.0-0.5	EPH	Woodbridge Creek	SED-04-A	0.0-0.5	BN and Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is adjacent to SWMU 24 (TEL Weathering Area), SWMU 31 (Effluent Treatment Plant), and SWMU 41 and downgradient of discharge point discussed in SED-05 Transect.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	3.25-3.75	EPH, Metals			3.25-3.75	VOCs, BNs	
SED-04-B	0.0-0.5	EPH	Woodbridge Creek	SED-04-B	0.0-0.5	BNs and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-04-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-04-C	0.0-0.5	Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	1.5-2.0	BNs, Metals, VOCs			1.5-2.0	Grain Size, TOC, pH, EPH	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-05-A	0.0-0.5	EPH	Woodbridge Creek	SED-05-A	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is adjacent to SWMU 31 (Effluent Treatment Plant) and SWMU 41 (Drying Area). In addition, this location is in line with the current discharge from the Effluent plant, as well as the location of the historic discharge point of SWMU 35 (No. 4 separator - Settling Basin in ISC Sewer Report). SWMU 1 (North Field Basin) and SWMU 2 (Surge Pond) also historically discharged at this point through Separator No.2 (API Separator #2 in ISC Sewer Report) and Separator No. 3. This location also addresses the Former SWMU 41 LNAPL area and the Former NF4 LNAPL Area.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-05-B	0.0-0.5	EPH	Woodbridge Creek	SED-05-B	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	Grain Size, TOC, pH EPH	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-05-C	0.0-0.5	EPH	Woodbridge Creek	SED-05-C	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-06-A	0.0-0.5	EPH	Woodbridge Creek	SED-06-A	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is adjacent to SWMU 1 (North Field Basin and SWMU 2 (Surge Pond). In addition, this location is in line with the historic confluence point of Spa Spring Creek and Woodbridge Creek and the overflow point of SWMU 1. This transect is also adjacent to the DITSWED-8 area.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-06-B(R)	0.0-0.5	EPH	Woodbridge Creek	SED-06-B	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	4.0-4.5	EPH, BNs, Metals, VOCs			4.0-4.5	Grain Size, TOC, pH, EPH	
SED-06-C	0.0-0.5	EPH	Woodbridge Creek	SED-06-C	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-07-A	0.0-0.5	EPH	Spa Spring Creek	SED-07-A	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is upgradient of the new confluence of Spa Spring Creek and Woodbridge Creek. In addition, this transect is adjacent to SWMU 1 (North Field Basin).
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-07-B	0.0-0.5	EPH	Spa Spring Creek	SED-07-B	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-07-C	0.0-0.5	EPH	Spa Spring Creek	SED-07-C	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-08-A	0.0-0.5	EPH	Spa Spring Creek	SED-08-A	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was selected as it was adjacent to SWMU 27 (TEL Weathering Area), SWMU 29 (Fines Transfer Area), and SWMU 39 (Unnamed North Field Pond).
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-08-C	0.0-0.5	EPH	Spa Spring Creek	SED-08-C	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-09-A(R)	0.0-0.5	EPH	Woodbridge Creek	SED-09-A and SED-09-A(R)	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is upgradient of the new confluence of Spa Spring Creek and Woodbridge Creek. This transect is also in line with the former American Cyanmid site and downstream of former discharge points from offsite properties along Woodbridge creek.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	3.0-3.5	EPH, BNs, Metals, VOCs			3.0-3.5	Grain Size, TOC, pH EPH	
SED-09-B	0.0-0.5	EPH	Woodbridge Creek	SED-09-B	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-09-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-09-C and SED-09-C(R)	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	2.75-3.25	EPH			2.75-3.25	Metals and BNs	
	4.5-5.0	BNs, Metals, VOCs			3.3-3.8	VOCs	
					4.5-5.0	Grain Size, TOC, pH, EPH	
SED-10-A	0.0-0.5	EPH	Woodbridge Creek	SED-10-A	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). These samples were collected as background samples.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-10-B	0.0-0.5	EPH	Woodbridge Creek	SED-10-B	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-10-C	0.0-0.5	EPH	Woodbridge Creek	SED-10-C	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-11-C	0.0-0.5	EPH	Woodbridge Creek	SED-11-C	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-19-B	0.0-0.5	EPH, BNs, and Metals	Woodbridge Creek	SED-19-B	4.0-4.5	VOCs, BNs and Metals	Samples were collected from the mouth of Woodbridge Creek. Sample locations are adjacent to both the Former Hess and Former Shell Sites and are situated next to Discharge 002 of the Former Hess Facility.
	0.5-1.0	EPH and VOCs			6.0-6.5	BNs, EPH, pH, Grain Size and TOC	
SED-19-C	0.0-0.5	EPH, BNs, and Metals	Woodbridge Creek	SED-19-C	7.5-8.0	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
	0.5-1.0	EPH and VOCs				VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-20-A	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-20-A	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-20-C	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-20-C	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-21-A	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-21-A	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-21-C	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-21-C	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-22-A	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located inbetween transects SED-01 and SED-02. This location is adjacent to the Former Hess and Former Shell Facilities and also coincides with the Hess Facilities Outfall 003.
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-22-B	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-22-C	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-23-A	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located inbetween transects SED-06 and SED-09. This location is adjacent to SWMU 1 (North Field Basin) and is in between SED-06 Transect and the confluence of Woodbridge Creek and Spa Spring Creek.
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-23-B	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-23-C	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-24-A	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located in between transects SED-06 and SED-09. This location is upstream of the Site and alos upstream of the confluence of Woodbridge Creek and Spa Spring Creek.
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-24-B	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-24-C	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-25-A[3]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located inbetween transects SED-02 and SED-03. This location is adjacent to the former Motiva/Shell Facilities, where a large petroleum spill occurred in the 1990s. In addition, this transect is directly adjacent to the Former AOC 8 (Oily Tarry Material at B27 and B23) NF6 LNAPL Area and downgradient of the SWMU 40 (Old Pond) LNAPL Area.
	0.5-1.0	VOCs					
SED-25-B[3]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
SED-25-C[3]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-1	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[2]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-2	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[2]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-3	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[2]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-4	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[1]	EPH, VOCs, SVOCs, Metals					

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.

[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field.

[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler.

ATTACHMENT 3:

ANALYTICAL DATA SUMMARY SHEETS:
1 - TABLE 9-8 OF THE 2003 BASLINE ECOLOGICAL EVALUATION SHOWING SEMI-VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN SEDIMENT
2 – REVISED TABLE IV OF THE 2016 SUPPLEMENTAL ECOLOGICAL EVALUATION REPORT

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-11-C/0-6		SED-08-A/0-6		SED-08-C/0-6		SED-07-A/0-6		SED-07-B/0-6		SED-07-C/0-6		SED-10-A/0-6		SED-10-B/0-6		SED-10-C/0-6	
			Date Sampled:	12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967899		3967903		3967885		3967897		3967859		3967901		3967871		3967873		3967862	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Flow Direction**		⇨		**Spa Spring Creek**		⇨				⇨		**Woodbridge Creek**				⇨	
Naphthalene	Naphthalene	*0.16*	*2.1*	0.012	U	0.013	J	0.024	U	0.053		0.034	U	0.031	U	0.0018	J	**0.22**		0.003	J
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	0.0049	U	0.0071	J	0.015	J	0.057		0.014	U	0.013	U	0.0009	J	**0.22**		0.0031	
Acenaphthylene	ACPL	*0.044*	*0.64*	0.0049	U	0.0024	U	0.015	J	**0.083**		0.014	U	0.013	U	0.021		0.027		0.0049	
Acenaphthene	ACP	*0.016*	*0.5*	0.0049	U	0.005	J	0.011	J	**0.017**	J	0.014	U	0.013	U	0.0008	J	**0.052**		**0.017**	
Fluorene	Fluorene	*0.019*	*0.54*	0.0059	J	0.0062	J	0.016	J	**0.031**		0.014	U	0.013	U	0.0012	J	**0.074**		0.019	
Phenanthrene	PhA	*0.24*	*1.5*	0.011	J	0.032		0.17		**0.31**		0.018	J	0.025	J	0.011		**0.77**		0.24	
Anthracene	ANT	*0.085*	*1.1*	0.0049	U	0.0071	J	0.043		**0.13**		0.014	U	0.013	U	0.017		**0.19**		0.051	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	0.022		0.056		0.39		0.5		0.034	J	0.028	J	0.12		**1.1**		0.4	
Pyrene	Pyrene	*0.665*	*2.6*	0.022		0.1		0.35		0.61		0.039	J	0.031	J	0.24		**1.4**		0.47	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	0.0097	J	0.018		0.16		**0.29**		0.014	U	0.013	U	0.14		**0.63**		0.21	
Chrysene	Chrysene	*0.384*	*2.8*	0.011	J	0.036		0.24		**0.39**		0.02	J	0.017	J	0.14		**1**		0.24	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.012	J	0.042		0.33		0.53		0.025	J	0.02	J	0.21		1.1		0.33	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	0.0049	U	0.015	J	0.12		0.18		0.014	U	0.013	U	0.087		**0.34**		0.1	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	0.0061	J	0.018		0.22		**0.45**		0.014	J	0.013	U	0.19		**0.65**		0.22	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	0.0058	J	0.019		0.18		**0.37**		0.014	U	0.014	J	0.095		**0.22**		0.14	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	0.0049	U	0.0067	J	0.05		**0.15**		0.014	U	0.013	U	0.026		**0.073**		0.036	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	0.0049	U	0.025		**0.23**		**0.74**		0.016	J	0.013	U	0.095		**0.21**		0.17	
Phenol	Phenol	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2-Chlorophenol	2-CP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
2-Nitrophenol	2-NP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachloroethane	HCE	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Isophorone	IP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Dimethylphthalate	DMP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
2-Methylphenol	2-MP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Methylphenol	4-MP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
4-Chloroaniline	4-CLA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2-Nitroaniline	2-NA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Atrazine	Atrazine	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Caprolactam	Caprolactam	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Benzaldehyde	Benzald	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Nitrophenol	4-NP	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Pentachlorophenol	PCP	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	3.2	U	16	U	6.2	U	2	U	14	U	4.2	U	0.82	U	3.4	U	0.82	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-11-C/0-6		SED-08-A/0-6		SED-08-C/0-6		SED-07-A/0-6		SED-07-B/0-6		SED-07-C/0-6		SED-10-A/0-6		SED-10-B/0-6		SED-10-C/0-6	
			Date Sampled:	12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967899		3967903		3967885		3967897		3967859		3967901		3967871		3967873		3967862	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Flow Direction**		⇨		**Spa Spring Creek**		⇨				⇨		**Woodbridge Creek**				⇨	
Diethylphthalate	DEP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.062	J	0.17	U	0.04	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Di-n-butylphthalate	DBP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Butylbenzylphthalate	BBP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	0.32	U	1.6	U	0.86	J	0.5	J	1.4	U	0.42	U	0.46		1	J	5.2	
Di-n-octylphthalate	DOP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
3-Nitroaniline	3-NA	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Dibenzofuran	DBF	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.61	J	0.04	U
4-Nitroaniline	4-NA	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Carbazole	Carbazole	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.88	J	0.04	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Acetophenone	Acetophen	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Total Targeted SVOCs		(--)	(--)	0.1055		0.4061		3.4		5.391		0.166		0.135		1.9187		10.766		7.854	
Total TICs		(--)	(--)	119.8		1155.2		134.3		107.2		494.3		154.7		17.84		52		20.67	
Total PAHs		*4*	*45*	0.1055		0.4061		2.54		**4.891**		0.166		0.135		1.3967		**8.276**		2.654	
Total SVOCs		(--)	(--)	119.9055		1155.6061		137.7		112.591		494.466		154.835		19.7587		62.766		28.524	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-09-A/0-6		SED-09-B/0-6		SED-09-C/0-6		SED-09-C/33-39		SED-06-A/0-6		SED-06-B/0-6		SED-06-C/0-6		SED-05-A/0-6		SED-05-B/0-6	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967877		3967869		3967864		3967865		3967875		3967879		3967867		3967907		3967909	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Naphthalene	Naphthalene	*0.16*	*2.1*	0.024	J	0.068		0.049		**5.9**		0.01	U	0.012	J	0.029	J	0.092	J	0.0062	U
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	0.017		0.067		0.032		**21**		0.004	U	0.011		0.024		0.049	J	0.0059	J
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.053**		**0.052**		**0.083**		**0.97**		0.008	J	0.019		**0.05**		**0.088**		0.0071	J
Acenaphthene	ACP	*0.016*	*0.5*	**0.032**		**0.2**		**0.099**		**1.9**		0.004	U	0.0052	J	**0.056**		**0.045**	J	0.0025	U
Fluorene	Fluorene	*0.019*	*0.54*	**0.028**		**0.22**		**0.085**		**3.8**		0.0061	J	0.0064	J	**0.059**		**0.072**		0.003	J
Phenanthrene	PhA	*0.24*	*1.5*	0.11		**2**		**0.95**		**18**		0.018		0.038		**0.72**		**0.7**		0.025	
Anthracene	ANT	*0.085*	*1.1*	**0.29**		**0.67**		**0.31**		**3.1**		0.011	J	0.033		**0.2**		**0.19**		0.011	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**0.71**		**2.3**		**2.1**		**5.5**		0.041		0.13		**1.2**		**1.1**		0.076	
Pyrene	Pyrene	*0.665*	*2.6*	**1.9**		**4.6**		**2.9**		**13**		0.11		**0.71**		**1.7**		**2.3**		0.2	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.69**		**1.9**		**1.2**		**6.5**		0.034		0.15		**0.8**		**0.83**		0.066	
Chrysene	Chrysene	*0.384*	*2.8*	**1.1**		**2.1**		**1.7**		**11**		0.052		0.27		**1.1**		**1.1**		0.083	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.68		2.1		2.3		9.6		0.071		0.28		1.4		1.2		0.19	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	0.21		**0.95**		**0.71**		**1.2**		0.022		0.077		**0.46**		**0.43**		0.044	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	**0.55**		**1.7**		**1.5**		**13**		0.044		0.21		**0.94**		**1.3**		0.2	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	0.17		**0.99**		**0.8**		**4.1**		0.028		0.07		**0.44**		**0.64**		0.1	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	**0.07**		**0.28**		**0.23**		**4**		0.011	J	0.031		**0.14**		**0.28**		**0.064**	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.24**		**1**		**1**		**18**		0.049		0.1		**0.54**		**1.2**		**0.27**	
Phenol	Phenol	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2-Chlorophenol	2-CP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
2-Nitrophenol	2-NP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachloroethane	HCE	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Isophorone	IP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.69	U	0.44	U	1.7	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Dimethylphthalate	DMP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
2-Methylphenol	2-MP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Methylphenol	4-MP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
4-Chloroaniline	4-CLA	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2-Nitroaniline	2-NA	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Atrazine	Atrazine	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Caprolactam	Caprolactam	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Benzaldehyde	Benzald	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Nitrophenol	4-NP	(--)	(--)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Pentachlorophenol	PCP	(--)	(--)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	2.7	U	1.7	U	7	U	15	U	3.4	U	1.7	U	5.6	U	4.6	U	0.83	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-09-A/0-6		SED-09-B/0-6		SED-09-C/0-6		SED-09-C/33-39		SED-06-A/0-6		SED-06-B/0-6		SED-06-C/0-6		SED-05-A/0-6		SED-05-B/0-6	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967877		3967869		3967864		3967865		3967875		3967879		3967867		3967907		3967909	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Diethylphthalate	DEP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Di-n-butylphthalate	DBP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Butylbenzylphthalate	BBP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	4.2		1.4		7		37		0.69	J	0.71	J	3.1		2.1	J	0.51	
Di-n-octylphthalate	DOP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
3-Nitroaniline	3-NA	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Dibenzofuran	DBF	(--)	(--)	0.14	U	0.09	U	0.3	U	1.9	J	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Nitroaniline	4-NA	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Carbazole	Carbazole	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Acetophenone	Acetophen	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Total Targeted SVOCs		(--)	(--)	11.074		22.597		23.048		179.47		1.1951		2.8626		12.958		13.716		1.855	
Total TICs		(--)	(--)	66.3		29.2		190.3		1181		123.89		29.38		65.5		75.6		25.49	
Total PAHs		*4*	*45*	**6.874**		**21.197**		**16.048**		**140.57**		0.5051		2.1526		**9.858**		**11.616**		1.345	
Total SVOCs		(--)	(--)	77.374		51.797		213.348		1360.47		125.0851		32.2426		78.458		89.316		27.345	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-05-C/0-6		SED-04-A/0-6		SED-04-A/39-45		SED-04-B/0-6		SED-04-C/0-6		SED-03-A/0-6		SED-03-B/0-6		SED-03-C/0-6		SED-03-C/12-18	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967855		3967911		3967912		3967915		3967917		3967919		3967857		3967921		3967922	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Naphthalene	Naphthalene	*0.16*	*2.1*	0.13		0.04	U	**0.42**		0.036		0.0041	J	0.065	J	0.086	J	**3.4**		**10**	
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	**0.13**		0.027	J	**1.4**		0.031		0.0034	J	0.042	J	**0.093**		**7.5**		**39**	
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.11**		**0.063**	J	**0.29**		0.025		0.0012	J	**0.15**		**0.13**		**0.8**		**1.2**	
Acenaphthene	ACP	*0.016*	*0.5*	**0.068**		**0.036**	J	**0.64**		**0.092**		0.0015	J	**0.086**	J	**0.26**		**1.9**		**2.8**	
Fluorene	Fluorene	*0.019*	*0.54*	**0.065**		**0.052**	J	**1.1**		**0.092**		0.003	J	0.019	U	**0.25**		**3.7**		**5.8**	
Phenanthrene	PhA	*0.24*	*1.5*	0.17		**0.6**		**4.5**		**1**		0.011		**0.25**		**2.5**		**11**		**10**	
Anthracene	ANT	*0.085*	*1.1*	**0.18**		**0.2**		**0.97**		**0.28**		0.003	J	**0.36**		**0.95**		**1.9**		**1.4**	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**1.1**		**1.2**		**2.5**		**1.1**		0.021		**2**		**4.8**		**4.2**		**3.7**	
Pyrene	Pyrene	*0.665*	*2.6*	**1.4**		**1.8**		**6.1**		**1.4**		0.027		**5.2**		**6**		**8.6**		**5.1**	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.54**		**0.72**		**2**		**0.51**		0.0081		**1.3**		**2.9**		**3.9**		**1.4**	
Chrysene	Chrysene	*0.384*	*2.8*	**0.96**		**1**		**2.8**		**0.68**		0.011		**2.3**		**3.6**		**7.5**		**2.5**	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.98		1.3		1.6		0.69		0.017		1.6		3.8		5.9		1.4	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	**0.32**		**0.44**		**0.46**		0.24		0.0056		**0.44**		**1.3**		**1.1**		**0.46**	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	**0.71**		**1.1**		**2**		**0.6**		0.01		**1.1**		**3.3**		**8.5**		**1.1**	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	**0.54**		**0.76**		**0.86**		**0.41**		0.0076		**0.72**		**1.9**		**3.6**		**0.69**	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	**0.17**		**0.2**		**0.48**		**0.11**		0.0018	J	**0.35**		**0.59**		**3.1**		**0.22**	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.68**		**1**		**2.4**		**0.5**		0.011		**1.6**		**2.1**		**14**		**0.94**	
Phenol	Phenol	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2-Chlorophenol	2-CP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
2-Nitrophenol	2-NP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachloroethane	HCE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Nitrobenzene	Nitrobenzene	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Isophorone	IP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachlorobutadiene	HCBD	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2-Chloronaphthalene	2-CNP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Dimethylphthalate	DMP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
2-Methylphenol	2-MP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Methylphenol	4-MP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
4-Chloroaniline	4-CLA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2-Nitroaniline	2-NA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Atrazine	Atrazine	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Caprolactam	Caprolactam	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Benzaldehyde	Benzald	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Nitrophenol	4-NP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Pentachlorophenol	PCP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	26	U	1.1	U	11	U	0.85	U	1.6	U	7.8	U	2.4	U	16	U	16	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-05-C/0-6		SED-04-A/0-6		SED-04-A/39-45		SED-04-B/0-6		SED-04-C/0-6		SED-03-A/0-6		SED-03-B/0-6		SED-03-C/0-6		SED-03-C/12-18	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967855		3967911		3967912		3967915		3967917		3967919		3967857		3967921		3967922	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Diethylphthalate	DEP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachlorobenzene	HCB	*0.02*	*24*	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Di-n-butylphthalate	DBP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Butylbenzylphthalate	BBP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	18		2.3		5.2	J	0.85		0.17	J	50		1.7		12		8	J
Di-n-octylphthalate	DOP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
3-Nitroaniline	3-NA	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Dibenzofuran	DBF	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	1.9	J	3.9	J
4-Nitroaniline	4-NA	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Carbazole	Carbazole	(--)	(--)	1.3	U	0.087	J	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Acetophenone	Acetophen	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Total Targeted SVOCs		(--)	(--)	26.253		12.885		35.72		8.646		0.3173		67.563		36.259		104.5		99.61	
Total TICs		(--)	(--)	184.2		52.5		586		33.14		56.17		485		67.6		1403		2204	
Total PAHs		*4*	*45*	**8.253**		**10.498**		**30.52**		**7.796**		0.1473		**17.563**		**34.559**		**90.6**		**87.71**	
Total SVOCs		(--)	(--)	210.453		65.385		621.72		41.786		56.4873		552.563		103.859		1507.5		2303.61	

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(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-03-C/30-36		SED-02-A/0-6		SED-02-B/0-6		SED-02-B/0-6D		SED-02-C/0-6		SED-01-A/0-6		SED-01-B/0-6		SED-01-C/0-6		SED-16-C/0-6	
			Date Sampled:	12/19/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/17/02	
			Lab Sample No.:	3967923		3967892		3967889		3967890		3967894		3967881		3967883		3967905		3964485	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				**Arthur Kill**	
Naphthalene	Naphthalene	*0.16*	*2.1*	**3.4**		0.1	J	**0.19**		0.036	U	0.071	J	0.039	J	0.042		0.089		0.11	
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	**8.9**		0.069	J	**0.15**		0.032	J	0.056	J	0.029		0.039		0.05		0.065	
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.33**		**0.11**		**0.046**	J	**0.057**	J	**0.11**		**0.062**		**0.059**		**0.17**		**0.15**	
Acenaphthene	ACP	*0.016*	*0.5*	**0.46**		**0.034**	J	**0.45**		**0.068**		**0.037**	J	0.012	J	**0.077**		**0.084**		**0.027**	
Fluorene	Fluorene	*0.019*	*0.54*	**0.99**		**0.049**	J	**0.5**		**0.14**		**0.037**	J	**0.022**		**0.069**		**0.1**		**0.05**	
Phenanthrene	PhA	*0.24*	*1.5*	**2.8**		**0.33**		**4.9**		**1.7**		0.2		0.13		**0.61**		**0.29**		0.2	
Anthracene	ANT	*0.085*	*1.1*	**0.32**		**0.24**		**1.3**		**0.47**		**0.22**		**0.086**		**0.2**		**0.5**		**0.25**	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**1**		**1.3**		**4.8**		**2.2**		**0.94**		**0.64**		**1**		**1.3**		**1**	
Pyrene	Pyrene	*0.665*	*2.6*	**1.8**		**1.6**		**5.1**		**2.3**		**3.3**		**0.72**		**1.3**		**2.6**		**1.3**	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.4**		**0.55**		**2.1**		**1**		**0.65**		**0.31**		**0.61**		**0.59**		**0.44**	
Chrysene	Chrysene	*0.384*	*2.8*	**0.53**		**0.83**		**2.3**		**1.4**		**1.4**		0.23		**0.91**		**1.2**		**0.7**	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.39		1.2		2.6		1.3		1.5		0.55		1		0.7		0.9	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	0.11		**0.4**		**0.99**		**0.48**		**0.48**		0.2		**0.36**		0.19		**0.33**	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	0.29		**0.78**		**2.2**		**0.97**		**1.4**		0.39		**0.86**		0.42		**0.65**	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	0.16		**0.58**		**1.4**		**0.55**		**0.75**		**0.36**		**0.64**		0.16		**0.36**	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	0.058	J	**0.17**		**0.34**		**0.17**		**0.37**		**0.096**		**0.21**		0.059		**0.094**	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.25**		**0.76**		**1.6**		**0.64**		**1.5**		**0.42**		**0.87**		**0.2**		**0.33**	
Phenol	Phenol	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2-Chlorophenol	2-CP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
2-Nitrophenol	2-NP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachloroethane	HCE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Isophorone	IP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Dimethylphthalate	DMP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
2-Methylphenol	2-MP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Methylphenol	4-MP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
4-Chloroaniline	4-CLA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.27	J
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2-Nitroaniline	2-NA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Atrazine	Atrazine	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Caprolactam	Caprolactam	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Benzaldehyde	Benzald	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.13	J
4-Nitrophenol	4-NP	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Pentachlorophenol	PCP	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	8	U	1.5	U	1	U	1	U	13	U	3.6	U	2.2	U	7.4	U	2.1	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-03-C/30-36		SED-02-A/0-6		SED-02-B/0-6		SED-02-B/0-6D		SED-02-C/0-6		SED-01-A/0-6		SED-01-B/0-6		SED-01-C/0-6		SED-16-C/0-6	
			Date Sampled:	12/19/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/17/02	
			Lab Sample No.:	3967923		3967892		3967889		3967890		3967894		3967881		3967883		3967905		3964485	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				**Arthur Kill**	
Diethylphthalate	DEP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Di-n-butylphthalate	DBP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Butylbenzylphthalate	BBP	(--)	(--)	0.8	U	0.25	J	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	0.8	U	4.3		2.1		1		20		6.5		3.2		0.74	U	21	
Di-n-octylphthalate	DOP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
3-Nitroaniline	3-NA	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Dibenzofuran	DBF	(--)	(--)	0.79	J	0.075	U	0.07	J	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Nitroaniline	4-NA	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Carbazole	Carbazole	(--)	(--)	0.41	U	0.075	U	0.13	J	0.047	U	0.66	U	0.18	U	0.2	J	0.38	U	0.1	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Acetophenone	Acetophen	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Total Targeted SVOCs		(--)	(--)	22.978		13.652		33.266		14.477		33.021		10.796		12.256		8.702		28.356	
Total TICs		(--)	(--)	476		107.8		43.12		37.84		157		80.1		65.4		101.7		107.7	
Total PAHs		*4*	*45*	**22.188**		**9.102**		**30.966**		**13.477**		**13.021**		**4.296**		**8.856**		**8.702**		**6.956**	
Total SVOCs		(--)	(--)	498.978		121.452		76.386		52.317		190.021		90.896		77.656		110.402		136.056	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-13-C/0-6		SED-13-C/0-6D		SED-14-C/0-6		SED-18-C/0-6		SED-15-C/0-6		SED-17-C/0-6		FB121902		FB122002	
			Date Sampled:	12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/19/02		12/202/02	
			Lab Sample No.:	3964479&80		3964481&82		3964483&84		3964488		3964477&78		3964486		3967924		3967895	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Arthur Kill**		⇨				⇨				⇨		**Field Blanks (ppb)**			
Naphthalene	Naphthalene	*0.16*	*2.1*	0.1		0.11		0.15		0.094		0.1		**0.8**		1	U	1	U
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	0.069		0.07		**0.085**		0.069		0.064		**0.67**		1	U	1	U
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.14**		**0.14**		**0.15**		**0.12**		**0.15**		**0.59**		1	U	1	U
Acenaphthene	ACP	*0.016*	*0.5*	**0.077**		**0.067**		**0.46**		**0.065**		**0.04**		**3.9**		1	U	1	U
Fluorene	Fluorene	*0.019*	*0.54*	**0.085**		**0.077**		**0.21**		**0.069**		**0.053**		**1.2**		1	U	1	U
Phenanthrene	PhA	*0.24*	*1.5*	**0.3**		**0.3**		**0.28**		**0.34**		**0.36**		**2.2**		1	U	1	U
Anthracene	ANT	*0.085*	*1.1*	**0.29**		**0.26**		**0.31**		**0.27**		**0.3**		**2.4**		1	U	1	U
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**1.2**		**1.1**		**1.3**		**0.92**		**1.1**		**6.4**		1	U	1	U
Pyrene	Pyrene	*0.665*	*2.6*	**1.3**		**1.3**		**1.6**		**1.2**		**1.4**		**7.3**		1	U	1	U
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.56**		**0.52**		**0.61**		**0.52**		**0.65**		**3.7**		1	U	1	U
Chrysene	Chrysene	*0.384*	*2.8*	**0.68**		**0.59**		**0.62**		**0.67**		**0.94**		**3.8**		1	U	1	U
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.94		0.9		0.91		0.21		1.3		3.7		1	U	1	U
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	**0.37**		**0.26**		**0.34**		**0.33**		**0.44**		**1.2**		1	U	1	U
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	**0.66**		**0.6**		**0.65**		**0.61**		**0.85**		**3.2**		1	U	1	U
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	**0.38**		**0.35**		**0.35**		**0.3**		**0.64**		**1.6**		1	U	1	U
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	**0.1**		**0.097**		**0.092**		**0.084**		**0.15**		**0.47**		1	U	1	U
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.37**		**0.35**		**0.32**		**0.26**		**0.63**		**1.7**		1	U	1	U
Phenol	Phenol	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2-Chlorophenol	2-CP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
2-Nitrophenol	2-NP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachloroethane	HCE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Isophorone	IP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	U	0.35	U	5	U	5	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Dimethylphthalate	DMP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
2-Methylphenol	2-MP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
4-Methylphenol	4-MP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
4-Chloroaniline	4-CLA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.12	J	0.11	U	0.068	U	1	U	1	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2-Nitroaniline	2-NA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Atrazine	Atrazine	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Caprolactam	Caprolactam	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	5	U	5	U
Benzaldehyde	Benzald	(--)	(--)	0.1	J	0.11	J	0.13	J	0.15	J	0.11	U	0.09	J	1	U	1	U
4-Nitrophenol	4-NP	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	J	0.35	U	10	U	10	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Pentachlorophenol	PCP	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	U	0.35	U	3	U	3	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	2	U	1.8	U	2.1	U	1.9	U	2.3	U	1.4	U	19	U	20	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	U	0.35	U	5	U	5	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-13-C/0-6		SED-13-C/0-6D		SED-14-C/0-6		SED-18-C/0-6		SED-15-C/0-6		SED-17-C/0-6		FB121902		FB122002	
			Date Sampled:	12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/19/02		12/202/02	
			Lab Sample No.:	3964479&80		3964481&82		3964483&84		3964488		3964477&78		3964486		3967924		3967895	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Arthur Kill**		⇨				⇨				⇨		**Field Blanks (ppb)**			
Diethylphthalate	DEP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	2	U	2	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Di-n-butylphthalate	DBP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
Butylbenzylphthalate	BBP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	4.5		4.8		3.7		4.7		3.9		0.14	U	2	U	4	J
Di-n-octylphthalate	DOP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
3-Nitroaniline	3-NA	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Dibenzofuran	DBF	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.48	J	1	U	1	U
4-Nitroaniline	4-NA	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Carbazole	Carbazole	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.12	J	1	U	1	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.16	J	1	U	1	U
Acetophenone	Acetophen	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	1	U
Total Targeted SVOCs		(--)	(--)	12.221		12.001		12.267		11.101		13.657		45.68		ND		4	
Total TICs		(--)	(--)	470.8		89.7		85.4		98.3		138.6		101.5		ND		140	
Total PAHs		*4*	*45*	**7.621**		**7.091**		**8.437**		**6.131**		**9.167**		**44.83**		ND		ND	
Total SVOCs		(--)	(--)	483.021		101.701		97.667		109.401		152.257		147.18		ND		144	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

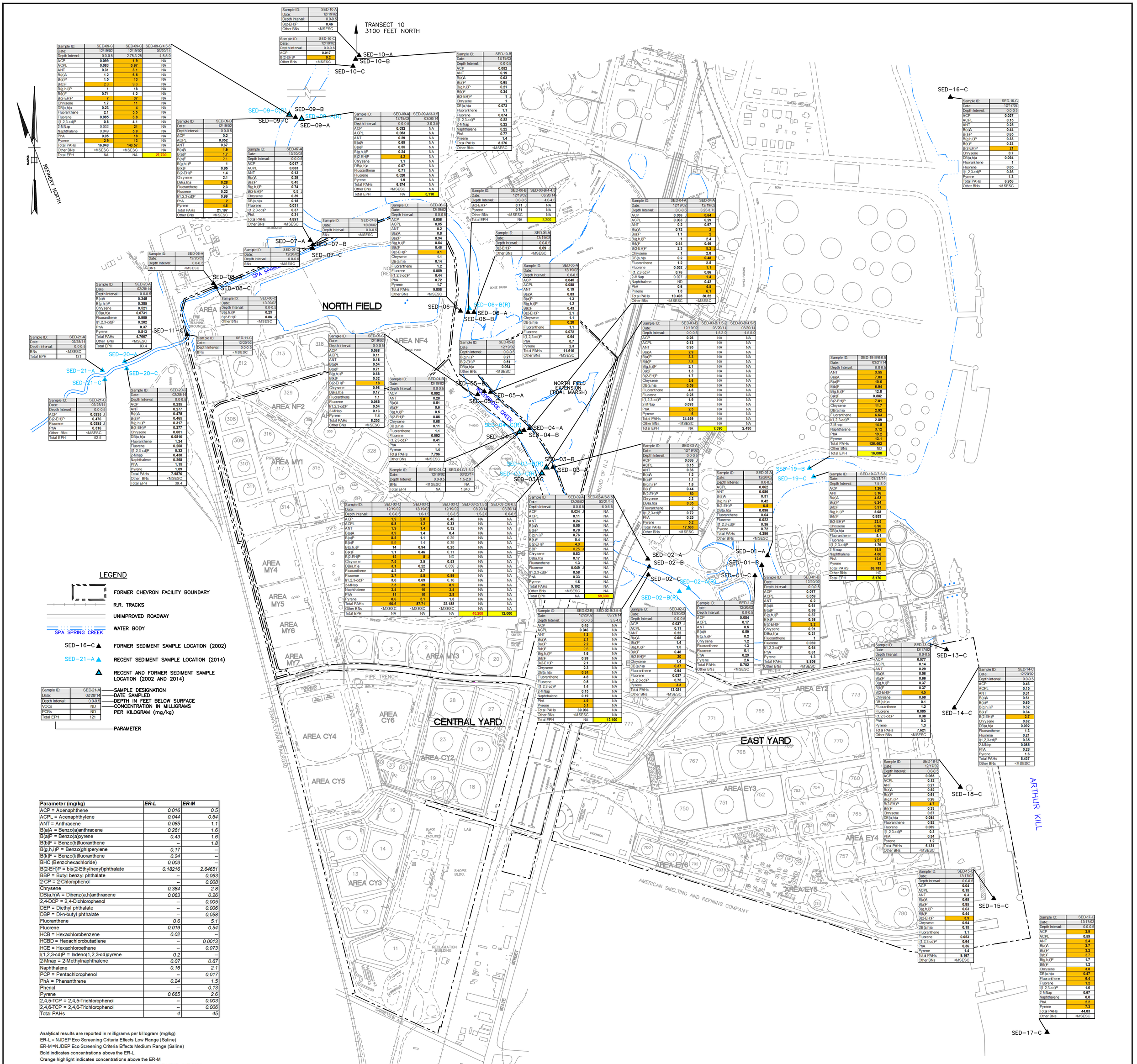
Table IV
Summary of Semi-Volatile Organic Compounds (SVOCs) in Sediment
Former Chevron Facility - Perth Amboy, New Jersey

		Sample No.:	SED-19-B/6-6.5	SED-19-C/7.5-8	SED-20-A	SED-20-C	SED-21-A	SED-21-C
		Date Sampled:	03/21/14	03/21/14	02/28/14	02/28/14	02/28/14	02/28/14
		Depth (ft):	6.0-6.5	7.5-8.0	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5
		LAB Sample ID:	JB62621-3	JB62621-4	JB60857-1	JB60857-2	JB60857-4	JB60857-3
		LAB:	Accutest, NJ	Accutest, NJ	Accutest, NJ	Accutest, NJ	Accutest, NJ	Accutest, NJ
Parameter (mg/kg)	***ER-L***	***ER-M***						
Acenaphthene	*0.016*	*0.5*	ND (0.076)	**1.26**	ND (0.011)	**0.235**	ND (0.0098)	**0.0235** J
Acenaphthylene	*0.044*	*0.64*	ND (0.084)	ND (0.11)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.013)
Acetophenone	--	--	ND (0.046)	ND (0.060)	ND (0.0065)	ND (0.0073)	ND (0.0060)	ND (0.0071)
Anthracene	*0.085*	*1.1*	**3.55**	**3.16**	0.0521	**0.277**	0.0268 J	0.0748
Atrazine	--	--	ND (0.052)	ND (0.067)	ND (0.0072)	ND (0.0082)	ND (0.0067)	ND (0.0079)
Benzaldehyde	--	--	ND (0.060)	ND (0.078)	ND (0.0084)	ND (0.0096)	ND (0.0078)	ND (0.0093)
Benzo(a)pyrene	*0.43*	*1.6*	**10.6**	**6.24**	0.376	**0.465**	0.199	0.166
Benzo(a)anthracene	*0.261*	*1.6*	**7.03**	**4.63**	**0.345**	**0.475**	0.17	0.151
Benzo(b)fluoranthene	--	*1.8*	**6.94**	**3.91**	0.541	0.608	0.245	0.217
Benzo(ghi)perylene	*0.17*	--	**12.8**	**5.08**	**0.285**	**0.317**	0.155	0.136
Benzo(k)fluoranthene	*0.24*	--	**0.882**	**0.853**	0.185	0.214	0.0922	0.0681
BHC (Benzohexachloride)	*0.003*	--	NA	NA	NA	NA	NA	NA
1,1-Biphenyl	*Product Limit*	--	ND (0.030)	ND (0.039)	ND (0.0043)	0.0959	ND (0.0039)	ND (0.0047)
bis(2-Chloroethoxy)methane	--	--	ND (0.11)	ND (0.14)	ND (0.015)	ND (0.017)	ND (0.014)	ND (0.016)
bis(2-Chloroethyl)ether	--	--	ND (0.079)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.012)
bis(2-Chloroisopropyl)ether	--	--	ND (0.078)	ND (0.10)	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)
bis(2-Ethylhexyl)phthalate	*0.18216*	*2.64651*	**7.01**	**23.5**	0.158	**0.277**	0.115	**0.476**
4-Bromophenyl-phenylether	--	--	ND (0.095)	ND (0.12)	ND (0.013)	ND (0.015)	ND (0.012)	ND (0.015)
Butyl benzyl phthalate	--	*0.063*	ND (0.15)	ND (0.20)	ND (0.021)	ND (0.024)	ND (0.020)	ND (0.023)
Caprolactam	--	--	ND (0.083)	ND (0.11)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.013)
Carbazole	--	--	ND (0.12)	ND (0.16)	0.0641 J	0.207	0.0247 J	0.0355 J
4-Chloroaniline	--	--	ND (0.084)	ND (0.11)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.013)
4-Chloro-3-methyl phenol	--	--	ND (0.26)	ND (0.34)	ND (0.037)	ND (0.042)	ND (0.034)	ND (0.040)
2-Chloronaphthalene	--	--	ND (0.081)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)
2-Chlorophenol	--	*0.008*	ND (0.26)	ND (0.34)	ND (0.037)	ND (0.042)	ND (0.034)	ND (0.040)
4-Chlorophenyl-phenylether	--	--	ND (0.079)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.012)
Chrysene	*0.384*	*2.8*	**11.7**	**6.96**	**0.521**	**0.601**	0.25	0.21
Dibenz(a,h)anthracene	*0.063*	*0.26*	**2.92**	**1.67**	**0.0731**	**0.0816**	0.0382	0.0298 J
Dibenzofuran	--	--	ND (0.078)	ND (0.10)	ND (0.011)	0.22	ND (0.010)	0.0164 J
3,3'-Dichlorobenzidine	--	--	ND (0.067)	ND (0.086)	ND (0.0093)	ND (0.011)	ND (0.0086)	ND (0.010)
2,4-Dichlorophenol	--	*0.005*	ND (0.42)	ND (0.55)	ND (0.059)	ND (0.067)	ND (0.055)	ND (0.065)
Diethyl phthalate	--	*0.006*	ND (0.089)	ND (0.12)	ND (0.013)	ND (0.014)	ND (0.012)	ND (0.014)
2,4-Dimethyl phenol	--	--	ND (0.44)	ND (0.57)	ND (0.062)	ND (0.070)	ND (0.057)	ND (0.068)
Dimethyl phthalate	--	--	ND (0.092)	ND (0.12)	ND (0.013)	ND (0.015)	ND (0.012)	ND (0.014)
Di-n-butyl phthalate	--	*0.058*	ND (0.058)	ND (0.075)	ND (0.0081)	ND (0.0092)	ND (0.0075)	ND (0.0089)
4,6-Dinitro-o-cresol	--	--	ND (0.32)	ND (0.41)	ND (0.045)	ND (0.051)	ND (0.041)	ND (0.049)
4,6-Dinitro-2-methylphenol	--	--	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	--	--	ND (0.32)	ND (0.41)	ND (0.045)	ND (0.051)	ND (0.041)	ND (0.049)
Dinitrotoluene (2,4-2,6- mixture)	--	--	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	--	--	ND (0.11)	ND (0.15)	ND (0.016)	ND (0.018)	ND (0.015)	ND (0.018)
2,6-Dinitrotoluene	--	--	ND (0.10)	ND (0.13)	ND (0.014)	ND (0.016)	ND (0.013)	ND (0.015)
Di-n-octyl phthalate	--	--	ND (0.13)	ND (0.16)	ND (0.018)	ND (0.020)	ND (0.017)	ND (0.020)
1,4-Dioxane	--	--	ND (0.17)	ND (0.22)	ND (0.024)	ND (0.027)	ND (0.022)	ND (0.026)
Fluoranthene	*0.6*	*5.1*	**6.63**	**5.1**	**0.909**	**1.24**	0.365	0.368
Fluorene	*0.019*	*0.54*	ND (0.086)	**2.57**	0.0145 J	**0.208**	ND (0.011)	**0.0285** J
Hexachlorobenzene	*0.02*	--	ND (0.085)	ND (0.11)	ND (0.012)	ND (0.014)	ND (0.011)	ND (0.013)
Hexachlorobutadiene	--	*0.0013*	ND (0.073)	ND (0.094)	ND (0.010)	ND (0.012)	ND (0.0094)	ND (0.011)
Hexachlorocyclopentadiene	--	--	ND (0.27)	ND (0.35)	ND (0.037)	ND (0.042)	ND (0.035)	ND (0.041)
Hexachloroethane	--	*0.073*	ND (0.073)	ND (0.094)	ND (0.010)	ND (0.012)	ND (0.0094)	ND (0.011)
Indeno(1,2,3-cd)pyrene	*0.2*	--	**2.89**	**1.79**	**0.282**	**0.32**	0.143	0.101
Isophorone	--	--	ND (0.070)	ND (0.091)	ND (0.0099)	ND (0.011)	ND (0.0091)	ND (0.011)
2-Methylnaphthalene	*0.07*	*0.67*	**14.5**	**14.9**	ND (0.020)	**0.438**	ND (0.019)	ND (0.022)
2-Methylphenol	--	--	ND (0.30)	ND (0.39)	ND (0.042)	ND (0.047)	ND (0.039)	ND (0.046)
3&4-Methylphenol	--	--	ND (0.33)	ND (0.43)	ND (0.047)	ND (0.053)	ND (0.043)	ND (0.051)
Naphthalene	*0.16*	*2.1*	**3.12**	**4.06**	ND (0.010)	**0.268**	ND (0.0093)	ND (0.011)
2-Nitroaniline	--	--	ND (0.12)	ND (0.15)	ND (0.016)	ND (0.018)	ND (0.015)	ND (0.018)
3-Nitroaniline	--	--	ND (0.10)	ND (0.14)	ND (0.015)	ND (0.017)	ND (0.014)	ND (0.016)
4-Nitroaniline	--	--	ND (0.10)	ND (0.13)	ND (0.014)	ND (0.016)	ND (0.013)	ND (0.016)
Nitrobenzene	--	--	ND (0.076)	ND (0.098)	ND (0.011)	ND (0.012)	ND (0.0098)	ND (0.012)
2-Nitrophenol	--	--	ND (0.28)	ND (0.36)	ND (0.039)	ND (0.044)	ND (0.036)	ND (0.043)
4-Nitrophenol	--	--	ND (0.44)	ND (0.57)	ND (0.062)	ND (0.070)	ND (0.057)	ND (0.068)
n-Nitrosodi-n-propylamine	--	--	ND (0.064)	ND (0.083)	ND (0.0089)	ND (0.010)	ND (0.0083)	ND (0.0098)
n-Nitrosodiphenylamine	--	--	ND (0.16)	ND (0.20)	ND (0.022)	ND (0.025)	ND (0.020)	ND (0.024)
p-Chloroaniline	--	--	NA	NA	NA	NA	NA	NA
p-Chloro-m-cresol	--	--	NA	NA	NA	NA	NA	NA
Pentachlorophenol	--	*0.017*	ND (0.45)	ND (0.58)	ND (0.063)	ND (0.071)	ND (0.058)	ND (0.069)
Phenanthrene	*0.24*	*1.5*	**19.2**	**12.6**	**0.37**	**1.15**	0.13	**0.316**
Phenol	--	*0.13*	ND (0.28)	ND (0.36)	ND (0.038)	ND (0.044)	ND (0.036)	ND (0.042)
Pyrene	*0.665*	*2.6*	**13.1**	**12**	**0.813**	**1.09**	0.346	0.408
1,2,4,5-Tetrachlorobenzene	--	--	ND (0.080)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.012)
2,3,4,6-Tetrachlorophenol	--	--	ND (0.27)	ND (0.35)	ND (0.038)	ND (0.043)	ND (0.035)	ND (0.042)
2,4,5-Trichlorophenol	--	*0.003*	ND (0.30)	ND (0.39)	ND (0.043)	ND (0.048)	ND (0.039)	ND (0.047)
2,4,6-Trichlorophenol	--	*0.006*	ND (0.25)	ND (0.32)	ND (0.034)	ND (0.039)	ND (0.032)	ND (0.038)
Low Molecular Weight PAHs	--	--	40.37	38.55	0.4366	2.576	0.1568	0.4428
High Molecular Weight PAHs	--	--	86.092	48.233	4.3301	5.4116	2.0034	1.8549
Total PAHs	*4*	*45*	**126.462**	**86.783**	**4.7667**	**7.9876**	2.1602	2.2977
Total SVOC TIC	--	--	336 J	221 J	3.06 J	2.95 J	4.91 J	1.27 J
Total VOC and SVOC TICs	--	--	533 J	493 J	3.06 J	2.95 J	4.91 J	1.27 J

ER-L = NJDEP Eco Screening Criteria Effects Low Range (Saline)
ER-M =NJDEP Eco Screening Criteria Effects Medium Range (Saline)
Bold indicates concentrations above the ER-L
Bold and Underlined indicates concentrations above the ER-M
ND = Not Detected
NA = Not Analyzed
J = Estimated value below sample reporting limit

ATTACHMENT 4:

REVISED FIGURE 4 of the 2014 SUPPLEMENTAL ECOLOGICAL EVALUATION REPORT



Sample ID:	SED-09-C	SED-09-C	SED-09-C/4.5-5
Date:	12/19/02	12/19/02	03/20/14
Depth Interval:	0.0-0.5	2.75-3.25	4.5-5.0
ACP	**0.099**	**1.9**	NA
ACPL	**0.083**	**0.97**	NA
ANT	**0.31**	**3.1**	NA
B(a)A	**1.2**	**6.5**	NA
B(a)P	**1.5**	**13**	NA
B(b)F	2.3	9.6	NA
B(g,h,i)P	**1**	**18**	NA
B(k)F	**0.71**	**1.2**	NA
B(2-EH)P	**7**	**37**	NA
Chrysene	**1.7**	**11**	NA
DB(a,h)a	**0.23**	**4**	NA
Fluoranthene	**2.1**	**5.5**	NA
Fluorene	**0.085**	**3.8**	NA
I(1,2,3-cd)P	**0.8**	**4.1**	NA
2-MNap	0.032	**21**	NA
Naphthalene	0.049	**5.9**	NA
PhA	**0.95**	**18**	NA
Pyrene	**2.9**	**13**	NA
Total PAHs	**16.048**	**140.57**	NA
Other BNs	<MSESC	<MSESC	NA
Total EPH	NA	NA	**27,700**

Sample ID:	SED-10-A
Date:	12/19/02
Depth Interval:	0.0-0.5
B(2-EH)P	**0.46**
Other BNs	<MSESC

Sample ID:	SED-10-C
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.017**
B(2-EH)P	**5.2**
Other BNs	<MSESC

Sample ID:	SED-10-B
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.052**
ANT	**0.19**
B(a)A	**0.63**
B(a)P	**0.65**
B(g,h,i)P	**0.21**
B(k)F	**0.34**
B(2-EH)P	**1** J
Chrysene	**1**
DB(a,h)a	**0.073**
Fluoranthene	**1.1**
Fluorene	**0.074**
I(1,2,3-cd)P	**0.22**
2-MNap	**0.22**
Naphthalene	**0.22**
PhA	**0.77**
Pyrene	**1.4**
Total PAHs	**8.276**
Other BNs	<MSESC

Sample ID:	SED-09-B
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.2**
ACPL	**0.052**
ANT	**0.57**
B(a)A	**1.9**
B(a)P	**1.7**
B(b)F	2.1
B(g,h,i)P	**1**
B(k)F	**0.95**
B(2-EH)P	**1.4**
Chrysene	**2.1**
DB(a,h)a	**0.28**
Fluoranthene	**2.3**
Fluorene	**0.22**
I(1,2,3-cd)P	**0.99**
PhA	**2**
Pyrene	**4.6**
Total PAHs	**21.197**
Other BNs	<MSESC

Sample ID:	SED-09-A	SED-09-A/3-3.5
Date:	12/19/02	03/20/14
Depth Interval:	0.0-0.5	3.0-3.5
ACP	**0.032**	NA
ACPL	**0.053**	NA
ANT	**0.29**	NA
B(a)A	**0.69**	NA
B(a)P	**0.55**	NA
B(g,h,i)P	**0.24**	NA
B(2-EH)P	**4.2**	NA
Chrysene	**1.1**	NA
DB(a,h)a	**0.07**	NA
Fluoranthene	**0.71**	NA
Fluorene	**0.028**	NA
Pyrene	**1.9**	NA
Total PAHs	**6.874**	NA
Other BNs	<MSESC	NA
Total EPH	NA	**5,110**

Sample ID:	SED-07-A
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.017** J
ACPL	**0.083**
ANT	**0.13**
B(a)A	**0.29**
B(a)P	**0.45**
B(g,h,i)P	**0.74**
B(2-EH)P	**0.5** J
Chrysene	**0.39**
DB(a,h)a	**0.15**
Fluorene	**0.031**
I(1,2,3-cd)P	**0.37**
PhA	**0.31**
Total PAHs	**4.891**
Other BNs	<MSESC

Sample ID:	SED-07-B
Date:	12/20/02
Depth Interval:	0.0-0.5
BNs	<MSESC

Sample ID:	SED-07-C
Date:	12/20/02
Depth Interval:	0.0-0.5
BNs	<MSESC

Sample ID:	SED-08-A
Date:	12/20/02
Depth Interval:	0.0-0.5
BNs	<MSESC

Sample ID:	SED-08-C
Date:	12/20/02
Depth Interval:	0.0-0.5
B(g,h,i)P	**0.23**
B(2-EH)P	**0.86** J
Other BNs	<MSESC

Sample ID:	SED-06-C
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.056**
ACPL	**0.05**
ANT	**0.2**
B(a)A	**0.8**
B(a)P	**0.94**
B(g,h,i)P	**0.54**
B(k)F	**0.46**
B(2-EH)P	**3.1**
Chrysene	**1.1**
DB(a,h)a	**0.14**
Fluoranthene	**1.2**
Fluorene	**0.059**
I(1,2,3-cd)P	**0.44**
PhA	**0.72**
Pyrene	**1.7**
Total PAHs	**9.858**
Other BNs	<MSESC

Sample ID:	SED-06-B	SED-06-B/4-4.5
Date:	12/19/02	03/20/14
Depth Interval:	0.0-0.5	4.0-4.5
B(2-EH)P	**0.71** J	NA
Pyrene	**0.71**	NA
Other BNs	<MSESC	NA
Total EPH	NA	3,200

Sample ID:	SED-06-A
Date:	12/19/02
Depth Interval:	0.0-0.5
B(2-EH)P	**0.69**
Other BNs	<MSESC

Sample ID:	SED-05-A
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.045**
ACPL	**0.088**
ANT	**0.19**
B(a)A	**0.83**
B(a)P	**1.3**
B(g,h,i)P	**1.2**
B(k)F	**0.43**
B(2-EH)P	**2.1** J
Chrysene	**1.1**
DB(a,h)a	**0.28**
Fluoranthene	**1.1**
Fluorene	**0.072**
I(1,2,3-cd)P	**0.64**
PhA	**0.7**
Pyrene	**2.3**
Total PAHs	**11.616**
Other BNs	<MSESC

Sample ID:	SED-05-B
Date:	12/19/02
Depth Interval:	0.0-0.5
B(g,h,i)P	**0.27**
B(2-EH)P	**0.51**
DB(a,h)a	**0.064**
Other BNs	<MSESC

Sample ID:	SED-05-C
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.068**
ACPL	**0.11**
ANT	**0.18**
B(a)A	**0.54**
B(a)P	**0.71**
B(g,h,i)P	**0.68**
B(k)F	**0.32**
B(2-EH)P	**18**
Chrysene	**0.96**
DB(a,h)a	**0.17**
Fluoranthene	**1.1**
Fluorene	**0.065**
I(1,2,3-cd)P	**0.54**
2-MNap	**0.13**
Pyrene	**1.4**
Total PAHs	**8.253**
Other BNs	<MSESC

Sample ID:	SED-04-B
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.092**
ANT	**0.28**
B(a)A	**0.51**
B(a)P	**0.6**
B(g,h,i)P	**0.5**
B(2-EH)P	**0.85**
Chrysene	**0.68**
DB(a,h)a	**0.11**
Fluoranthene	**1.1**
Fluorene	**0.092**
I(1,2,3-cd)P	**0.41**
PhA	**1**
Pyrene	**1.4**
Total PAHs	**7.796**
Other BNs	<MSESC

Sample ID:	SED-04-C	SED-04-C/1.5-2
Date:	12/19/02	03/20/14
Depth Interval:	0.0-0.5	1.5-2.0
BNs	<MSESC	NA
Total EPH	NA	1,640

Sample ID:	SED-04-A
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.036**
ACPL	**0.063** J
ANT	**0.2**
B(a)A	**0.72**
B(a)P	**1.1**
B(g,h,i)P	**1**
B(k)F	**0.44**
B(2-EH)P	**2.3**
Chrysene	**1**
DB(a,h)a	**0.2**
Fluoranthene	**1.2**
Fluorene	**0.052**
I(1,2,3-cd)P	**0.76**
2-MNap	0.027 J
Naphthalene	ND
PhA	**0.6**
Pyrene	**1.8**
Total PAHs	**10.498**
Other BNs	<MSESC

Sample ID:	SED-03-B	SED-03-B/1.5-2	SED-03-B/4.5-5
Date:	12/19/02	03/20/14	03/20/14
Depth Interval:	0.0-0.5	1.5-2.0	4.5-5.0
ACP	**0.26**	NA	NA
ACPL	**0.13**	NA	NA
ANT	**0.95**	NA	NA
B(a)A	**2.9**	NA	NA
B(a)P	**3.3**	NA	NA
B(b)F	3.8	NA	NA
B(g,h,i)P	**2.1**	NA	NA
B(k)F	**1.3**	NA	NA
B(2-EH)P	**1.7**	NA	NA
Chrysene	**3.6**	NA	NA
DB(a,h)a	**0.59**	NA	NA
Fluoranthene	**4.8**	NA	NA
Fluorene	**0.25**	NA	NA
I(1,2,3-cd)P	**1.9**	NA	NA
2-MNap	**0.093**	NA	NA
PhA	**2.5**	NA	NA
Pyrene	**6**	NA	NA
Total PAHs	**34.559**	NA	NA
Other BNs	<MSESC	NA	NA
Total EPH	NA	**7,390**	**2,430**

Sample ID:	SED-03-A
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.086**
ACPL	**0.15**
ANT	**0.36**
B(a)A	**1.3**
B(a)P	**1.1**
B(g,h,i)P	**1.6**
B(k)F	**0.44**
B(2-EH)P	**50**
Chrysene	**2.3**
DB(a,h)a	**0.35**
Fluoranthene	**2**
I(1,2,3-cd)P	**0.72**
PhA	**0.25**
Pyrene	**5.2**
Total PAHs	**17.563**
Other BNs	<MSESC

Sample ID:	SED-01-A
Date:	12/20/02
Depth Interval:	0.0-0.5
ACPL	**0.062**
ANT	**0.086**
B(a)A	**0.31**
B(g,h,i)P	**0.42**
B(2-EH)P	**6.5**
DB(a,h)a	**0.090**
Fluoranthene	**0.64**
Fluorene	**0.022**
I(1,2,3-cd)P	**0.36**
Pyrene	**0.72**
Total PAHs	**4.296**
Other BNs	<MSESC

Sample ID:	SED-01-B
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.077**
ACPL	**0.059**
ANT	**0.2**
B(a)A	**0.61**
B(a)P	**0.86**
B(g,h,i)P	**0.87**
B(k)F	**0.36**
B(2-EH)P	**3.2**
Chrysene	**0.91**
DB(a,h)a	**0.21**
Fluoranthene	**1**
Fluorene	**0.069**
I(1,2,3-cd)P	**0.64**
PhA	**0.61**
Pyrene	**1.3**
Total PAHs	**8.856**
Other BNs	<MSESC

Sample ID:	SED-01-C
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.084**
ACPL	**0.17**
ANT	**0.5**
B(a)A	**0.59**
B(g,h,i)P	**0.2**
Chrysene	**1.2**
Fluoranthene	**1.3**
Fluorene	**0.1**
PhA	**0.29**
Pyrene	**2.6**
Total PAHs	**8.702**
Other BNs	<MSESC

Sample ID:	SED-02-A	SED-02-A/6-6.5
Date:	12/20/02	03/21/14
Depth Interval:	0.0-0.5	6.0-6.5
ACP	**0.034** J	NA
ACPL	**0.11**	NA
ANT	**0.24**	NA
B(a)A	**0.55**	NA
B(a)P	**0.78**	NA
B(g,h,i)P	**0.76**	NA
B(k)F	**0.4**	NA
B(2-EH)P	**4.3**	NA
BBP	0.25 J	NA
Chrysene	**0.83**	NA
DB(a,h)a	**0.17**	NA
Fluoranthene	**1.3**	NA
Fluorene	**0.049**	NA
I(1,2,3-cd)P	**0.58**	NA
PhA	**0.33**	NA
Pyrene	**1.6**	NA
Total PAHs	**9.102**	NA
Other BNs	<MSESC	NA
Total EPH	NA	**59,300**

Sample ID:	SED-02-B	SED-02-B/3.5-4
Date:	12/20/02	03/21/14
Depth Interval:	0.0-0.5	3.5-4.0
ACP	**0.45**	NA
ACPL	**0.046** J	NA
ANT	**1.3**	NA
B(a)A	**2.1**	NA
B(a)P	**2.2**	NA
B(b)F	2.6	NA
B(g,h,i)P	**1.6**	NA
B(k)F	**0.99**	NA
B(2-EH)P	**2.1**	NA
Chrysene	**2.3**	NA
DB(a,h)a	**0.34**	NA
Fluoranthene	**4.8**	NA
Fluorene	**0.5**	NA
I(1,2,3-cd)P	**1.4**	NA
2-MNap	**0.15**	NA
Naphthalene	**0.19**	NA
PhA	**4.9**	NA
Pyrene	**5.1**	NA
Total PAHs	**30.966**	NA
Other BNs	<MSESC	NA
Total EPH	NA	**12,100**

Sample ID:	SED-02-C
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.037** J
ACPL	**0.11**
ANT	**0.22**
B(a)A	**0.65**
B(a)P	**1.4**
B(g,h,i)P	**1.5**
B(k)F	**0.48**
B(2-EH)P	**20**
Chrysene	**1.4**
DB(a,h)a	**0.37**
Fluoranthene	**0.94**
Fluorene	**0.037** J
I(1,2,3-cd)P	**0.75**
Pyrene	**3.3**
Total PAHs	**13.021**
Other BNs	<MSESC

Sample ID:	SED-19-B/6-6.5
Date:	03/21/14
Depth Interval:	6.0-6.5
ANT	**3.55**
B(a)A	**7.03**
B(a)P	**10.6**
B(b)F	**6.94**
B(g,h,i)P	**12.8**
B(k)F	**0.882**
B(2-EH)P	**7.01**
Chrysene	**11.7**
DB(a,h)a	**2.92**
Fluoranthene	**6.63**
I(1,2,3-cd)P	**2.89**
2-MNap	**14.5**
Naphthalene	**3.12**
PhA	**19.2**
Pyrene	**13.1**
Total PAHs	**126.462**
Other BNs	ND
Total EPH	**16,000**

Sample ID:	SED-19-C/7.5-8
Date:	03/21/14
Depth Interval:	7.5-8.0
ACP	**1.26**
ANT	**3.16**
B(a)A	**4.63**
B(a)P	**6.24**
B(b)F	**3.91**
B(g,h,i)P	**5.08**
B(k)F	**0.853**
B(2-EH)P	**23.5**
Chrysene	**6.96**
DB(a,h)a	**1.67**
Fluoranthene	**5.1**
Fluorene	**2.57**
I(1,2,3-cd)P	**1.79**
2-MNap	**14.9**
Naphthalene	**4.06**
PhA	**12.6**
Pyrene	**12**
Total PAHS	**86.783**
Other BNs	ND
Total EPH	**8,170**

Sample ID:	SED-16-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.027**
ACPL	**0.15**
ANT	**0.25**
B(a)A	**0.44**
B(a)P	**0.65**
B(g,h,i)P	**0.33**
B(k)F	**0.33**
B(2-EH)P	**21**
Chrysene	**0.7**
DB(a,h)a	**0.094**
Fluoranthene	**1**
Fluorene	**0.05**
I(1,2,3-cd)P	**0.36**
Pyrene	**1.3**
Total PAHs	**6.956**
Other BNs	<MSESC

Sample ID:	SED-13-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.077**
ACPL	**0.14**
ANT	**0.29**
B(a)A	**0.56**
B(a)P	**0.66**
B(g,h,i)P	**0.37**
B(k)F	**0.37**
B(2-EH)P	**4.5**
Chrysene	**0.68**
DB(a,h)a	**0.1**
Fluoranthene	**1.2**
Fluorene	**0.085**
I(1,2,3-cd)P	**0.38**
PhA	**0.3**
Pyrene	**1.3**
Total PAHs	**7.621**
Other BNs	<MSESC

Sample ID:	SED-14-C
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.46**
ACPL	**0.15**
ANT	**0.31**
B(a)A	**0.61**
B(a)P	**0.65**
B(g,h,i)P	**0.32**
B(k)F	**0.34**
B(2-EH)P	**3.7**
Chrysene	**0.62**
DB(a,h)a	**0.092**
Fluoranthene	**1.3**
Fluorene	**0.21**
I(1,2,3-cd)P	**0.35**
2-MNap	**0.085**
PhA	**0.28**
Pyrene	**1.6**
Total PAHs	**8.437**
Other BNs	<MSESC

Sample ID:	SED-18-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.065**
ACPL	**0.12**
ANT	**0.27**
B(a)A	**0.52**
B(a)P	**0.61**
B(g,h,i)P	**0.28**
B(2-EH)P	**4.7**
B(k)F	**0.33**
Chrysene	**0.67**
DB(a,h)a	**0.084**
Fluoranthene	**0.92**
Fluorene	**0.069**
I(1,2,3-cd)P	**0.3**
PhA	**0.34**
Pyrene	**1.2**
Total PAHs	**6.131**
Other BNs	<MSESC

Sample ID:	SED-15-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.04**
ACPL	**0.15**
ANT	**0.3**
B(a)A	**0.65**
B(a)P	**0.85**
B(g,h,i)P	**0.63**
B(k)F	**0.44**
B(2-EH)P	**3.9**
Chrysene	**0.94**
DB(a,h)a	**0.15**
Fluoranthene	**1.1**
Fluorene	**0.053**
I(1,2,3-cd)P	**0.54**
PhA	**0.36**
Pyrene	**1.4**
Total PAHs	**9.167**
Other BNs	<MSESC

Sample ID:	SED-17-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**3.9**
ACPL	**0.59**
ANT	**2.4**
B(a)A	**3.7**
B(a)P	**3.2**
B(b)F	3.7
B(g,h,i)P	**1.7**
B(k)F	**1.2**
Chrysene	**3.8**
DB(a,h)a	**0.47**
Fluoranthene	**6.4**
Fluorene	**1.2**
I(1,2,3-cd)P	**1.6**
2-MNap	**0.67**
Naphthalene	**0.8**
PhA	**2.2**
Pyrene	**7.3**
Total PAHs	**44.83**
Other BNs	<MSESC

Parameter (mg/kg)	ER-L	ER-M
ACP = Acenaphthene	0.016	0.5
ACPL = Acenaphthylene	0.044	0.64
ANT = Anthracene	0.085	1.1
B(a)A = Benzo(a)anthracene	0.261	1.6
B(a)P = Benzo(a)pyrene	0.43	1.6
B(b)F = Benzo(b)fluoranthene	–	1.8
B(g,h,i)P = Benzo(ghi)perylene	0.17	–
B(k)F = Benzo(k)fluoranthene	0.24	–
BHC (Benzohexachloride)	0.003	–
B(2-EH)P = bis(2-Ethylhexyl)phthalate	0.18216	2.64651
BBP = Butyl benzyl phthalate	–	0.063
2-CP = 2-Chlorophenol	–	0.008
Chrysene	0.384	2.8
DB(a,h)A = Dibenz(a,h)anthracene	0.063	0.26
2,4-DCP = 2,4-Dichlorophenol	–	0.005
DEP = Diethyl phthalate	–	0.006
DBP = Di-n-butyl phthalate	–	0.058
Fluoranthene	0.6	5.1
Fluorene	0.019	0.54
HCB = Hexachlorobenzene	0.02	–
HCBD = Hexachlorobutadiene	–	0.0013
HCE = Hexachloroethane	–	0.073
I(1,2,3-cd)P = Indeno(1,2,3-cd)pyrene	0.2	–
2-Mnap = 2-Methylnaphthalene	0.07	0.67
Naphthalene	0.16	2.1
PCP = Pentachlorophenol	–	0.017
PhA = Phenanthrene	0.24	1.5
Phenol	–	0.13
Pyrene	0.665	2.6
2,4,5-TCP = 2,4,5-Trichlorophenol	–	0.003
2,4,6-TCP = 2,4,6-Trichlorophenol	–	0.006
Total PAHs	4	45

Analytical results are reported in milligrams per killogram (mg/kg)
ER-L = NJDEP Eco Screening Criteria Effects Low Range (Saline)
ER-M =NJDEP Eco Screening Criteria Effects Medium Range (Saline)
Bold indicates concentrations above the ER-L
Orange highlight indicates concentrations above the ER-M
Orange highlight and Bold indicates concentrations above the ER-L and ER-M
<MSESC = Value is less than Most Stringent Ecological Screening Criteria
J = estimated value below sample reporting limit
ND = Not Detected
All samples were not analyzed for BHC (Benzohexachloride)

Petroleum Hydrocarbon Analytes (EPH/TPHC):
Yellow Highlight = Greater than 1,700 ppm but below 4,000 ppm (Lower Terrestrial Ecological Screening Criteria)
Yellow Highlight (Bold) = Greater than 4,000 ppm but below 17,000 ppm (Upper Terrestrial Ecological Screening Criteria)
Yellow Highlight (Bold/Red) = Greater than 17,000 ppm (Residual/free product threshold for petroleum hydrocarbon mixtures other than No. 2 fuel oil and diesel)
EPH Product Determination = NJDEP's residual/free product limit for Category-2 discharge
EPH Trigger Level = NJDEP's trigger for development of sample-specific human health-based criterion for Category-2 discharge

NO.	DESCRIPTION	BY	DATE
0	REVISIONS OF FIGURE BOXES PER SUPPLEMENTAL REVIEW (SED-01-C, SED-19-B, SED-19-C, SED-20-A, SED-20-C)	EO/PW	08/19/19

TRC ENVIRONMENTAL CORP.
41 Spring Street
New Providence, New Jersey 07974

SEDIMENT ANALYTICAL RESULTS
SVOCs AND EPH

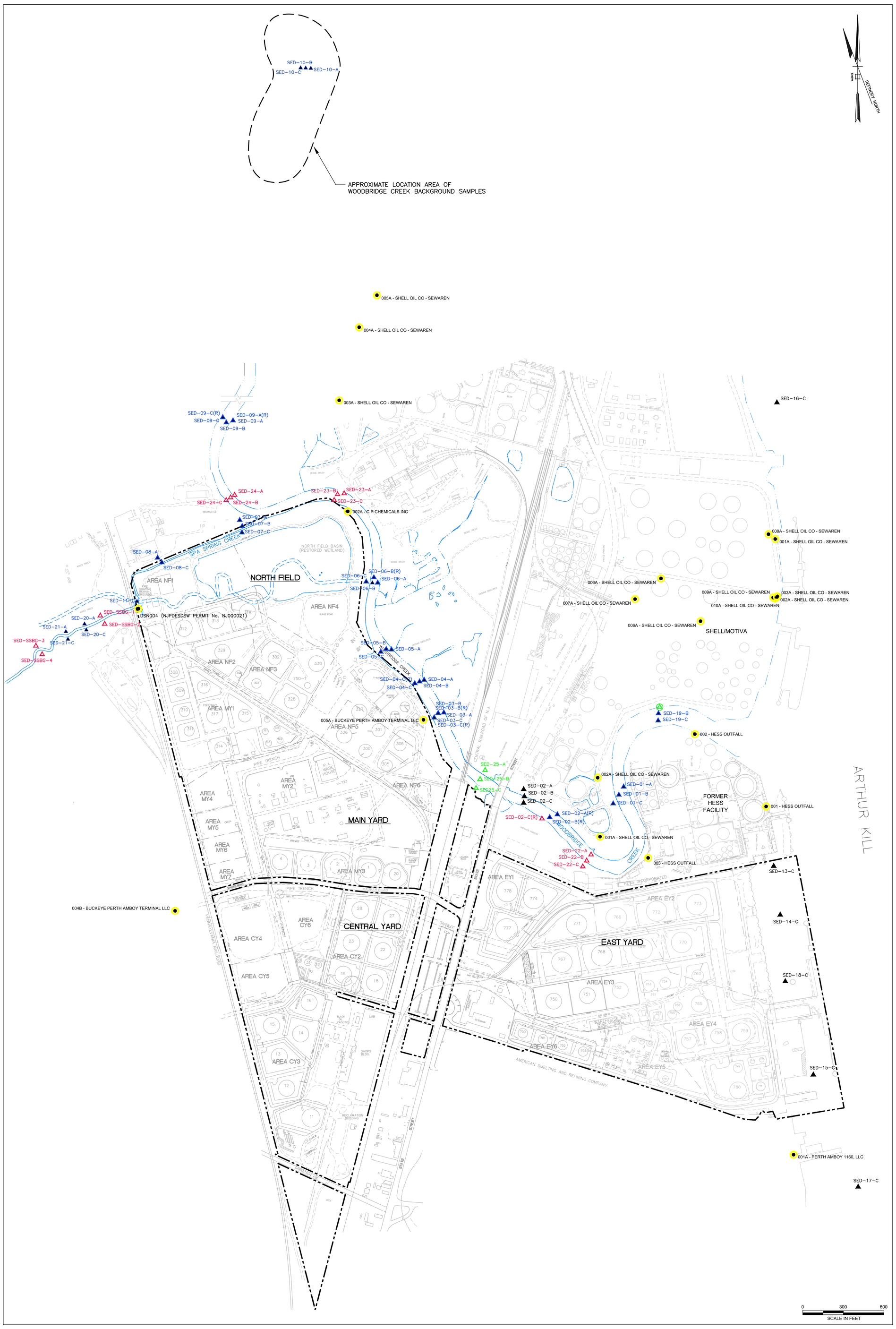
CHEVRON FACILITY - PERTH AMBOY, NJ

JOB NO. 890 - 194098

TR/ODL | DATE: OCTOBER 2014 | FIGURE: 4

FILE: M:\CAD FILES\VISION PROJECTS\194098\PHASE 000003\FIGURE 4 – SEDIMENT BNS AND EPH_081919_EO EDIT.DWG, DATE: 08/20/2019 11:21:27AM

FIGURES



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

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.
[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field.
[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler.

LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- SEDIMENT SAMPLE LOCATION (2002 AND 2014)
- PROPOSED SEDIMENT SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE LOCATION TO BE REVISITED
- PROPOSED SEDIMENT LOCATION LIMITED TO MANUAL SURFACE SAMPLING (0 - 0.5 FEET) DUE TO BURIED UTILITIES. LOCATION SUBJECT FOR APPROVAL FROM RESPECTIVE PIPELINE COMPANIES
- REQUESTED SEDIMENT LOCATION NOT ACCESSIBLE
- NJPDES DISCHARGE POINT

NOTES:

1. ALL SAMPLING LOCATIONS SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND ACCESSIBILITY.
2. ALL LOCATIONS ARE UNDERSTOOD TO BE WITHIN LIMITS OF WATERWAYS - MORE PRECISE LOCATION INFORMATION WILL BE DETAILED IN SUPPLEMENTAL REPORT.

NO.	BY	DATE	REVISION	APP'D
2	KAL	8/21/19	UPDATED BASED ON AUSGUST 7, 2019 USEPA MEETING	RL
1	MG	6/26/19	UPDATED BASED ON USEPA'S MARCH 1, 2019 COMMENTS TO NOVEMBER 2018 SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN, INCLUDING 5 ADDITIONAL SAMPLE POINTS	WC

PROJECT:
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:
PROPOSED SEDIMENT SAMPLE LOCATIONS

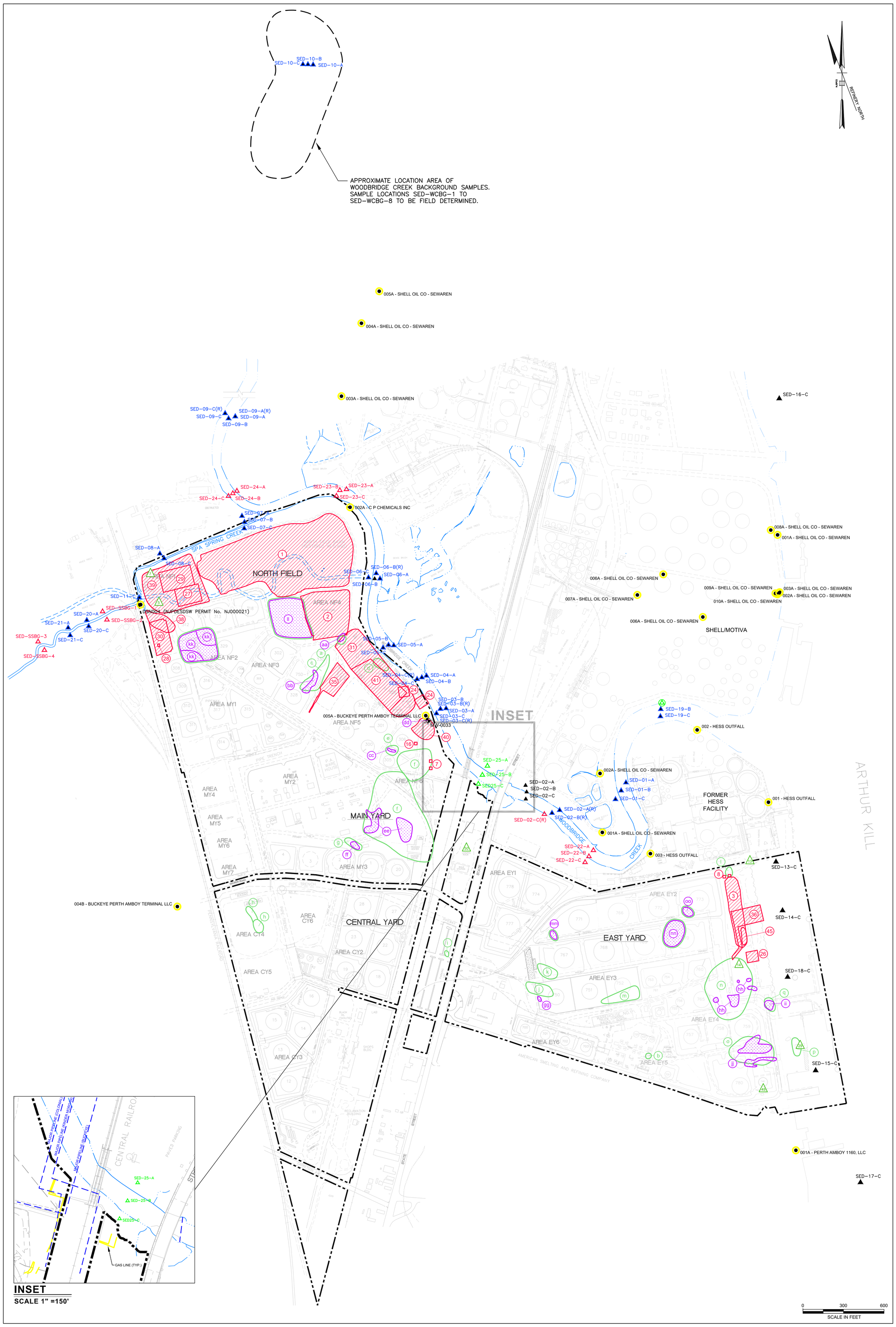
DRAWN BY:	M. GIAMBATTISTA	PROJ. NO.:	------
CHECKED BY:	K. LOCKARD		
APPROVED BY:	W. CORDASCO		
DATE:	JUNE 2019		

FIGURE 2

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

FILE NO.: FIGURE 2_082119.dwg

30x42 --- USER: PWanfried --- ATTACHED XREF'S: --- ATTACHED IMAGES: J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\RTC FSAP\ FIGURE 2A_082119.dwg --- PLOT DATE: August 21, 2019 - 5:44PM --- LAYOUT: FIGURE 2A



INSET
SCALE 1" =150'

LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- PIPELINE CROSSING LOCATIONS
- FORMER SEDIMENT SAMPLE LOCATION (2002 AND 2014)
- PROPOSED SEDIMENT SAMPLE LOCATION
- FORMER (2002 AND 2014) SEDIMENT SAMPLE LOCATION TO BE REVISITED
- PROPOSED SEDIMENT LOCATION LIMITED TO MANUAL SURFACE SAMPLING (0 - 0.5 FEET) DUE TO BURIED UTILITIES. LOCATION SUBJECT FOR APPROVAL FROM RESPECTIVE PIPELINE COMPANIES
- REQUESTED SEDIMENT LOCATION NOT ACCESSIBLE
- NJPDES SURFACE WATER DISCHARGE POINT
- CURRENT EXTENT OF LNAPL
- FORMER EXTENT OF LNAPL

NOTES:

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

SOLID WASTE MANAGEMENT UNITS (SWMUs)*

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

AREAS OF CONCERN (AOCs)*

- 5 PETROLEUM SUBSTANCE NEAR UGST E3
- 7 TARRY MATERIAL AT MW-13
- 13 B-11 OILY FILL AREA
- 14 GWQAP OIL FILL AREA III
- 25 5 BERTH COAL TAR
- 45 TANK BASIN 748
- 26 BULK STATION

FORMER LNAPL AREAS

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

CURRENT LNAPL AREAS

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

PROPOSED SEDIMENT SAMPLES

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

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.
[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field.
[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler.

NO.	BY	DATE	REVISION	APP'D
2	KAL	8/21/19	UPDATED BASED ON AUSGUST 7, 2019 USEPA MEETING	
1	MG	6/26/19	UPDATED BASED ON USEPA'S MARCH 1, 2019 COMMENTS TO NOVEMBER 2018 SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN, INCLUDING 5 ADDITIONAL SAMPLE POINTS	WC

PROJECT:
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:
PROPOSED SEDIMENT SAMPLE LOCATIONS AND SUPPLEMENTAL INFORMATION

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

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

FILE NO.: FIGURE 2A_082119.dwg

41 Spring Street, Suite 102
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T 908.988.1700
TRCcompanies.com

July 2, 2019

United States Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866

Attn: Mr. Ricardito Vargas, Project Manager

Subject: Response to USEPA's March 1, 2019 Comment Letter
Supplemental Field Sampling and Analysis Plan
Arthur Kill, Spa Spring Creek and Woodbridge Creek
Former Chevron Perth Amboy Facility
1200 Maurer Road, Perth Amboy – Middlesex County
Facility EPA ID #: NJD081982902
TRC Project No. 326731/890

Dear Mr. Vargas:

On behalf of Chevron Environmental Management Company (Chevron) TRC Companies, Inc. (TRC) has prepared the enclosed response to the United States Environmental Protection Agency's (USEPA) March 1, 2019 comments regarding the November 19, 2018 Supplemental Field Sampling and Analysis Plan (SFSAP) prepared for the above-referenced Chevron Facility (the Facility). The SFSAP proposed collection and analysis of sediment samples from Spa Spring Creek, Woodbridge Creek, and the Arthur Kill, all adjacent to the Facility. As described further, the attached, revised SFSAP addresses the USEPA's written comments, as well as those discussed and agreed upon during the September 17, 2018 meeting between Chevron, TRC, and representatives of the USEPA and the New Jersey Department of Environmental Protection (NJDEP). The USEPA's March 1, 2019 letter included 12 comments in response to the SFSAP, which was submitted by Chevron along with responses to the USEPA's August 13, 2018 letter concerning the three waterbodies to be sampled in accordance with the SFSAP. Several of the USEPA's comments described the need for additional information and/or provision of historical data, much of which was provided in earlier documents. Therefore, this letter and the attached, revised SFSAP are provided to the USEPA for their information to assist with their review and aid in an expedited approval. It should be noted that the SFSAP and antecedent documents and reports prepared and implemented over the course of the project have been reviewed by the USEPA and NJDEP and modified as needed. The objective of the SFSAP is to complete the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of water bodies as specified in the 2013 Hazardous and Solid Waste Amendment (HSWA) permit renewal and Permit Modifications I.

Contaminants of concern (COCs) exist in the soft sediments overlying the more competent glacial till in the waterways adjacent to the Facility. Based on the existing data and information, the contaminants in the soft sediments have been characterized in the waterbodies around the Facility (Spa Spring Creek, Woodbridge Creek, and Arthur Kill). Delineation is based in part on physical limits of waterbodies and the edge of the scarp forming the end of soft sediments in the channel of the Arthur Kill as determined through a bathymetric survey and bank-to-bank sampling along sediment transects. The sampling, laboratory analysis, and physical/bathymetric survey activities implemented to characterize and delineate the soft sediment was documented in prior reports that were reviewed by both the USEPA and NJDEP. The proposed sediment sampling is intended to address the limited data gaps identified during the September 17, 2018 meeting, and in the March 1, 2019 USEPA comments.

As discussed and agreed upon in prior correspondence and at the September 2018 meeting, and memorialized in the November 2018 response to comments letter to the USEPA; terrestrial areas within 200 feet of the waterways (i.e., the shoreline Solid Waste Management Units [SWMUs], Areas of Concern [AOC]), and areas of Light Non-Aqueous Phase Liquid (LNAPL) were evaluated with respect to potential effects on adjacent waterways by the Baseline Ecological Evaluation (BEE) included in the 2003 RFI Report, and in the November 2016 Supplemental Ecological Evaluation Report (SEER). Historic migration pathways were also evaluated in prior RFI Reports, quarterly progress reports, and the numerous monitoring reports.

Given the above and with respect to the USEPA's current requests, Chevron has provided relevant information to address each of the USEPA's 12 comments from the March 1, 2019 letter. The USEPA's comments are provided below in their entirety, followed by Chevron's responses. The Tables, Attachments, Figures and Appendices referred in this letter are appended to the attached, revised SFSAP unless noted otherwise. Chevron believes that the information provided in this letter and in the revised SFSAP provide the technical information and a historical context to address the USEPA's comments concerning the proposed sediment sampling and enable an expedited approval of the SFSAP. Once approved, Chevron will expeditiously implement the field work and provide a comprehensive report integrating the results of all prior surface water investigations in a complete and final RFI report.

<u>USEPA Comment 1</u>. Section 1.0 Introduction, Page 1, 3rd paragraph: The document states, "The facility has completed several phases of the RCRA Facilities Investigation (RFI) for the three surface water bodies ..." However, the historical data is not included in this document, as such it is unclear if the proposed sampling locations and intervals are sufficient. The document should be revised to include a more detailed discussion of sampling results (text, figure, table) from prior investigations so that we can evaluate if the proposed locations are adequate to sufficiently delineate the nature and extent of contamination in the waterbodies and along the adjacent shorelines.

Response 1: As indicated above, the proposed sediment samples and intervals are based on several rounds of sampling, analysis, report submissions, and review by the NJDEP/USEPA. Therefore, Chevron believes the basis for the proposed sampling is consistent with the objectives of the sampling program as determined and reviewed by the agencies.

Laboratory data associated with previous submissions was provided in prior documents submitted to USEPA and NJDEP. Revised Figure 2 of the SFSAP, and Figure 2a of the SFSAP are attached to show the location of all existing and proposed sediment samples. Figure 2a is a Facility plan showing the relevant SWMUs/AOCs/PAOCs, historical and current extents of LNAPL areas, existing Facility features, and historical and proposed sediment sample locations. Revised Table 1 of the SFSAP is included to describe the relationship between proposed sample locations and the SWMUs and other features of concern. Attachment 1 includes the November 2016 Supplemental Ecological Evaluation Report (SEER), which provides all data and information related to the investigation of the adjacent waterways completed in 2014 (e.g., SEER Figures 3, 4, and 5). Sediment sample locations are shown with respect to the SWMUs and AOCs at the Facility on the drawing titled Sediment Sample Location Plan - 2002 and 2014 Sampling Events with Siting Explanation (Figure 5). This drawing highlights the relationship between SWMUs/AOCs/PAOCs, discharge areas, and sediment sample locations, and includes explanatory notes regarding sample locations. Historical data tables comparing sediment and surface water sample analytical results to the NJDEP's Ecological Screening Criteria (ESCs) for sediments are provided in Section 4 of the SEER.

<u>USEPA Comment 2</u>. Section 1.0 Introduction, Page 3: The document states, "As part of the Supplemental EE, Chevron ...further evaluated potential contaminant migration pathways to surface water." However, limited information on this evaluation was included in this document as such we are unable to determine if the proposed sampling program is adequate. The document, as well as Figure 2, should be revised to discuss, at length, any AOCs/SWMUs/PAOCs with the potential to impact these waterbodies, including but not limited to: SWMUs 1, 2, 3, 7, 8, 24, 26, 31, 35, 36, 40, 41, 45, etc. This figure should also show the former confluence of historic Spa Spring Creek with Woodbridge Creek and areas where non-point source discharges over the Facility's operation history may have occurred via sheet runoff or groundwater discharges, and/or were associated with overwater fuel transfers, former dock/pier operations, etc. Additionally, this figure should indicate the location of shoreline/perimeter soil borings where light non-aqueous phase liquid (LNAPL) was detected, as referenced below in Comment No. 9. The above information is necessary to determine if the proposed sampling program is adequate.

<u>Response 2</u>: As noted in Response 1, Figure 2a of the attached SFSAP is provided to show the former AOCs/SWMUs/PAOCs noted by USEPA in Comment 2, above, and historical features such as docking and product inbounding areas. Information on the management and other activities

conducted in the AOCs/SWMUs/PAOCs was provided to the USEPA in the Description of Current Conditions Report prepared by Environmental Science and Engineering, Inc. August 24, 1994 (DOCC). The text of the DOCC through Section 3 is included as Attachment 2 and provides information on historic practices in these areas. The basis for the proposed sediment sample locations is provided on revised Table 1, and on Figure 3. Relevant portions of the DOCC are summarized in Section 1.1.3 of the attached revised SFSAP. The summary includes the location of know historic discharge location and wastewater management areas.

Sediment samples were collected in the 2002 and 2014 investigations of adjacent waterways to evaluate Contaminants of Potential Ecological Concern (COPECs) in sediments that may have been related to the historical operations at the Facility (waste storage, product transfer, etc.). Chevron believes that the historical and proposed sample quantity and locations are adequate with respect to characterizing sediment near these former operational areas. In addition, the frequency of historic and proposed sampling is sufficient to assess potential effects of non-point source discharges, e.g., runoff and groundwater flow to surface water bodies. For reference, the extent of LNAPL areas in terrestrial SWMUs/AOCs proximal to the shoreline is presented on Figure 2a. The LNAPL areas were previously defined, are currently undergoing remediation, and as stated in the 2003 BEE, "Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear to be complete." Tables comparing analytical data from creek sediments with data for terrestrial soils of the SWMUs/AOCs and respective ESCs indicate that there are no data gaps regarding analytical parameters (Section 4 of the SEER [Attachment 1]). Historical information on Facility conditions, LNAPL monitoring and attenuation, Sections 7 and 9 of the 2003 RFI (LNAPL and BEE sections), and historical aerial photographs (1978) are included in Appendix B; this information is being re-submitted to expedite USEPA's review.

<u>USEPA Comment 3</u>. Section 1.0 Introduction, Page 3: The document states, "Historically, the Facility has discharged treated storm water and waste waters to outfalls located in Spa Spring Creek and Woodbridge Creek." However, limited additional information on these historic outfalls is included in this document. The document should be revised to include text and accompanying figures detailing the location of known and historic tidal creeks, outfalls, and other current and former discharge (permitted and unpermitted) points into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill; including those referenced in Attachment 3 (DSN 0004A, 004B, 004C, 005, 005A, 006A, etc.). The document should be revised to discuss waste management practices prior to 1974 (date of initial Federal NPDES permit), prior to city sewer connections, and identify historic direct discharges of industrial waste into the three waterbodies. Chevron is directed to a historic document by the Interstate Sanitation Commission Report, entitled Location of City Sewers Adjacent to Industrial Plants Bordering the Arthur Kill in New Jersey, dated January 1965, which discusses the direct discharge of waste material into Woodbridge Creek and the Arthur Kill from the

former California Oil Company (electronic pages 13, 14, 62) and other facilities. The document is available at:

http://www.iec-nynjct.org/sites/default/files/2018-08/965%20Sewers%20Locations%20Arthur%20Kill%20NJ%20opt.pdf.

Response 3: Figure 2a is included to show the current/former NJPDES outfalls, historical waterway locations, and known points of discharges from the Facility. Information on waste management practices prior to the mid-1970s, while requested by the USEPA, is limited. However, Chevron previously provided the USEPA with a copy of the DOCC which was prepared in accordance with the 2013 RCRA HSWA permit issued by the USEPA. As noted above in Response 2, relevant sections of the DOCC describing SWMUs and AOCs are included as Attachment 2. Section 2 of the DOCC contains information on historic discharges, which are summarized below. Section 1 of the revised SFSAP provides a narrative historical summary of wastewater, stormwater, and process waste management practices, and a brief summary is presented below.

From 1950 to 1976 and before the construction of the Effluent Treatment Plant (ETP), East Yard stormwater and wastewater discharges were to the Arthur Kill via an oil/water separator (identified as SWMU 36). No information is available for pre-1950 wastewater discharge practices or conditions. Other discharges described in the DOCC for the Central Yard, West Yard, Main Yard, and North Field were routed to an Oily Water Sewer System (AOC 16) to several oil/water separators in the North Field, where oil was recovered, and suspended solids settled out prior to discharge. The North Field oil/water separators were used to recover oils and for the collection of settled solids later disposed in SWMU 43 (Mud Flats). These units included:

- Old Pond (SWMU 40) – operated 1940s-1970s
- No. 4 Separator (SWMU 35) – 1950-1977
- Surge Pond (SWMU 2) – 1950-1960; capped and closed 2016
- North Field Basin (SWMU 1) – 1960-2006 (area remedied and restored as a tidal wetland)
- No. 2 and No. 3 Separators – associated with the Surge Pond, included in the ETP (SWMU 31).

The locations of these features are shown on Figure 2a and Figure 3. Figure 3 is a copy of a drawing titled AOC, SWMU, and PAOC Location Map, prepared from a figure of the same name by Parsons that provides the locations and descriptions of AOCs and SWMUs at the Facility, and the extent of LNAPL (also provided with detailed information on LNAPL monitoring in Appendix B-4).

All stormwater and wastewater from 1976 to 1987 was directed to the ETP, with the exception of a small stormwater discharge area draining to Spa Spring Creek. The Old Pond Separator, No. 4 Separator, and Oil/Water Separator for the East Yard were taken out of service after the ETP became operational. The East Yard Basin (SWMU 3) was completed in 1976 and replaced the Oil Water Separator Near East Yard Basin, which include a pumping station to divert oily water to the ETP. The ETP included oil water separation and advance biological treatment and discharged to Woodbridge Creek. Stormwater overloads were held in the North Field Basin from 1960-1976.

Further changes occurred after 1987, including the cessation of stormwater discharges to the North Field Basin and East Yard Basin, as well as cessation of waste sludge placement in the Surge Pond. Stormwater was held in multiple tanks prior to treatment at the ETP.

Chevron believes the historical and proposed samples in the three waterways are sufficient to assess sediment conditions related to historic point and non-point source discharges from plant operations. As noted in the SFSAP and in prior correspondence with the EPA (November 2016 SEER, November 2018 RTC/SFSAP), the historical and recent industrial uses of and contaminant contribution to the Arthur Kill and Woodbridge Creek by multiple entities cannot be understated.

Appendix B-1 is a drawing prepared in January 1993 that identifies the stormwater collection system and connections to the former treatment plant for process and bulk storage tank areas, as well as permitted discharge locations (e.g., DSN004) for non -contact cooling water from the former power plant. The drawing shows that only small and largely undeveloped areas of the Facility contributed runoff to the adjacent waterways.

Chevron reviewed the historic document titled Interstate Sanitation Commission Report (ISCR) via the internet link provided by the USEPA. The ISCR does not provide any further information beyond that in the DOCC and already known and described herein. The ICSR notes that the formerly operational API separators discharged to Woodbridge Creek ("API Separators 1 and 2 and the settling basin lagoon", i.e., the No. 2 and 3 separators and surge pond, now closed) with the East Yard Tank Farm Separator discharging to the Arthur Kill. The ISCR notes that all sanitary wastes were discharged to the 12-inch diameter public sewer on State Street. Maps included in the ISCR do not provide any detail for the Facility. Chevron previously reviewed this ISCR report in 1994 as part of the DOCC Report and discussed its findings previously with the NJDEP and USEPA case team at that time.

<u>USEPA Comment 4</u>. Section 2.1 Sample Collection, Page 5, Table 1 and Figure 2: The document states, "In summary the proposed sample locations were selected to ...revisit previously sampled locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed." However, it is unclear if this goal will be achieved since the previous sample locations/intervals were not referenced in the document, in any form, for direct comparison. Further review of the document suggests

that few samples will be collected at depth (greater than 0.5 ft. samples) for any contaminant of concern (COC). The document should be revised to include a table comparing past sampling intervals/depths to those proposed herein, so that we can confirm that the sampling program is adequate to sufficiently delineate the impacts to the waterbodies.

Response 4: The Revised Table 1 provides a comparative summary and the location of proposed and historical samples, depths, and analytical parameters. Regarding the depth of proposed sampling, it should be noted that the biologically active zone, or benthic zone is defined by the NJDEP as 0-0.5 feet and would be of primary concern with respect to sediment impacts. It was also agreed at the September 17, 2018 meeting and in the subsequent November 2018 responses to the USEPA's August 2018 comment letter that further sampling (i.e., of "hotspots") is not necessary to meet the requirements of the 2013 HSWA permit, and that the existing and proposed samples adequately characterize and delineate contaminants in sediment. Further, petroleum constituent analysis (i.e., Volatile Organic Compounds [VOCs]; Base Neutral Compounds [BNs]) has been completed throughout the waterways to various depths in and below the benthic zone. The horizontal, downstream and bank-to-bank physical limit of contaminated sediments in Woodbridge Creek was determined by completing a bathymetric survey and bottom profile analysis. The bathymetric survey revealed a steep submarine escarpment at the Woodbridge Creek/Arthur Kill confluence (Figure 6 of Attachment 1), indicating the terminus of soft sediments at the contact with the Arthur Kill. Therefore, further sampling to define the vertical/horizontal extent of EPH or other contaminants beyond that proposed in the SFSAP is not warranted.

USEPA Comment 5. Section 2.1 Sample Collection, Additional Background Locations Woodbridge Creek, Page 5: In response to concerns that SED-09 was not an appropriate background location, Chevron noted that "eight (8) additional background samples along Woodbridge Creek, in the vicinity of existing background location SED-10 ..." would be collected. While, the 2002 sample results for SED-10 indicated low contamination, a review of Figure 2 suggests that the location is directly beneath a highway overpass which is a potential source of PAHs and inorganics. As referenced in NJDEP's EETG Section 5.3.4, professional judgement should be used regarding the specific locations of the additional background samples such that obvious sources of contamination unrelated to the Facility should be avoided. Chevron also noted in the Response to Comments (Page 5, Woodbridge Creek Comment No. 1) that "SED-09 transects represents potential off-Facility source conditions." Please note, before we will concur that contamination detected at SED-09 is not Facility related, Chevron must collect sufficient data to support impacts from off-Facility sources as referenced in NJDEP TRSR (N.J.A.C. 7:26E-3.10).

Response 5: The USEPA's suggestion that proposed background samples at SED-10 are inappropriate due to potential roadway runoff contributing PAHs and inorganics does not take into consideration the nature of the surrounding, highly urbanized drainage basin. Urban runoff from the surrounding region is not limited to roadways, and as observed on aerial imagery

(Appendix B-6) multiple industrial, commercial, and residential areas are located directly along or in proximity to the subject waterways upstream of the Facility, including the various urban and industrial land use types identified in the regions based on the NJDEP's GeoWEB database map included in the SFSAP (see Attachment 3-1). Therefore, the presence of COPECs in Woodbridge Creek from regional point and non-point sources represents the background condition of the creek.

The proposed samples at SED-10 are not adjacent to "obvious offsite sources of contamination", such as an industrial outfall or known contaminated area. Further, the SED-10 location was discussed during the September 17, 2018 meeting, and deemed by USEPA as "an area that can potentially be used as background "in their August 31, 2018 comment letter. Sufficient data is available suggesting that the COPECs detected in samples around SED-9 are not Facility-related. Specifically, as shown on Figures 9-7 in Attachment 1, the concentration of COPECs detected in downstream samples at SED-6 are an order of magnitude lower than those at SED-9 (i.e., total PAHS at SED-9-C are 69.85 mg/kg versus those at SED-6-B (0.71 mg/kg). Similarly, low concentrations in Spa Spring Creek indicate that Chevron operations were not a contaminant source in that waterway. This trend from higher to lower concentrations would be reversed were the COPECs at SED-9 related to a Facility discharge. The laboratory analyses for the SED-6, SED-7, and SED-10 samples are consistent with information recorded on their boring logs (Attachment 6) which note the absence of visual or olfactory indication of contamination versus what was described on SED-9 boring logs. Regardless, as noted in the SFSAP and in the November 2018 RTCs, Chevron will add two additional sediment transects between SED-9 and SED-6, each having three sample locations (identified on Figures 2 and 2a in the revised SFSAP as SED-23 A, B, and C; SED-24 A, B, and C). Each sediment sample will be analyzed for the full suite of parameters listed on revised Table 1; a list of proposed sediment samples is also provided on each of these figures.

<u>USEPA Comment 6</u>. Section 2.1 Sample Collection, Data Gaps Woodbridge Creek New Locations, Page 5: The document states, "Chevron will attempt to collect shallow sediment samples between existing transects SED-03 and SED-02. This additional transect is SED-25-A, B, C. The feasibility of completing this transect depends on access approval of the utility owners." Since Figure 2 does not reference the location of the pipelines/utilities, it is difficult to evaluate the issues with this location. Figure 2 should be revised to include the location of the pipeline/utilities and any other obstacles to sampling.

<u>Response 6</u>: Figures 2 and 2a show the location of pipelines/utilities that may obstruct sampling at SED-25. As noted, shallower samples may be collected in these areas using a Ponar dredge or similar low-impact sampler.

<u>USEPA Comment 7</u>. Section 2.1 Sample Collection, Data Gap Samples EPH Analysis at Existing Boring Locations, Page 6: The document states, "Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not

analyzed previously." However, a review of the document suggests the proposed additional EPH analysis is generally limited to the shallow 0 to 0.5 ft. interval where analysis was conducted for other COCs. Further review of the available data suggests that collection of subsurface (at-depth) samples were previously limited in scope, such that the majority of samples were not analyzed for extractable petroleum hydrocarbons (EPH) or other COCs below 0 to 0.5 ft. interval including, but not limited to: SED-01 A/B/C; SED-2C, SED-3A, SED- 4B; SED-05A/B/C, SED-06A/C, SED-07A/B/C; SED-08A/C; SED-09B; SED-l OA/B, SED-1 l C, etc. The document should be revised to include additional at-depth (below 0.5 ft.) sample collection/analysis for EPH at all historic and proposed sample locations/transects. In addition, please specify if/when the samples hit bedrock and the corresponding depth.

Response 7: Please refer to Response 4. It was agreed at the September 17, 2018 meeting and in the November 2018 RTC that "Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously." The proposed additional sample depths are provided in revised Table 1. No other additional sampling is proposed. The USEPA's request for information on depth to bedrock appears to be a misunderstanding, since bedrock was not encountered during sampling, whereas refusal was encountered. The vertical limit of soft sediment in Woodbridge Creek coincides with the top of the underlying glacial till, which is sufficiently competent and refused the Vibracore drilling stem. As reported in Section 2 of the SEER (Attachment 1), bedrock was encountered in terrestrial borings from 65-85 feet below grade, well below the bed of Woodbridge Creek.

USEPA Comment 8. Section 2.1 Sample Collection, Additional Vertical Samples at Existing Boring Locations, Page 6: Though titled "Additional Vertical Samples" this section only discusses the collection of shallow samples at transect SED-19. As noted above regarding EPH, the document should be revised to include the collection of shallow and at-depth (greater than 0.5 ft. interval) samples for the full suite of parameters at all existing and proposed transects/locations where data does not previously exist.

*Response 8: The commenter misinterprets the quoted text. Section 2.1 of the SFSAP states that "…**only deeper samples were taken** at boring locations SED-19-B and SED-19-C (Emphasis added). Shallow samples to fill this gap will be taken at SED-19-B and SED-19-C." Figure 4 from the SEER (Attachment 1) provides the EPH data from SED-19 B and SED-19-C at 6-6.5 feet (16,000 mg/kg) and 7.5-8 feet (8,170 mg/kg) below the sediment surface. The shallow (0-0.5 feet) interval is the data gap to be filled by the proposed samples, as noted on revised Figure 2, and on Figure 2a and Table 1.*

USEPA Comment 9. Section 2.1.1 Sediment Sampling, Page 6: The document states, "...sediment cores will be advanced ...to refusal, or a total depth of 10 feet below the sediment surface or to the top of underlying parent material, whichever is encountered first." The document later states, "All locations will be advanced to interface of the sediment and parent

material or refusal." The document should be revised to be consistent. However, based on boring logs for several adjacent SWMU's, we are not certain that limiting boring depth to 10 feet is adequate for all locations. A quick review of boring logs associated with SWMU 40 suggests the presence of free/residual LNAPL to a depth of 26 ft. bgs in borings (i.e. S40-7/U040-007, MW-33, U040-001, HP-0001-D, S40-7/U040-007, S40-8/U040-008, etc.) along the shoreline of Woodbridge Creek. Since information, such as this, is scattered across numerous documents, we were unable to do a more thorough evaluation of all the waterbodies. The document should be revised include a figure and thorough discussion of all existing soil borings along the shorelines specifically at AOCs/SWMUs where LNAPL has been detected so that we can confirm if the proposed locations adequately evaluates impacts to the waterbodies via seepage or direct discharge. Furthermore, unless Chevron has data to indicate no contaminant migration pathway from these SWMUs where LNAPL was detected to the adjacent waterbodies, we reiterate the need for contingency borings to determine the full extent of petroleum product impacting the waterbodies and the subsurface.

Response 9: The text regarding the depth of termination for proposed borings has been revised for consistency, and where possible, sediment coring will proceed to greater depths, up to 20 feet.. Chevron disagrees with the comment regarding uncertainty of the proposed 10-foot boring limit and the concern over LNAPL found at greater depths in SWMU 40. As noted above, the 2003 BEE indicated that there are no current migration pathways (including evaluation of LNAPL areas) between SWMUs along the shoreline and the adjacent waterways. In addition, LNAPL monitoring reports indicate limited and declining LNAPL extents (Appendices B-2, B-4, B-5). LNAPL monitoring is accomplished at the Facility by gauging liquid product thicknesses (or its absence) in groundwater monitoring wells, and does not rely on historical soil boring logs, including the cited ones that are from 1995-1997 (Attachment 4). While LNAPL was noted in several borings, it was generally limited to the interval above the water table, generally within 8-12 feet, and above an organic layer comprised of peat and organic silt/clay. Fill was encountered in the entire profile at Boring U040-007, completed to 26 feet. It contained approximately 20 feet of petroleum catalyst beads, with LNAPL from 12-26 feet. Given the presence of the catalyst beads in the fill documented in the log for U040-007, the presence of LNAPL is not surprising. However, LNAPL appears less prevalent in flanking borings U040-001 and U040-008, and in the log for MW-33 (0033), suggesting that the LNAPL extent is limited (Attachment 6). The SEER concluded that "there is no indication of ongoing discharges of hazardous substances from the site based on the soil and groundwater sample analysis, and light, non—aqueous phase liquid (LNAPL) investigation."

Section 7 of the 2003 RFI (Appendix B-2) provides a comprehensive description of LNAPL areas at that time, and similarly concluded that the LNAPL was generally immobile. Subsequent monitoring reports provided annually to the USEPA have indicated no impacts to the adjacent waterways and noted the on-going reduction/elimination of LNAPL overall. The LNAPL detected in the SWMUs has been demonstrated to be virtually immobile and therefore does not represent a source of the contaminants detected in creek sediments. The existing and proposed sediment

sample locations are positioned in a manner where potential LNAPL or related contaminants would be detected.

USEPA Comment 10. Section 3.0 Deliverables, Page 8: The document states, "The report will incorporate the results of soil and groundwater data from adjacent SWMUs and AOCs." As noted above, this information (figure/boring logs, etc.) should be included in the revised SFSAP, for any adjacent AOCs/SWMUs where LNAPL or where highly elevated COCs are present in the soil or groundwater, so that we can confirm if the proposed locations adequately evaluate impacts to the waterbodies. The revised SFSAP should also include historic discharge monitoring data (as referenced in Attachment 3) and any other information concerning past waste management practices, that will be necessary to evaluate the proposed sampling program.

Response 10: Inclusion of analytical results from the 2002 and 2014 investigation of adjacent SWMUs and AOCs into the Supplemental RFI Report (SRFI) is proposed for a comprehensive review of the soil and groundwater conditions along the adjacent waterways. For informational purposes, data from the 2014 sampling event is included in Tables I-IX of the SEER (Attachment 1) and the 2002 sediment data associated with the BEE is included in Appendix B-3. This data was previously provided, and its incorporation is not intended to evaluate the representativeness of the proposed sample locations, or to identify analytical data gaps, as soil, groundwater, and sediment have been analyzed for the same broad suite of parameters (i.e., VOCs, BNs, metals, TOC, grain size, as applicable based on the sample matrix). Please refer to Response 3 and referenced attachments, appendices, and figures regarding the inclusion of historic discharge monitoring data and waste practices.

USEPA Comment 11. Table 1 Proposed Sediment Sampling: Table 1 should be revised to include why each, sample location and interval is proposed, referencing the specific contaminant migration pathway (i.e., specific AOC, SWMU, outfall, former tidal creek, etc.) that is being evaluated. As noted above the document should also include a summary of historic sample locations, in table form, to confirm that what is proposed is sufficient.

Response 11: Table 1 has been revised and is included in the Revised SFSAP. The sample locations are listed on the table and correlated with information concerning historic/current discharge outfalls, SWMUs, and AOCs on the adjacent shorelines. However, it cannot be overstated that the objective of the proposed investigation is to comply with the HSWA permit provisions, and not completion of an exhaustive study linking sediment the broadly-contaminated sediments with specific historical Facility operational areas.

USEPA Comment 12. Attachment 5 Dredging Documents: Chevron had suggested that due to historic dredging of Arthur Kill no additional sampling was necessary as noted in supporting documentation included in Attachment 5. However, review of Figure 5-1 suggests that dredging of the Arthur Kill was limited to two areas (A and B) adjacent to SWMUs 36 and 45 only.

Furthermore, Attachment 5 did not include any analytical data or information regarding contaminant concentrations in the dredged material and only included dredging permit authorization for Area B. Attachment 5 should be revised to include additional information on dredging activities and pre-dredging contaminant concentrations for both Areas A and B. Furthermore, based on the limited information provided, it is unclear if any impacts to Arthur Kill from adjacent SWMU 36 and 45 were noted during dredging activities. The document should clarify if any impacts from these SWMUs were noted during dredging operations. The document should also clarify/discuss if there are other adjacent AOCs, with the potential to impact the Arthur Kill, including but not limited to: PAOC 15, AOC 29 and EY 4a LNAPL areas, AOC 29, and wells MW-155R, etc. The document should be revised to conduct additional sampling in Arthur Kill to confirm no impacts at depth from adjacent AOCs/PAOCs/SWMUs.

Response: Information regarding areas of the Arthur Kill waterfront (Areas A and B) that were dredged in in November 2003 was provided as requested by the USEPA during the September 17, 2018 meeting. Please note that the dredging was conducted to maintain the tanker berths and not for sediment remediation purposes, therefore, information on adjacent AOCs and sediment sampling and analysis to determine pre-dredging conditions was not required for dredging permit authorization. No impacts from the adjacent AOCs/PAOCs/SWMUs are known to have occurred during dredging and filling operations. Subsequent sampling at SED-13C, -14C, -15C, and -18C provides sufficient data to characterize sediment conditions in the in this area. Further, the benthic zone (0-0.5 feet) was removed from the berthing areas as a result of the most recent maintenance dredging, and likely prior dredging, which prevents establishment of a normal benthic community regardless of potential Facility-related discharges. Further sediment evaluation in the berthing areas is therefore not warranted.

We trust that this letter and attachments address the USEPA's questions and concerns raised in the March 1, 2019 comment letter. Please note that an expeditious review is needed in order to complete the RFI for surface waters and meet the RCRA 2020 goal. While we believe that this letter and the associated SFSAP meets the USEPA's requirements, Chevron requests the opportunity to discuss the SFSAP with appropriate representatives of the USEPA, the NJDEP, and TRC at a meeting to be scheduled at the earliest possible convenience. The purpose of the meeting is to present the SFSAP, discuss any of the concerns on the part of the agencies, and to expedite final approval and implementation without further submissions. Please contact the undersigned if you have any questions and to discuss the timing and location for the proposed meeting.

Sincerely,

William S. Cordasco, Sr. Scientist

Kenneth Siet, Vice President

Cc: Lynn Vogel, NJDEP
Robert Mancini, Chevron
Todd Frantz, Parsons

Ltr RTC EPA 2July2019F

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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290 BROADWAY
NEW YORK, NY 10007-1866

MAR 1 - 2019

Robert Mancini
Project Manager, Refining Business Unit
Chevron Environmental Management Company
1200 State Street
Perth Amboy, New Jersey 08861

Re: 1. Supplemental Field Sampling and Analysis Plan, Sediments, November 16, 2018
Former Chevron Perth Amboy Facility
Perth Amboy, Middlesex County, New Jersey
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have completed our review of the Supplemental Field Sampling and Analysis Plan (SFSAP), Sediments, dated November 16, 2018 which was submitted for the Former Chevron Perth Amboy Facility in Perth Amboy, Middlesex County, NJ. The November 2018 RTC and the associated SFSAP were submitted by Chevron (Chevron) Environmental Management Company pursuant to the Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments (HSWA) Permit of 2013, and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E (TRSR).

We have also reviewed the Response to August 31, 2018 EPA/NJDEP Letter, dated November 15, 2018. Comments for this section, including addressing the DITSED-08 area, will be submitted under a separate cover. As agreed upon at the September 17, 2018 meeting, this Supplemental Field Sampling and Analysis Plan serves to fulfill the HSWA 2013 permit requirement to complete a RCRA Facility Investigation (RFI) of the adjacent waterbodies. Any additional investigations and remedial action will be negotiated after the completion of the RFI. Please note, the below comments are organized by the SFSAP Section and Page.

1. **Section 1.0 Introduction, Page 1, 3rd paragraph**: The document states, "The facility has completed several phases of the RFI for the three surface water bodies…" However, the historical data is not included in this document, as such it is unclear if the proposed sampling locations and intervals are sufficient. The document should be revised to include a more detailed discussion of sampling results (text, figure, table) from prior investigations so that we can evaluate if the proposed locations are adequate to sufficiently delineate the nature and extent of contamination in the waterbodies and along the adjacent shorelines.

2. **Section 1.0 Introduction, Page 3: The document states**, "As part of the Supplemental EE, Chevron…further evaluated potential contaminant migration pathways to surface water." However, limited information on this evaluation was included in this document as such we are unable to determine if the proposed sampling program is adequate. The document, as well as Figure 2, should be revised to discuss, at length, any AOCs/SWMUs/PAOCs with the potential to impact these waterbodies, including

but not limited to: SWMUs 1, 2, 3, 7, 8, 24, 26, 31, 35, 36, 40, 41, 45, etc. This figure should also show the former confluence of historic Spa Spring Creek with Woodbridge Creek and areas where non-point source discharges over the site's operation history may have occurred via sheet runoff or groundwater discharges, and/or were associated with overwater fuel transfers, former dock/pier operations, etc. Additionally, this figure should indicate the location of shoreline/perimeter soil borings where light non-aqueous phase liquid (LNAPL) was detected, as referenced below in Comment No. 9. The above information is necessary to determine if the proposed sampling program is adequate.

3. **Section 1.0 Introduction, Page 3: The document states**, "Historically, the Facility has discharged treated storm water and waste waters to outfalls located in Spa Spring Creek and Woodbridge Creek." However, limited additional information on these historic outfalls is included in this document. The document should be revised to include text and accompanying figures detailing the location of known and historic tidal creeks, outfalls, and other current and former discharge (permitted and unpermitted) points into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill; including those referenced in Attachment 3 (DSN 0004A, 004B, 004C, 005, 005A, 006A, etc.). The document should be revised to discuss waste management practices prior to 1974 (date of initial Federal NPDES permit), prior to city sewer connections, and identify historic direct discharges of industrial waste into the three waterbodies. Chevron is directed to a historic document by the Interstate Sanitation Commission Report, entitled Location of City Sewers Adjacent to Industrial Plants Bordering the Arthur Kill in New Jersey, dated January 1965, which discusses the direct discharge of waste material into Woodbridge Creek and the Arthur Kill from the former California Oil Company (electronic pages 13, 14, 62) and other facilities. The document is available at: http://www.iec-nynjct.org/sites/default/files/2018-08/1965%20Sewers%20Locations%20Arthur%20Kill%20NJ%20opt.pdf.

4. **Section 2.1 Sample Collection, Page 5, Table 1 and Figure 2**: The document states, "In summary the proposed sample locations were selected to…revisit previously sample locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed." However, it is unclear if this goal will be achieved since the previous sample locations/intervals were not referenced in the document, in any form, for direct comparison. Further review of the document suggests that few samples will be collected at depth (greater than 0.5 ft. samples) for any contaminant of concern (COC). The document should be revised to include a table comparing past sampling intervals/depths to those proposed herein, so that we can confirm that the sampling program is adequate to sufficiently delineate the impacts to the waterbodies.

5. **Section 2.1 Sample Collection, Additional Background Locations Woodbridge Creek, Page 5:** In response to concerns that SED-09 was not an appropriate background location, Chevron noted that "eight (8) additional background samples along Woodbridge Creek, in the vicinity of existing background location SED-10…" would be collected. While, the 2002 sample results for SED-10 indicated low contamination, a review of Figure 2 suggests that the location is directly beneath a highway overpass which is a potential source of PAHs and inorganics. As referenced in NJDEP's EETG Section 5.3.4, professional judgement should be used regarding the specific locations of the additional background samples such that obvious offsite sources of contamination should be avoided. Chevron also noted in the Response to Comments (Page 5, Woodbridge Creek Comment No. 1) that "SED-09 transects represents potential off-site source conditions." Please note, before we will concur that contamination detected at SED-09 is not site related, Chevron must collect sufficient data to support impacts from off-site sources as referenced in NJDEP TRSR (N.J.A.C. 7:26E-3.10).

6. Section 2.1 Sample Collection, Data Gaps Woodbridge Creek New Locations, Page 5: The document states, "Chevron will attempt to collect shallow sediment samples between existing transects SED-03 and SED-02…This additional transect is SED-25-A,B,C…The feasibility of completing this transect depends on access approval of the utility owners." Since Figure 2 does not reference the location of the pipelines/utilities, it is difficult to evaluate the issues with this location. Figure 2 should be revised to include the location of the pipeline/utilities and any other obstacles to sampling.

7. Section 2.1 Sample Collection, Data Gap Samples EPH Analysis at Existing Boring Locations, Page 6: The document states, "Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not analyzed previously." However, a review of the document suggests the proposed additional EPH analysis is generally limited to the shallow 0 to 0.5 ft. interval where analysis was conducted for other COCs. Further review of the available data suggests that collection of subsurface (at-depth) samples were previously limited in scope, such that the majority of samples were not analyzed for extractable petroleum hydrocarbons (EPH) or other COCs below 0 to 0.5 ft. interval including, but not limited to: SED-01 A/B/C; SED-2C, SED-3A, SED- 4B; SED-05A/B/C, SED-06A/C, SED-07A/B/C; SED-08A/C; SED-09B; SED-10A/B, SED-11C, etc. The document should be revised to included additional at-depth (below 0.5 ft.) sample collection/analysis for EPH at all historic and proposed sample locations/transects. In addition, please specify if/when the samples hit bedrock and the corresponding depth.

8. Section 2.1 Sample Collection, Additional Vertical Samples at Existing Boring Locations, Page 6: Though titled "Additional Vertical Samples" this section only discusses the collection of shallow samples at transect SED-19. As noted above regarding EPH, the document should be revised to include the collection of shallow and at-depth (greater than 0.5 ft. interval) samples for the full suite of parameters at all existing and proposed transects/locations where data does not previously exist.

9. Section 2.1.1 Sediment Sampling, Page 6: The document states, "…sediment cores will be advanced…to refusal, or a total depth of 10 feet below the sediment surface or to the top of underlying parent material…whichever is encountered first." The document later states, "All locations will be advanced to interface of the sediment and parent material or refusal." The document should be revised to be consistent. However, based on boring logs for several adjacent SWMU's, we are not certain that limiting boring depth to 10 feet is adequate for all locations. A quick review of boring logs associated with SWMU 40 suggests the presence of free/residual LNAPL to a depth of 26 ft. bgs in borings (i.e. S40-7/U040-007, MW-33, U040-001, HP-0001-D, S40-7/U040-007, S40-8/U040-008, etc.) along the shoreline of Woodbridge Creek. Since information, such as this, is scattered across numerous documents, we were unable to do a more thorough evaluation of all the waterbodies. The document should be revised include a figure and thorough discussion of all existing soil borings along the shorelines specifically at AOCs/SWMUs where LNAPL has been detected so that we can confirm if the proposed locations adequately evaluates impacts to the waterbodies via seepage or direct discharge. Furthermore, unless Chevron has data to indicate no contaminant migration pathway from these SWMUs where LNAPL was detected to the adjacent waterbodies, we reiterate the need for contingency borings to determine the full extent of petroleum product impacting the waterbodies and the subsurface.

10. Section 3.0 Deliverables, Page 8: The document states, "The report will incorporate the results of soil and groundwater data from adjacent SWMUs and AOCs." As noted above, this information (figure/boring logs, etc.) should be included in the revised SFSAP, for any adjacent AOCs/SWMUs where LNAPL or where highly elevated COCs are present in the soil or groundwater, so that we can confirm if the proposed locations adequately evaluate impacts to the waterbodies. The revised SFSAP should also include historic discharge monitoring data (as referenced in Attachment 3) and any other

information concerning past waste management practices, that will be necessary to evaluate the proposed sampling program.

11. Table 1 Proposed Sediment Sampling: Table 1 should be revised to include why each, sample location and interval is proposed, referencing the specific contaminant migration pathway (i.e., specific AOC, SWMU, outfall, former tidal creek, etc.) that is being evaluated. As noted above the document should also include a summary of historic sample locations, in table form, to confirm that what is proposed is sufficient.

12. Attachment 5 Dredging Documents: Chevron had suggested that due to historic dredging of Arthur Kill no additional sampling was necessary as noted in supporting documentation included in Attachment 5. However, review of Figure 5-1 suggests that dredging of the Arthur Kill was limited to two areas (A and B) adjacent to SWMUs 36 and 45 only. Furthermore, Attachment 5 did not include any analytical data or information regarding contaminant concentrations in the dredged material and only included dredging permit authorization for Area B. Attachment 5 should be revised to include additional information on dredging activities and pre-dredging contaminant concentrations for both Areas A and B. Furthermore, based on the limited information provided, it is unclear if any impacts to Arthur Kill from adjacent SWMU 36 and 45 were noted during dredging activities. The document should clarify if any impacts from these SWMUs were noted during dredging operations. The document should also clarify/discuss if there are other adjacent AOCs, with the potential to impact the Arthur Kill, including but not limited to: PAOC 15, AOC 29 and EY 4a LNAPL areas, AOC 29, and wells MW-155R, etc. The document should be revised to conduct additional sampling in Arthur Kill to confirm no impacts at depth from adjacent AOCs/PAOCs/SWMUs.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at vargas.ricardito@epa.gov.

Sincerely,

Ricardito Vargas

Ricardito Vargas
Project Manager
Hazardous Waste Programs Branch

cc: Lynn Vogel, NJDEP (electronic copy only)

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November 15, 2018

Ricardito Vargas
United States Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866

Subject: Response to August 31, 2018 EPA/NJDEP Letter Regarding Former Chevron Perth Amboy Facility Water Body Sediment Sampling
Facility EPA ID#: NJD081982902

Dear Mr. Vargas:

Thank you and the State representatives for meeting with Chevron and our consultants to resolve the remaining HSWA Permit issues relating to the three surface water bodies adjacent to the former Chevron Perth Amboy Facility (Arthur Kill, Spa Spring Creek and Woodbridge Creek). We believe the meeting and site tour were useful in identifying and resolving outstanding issues and provided a roadmap for for inalizing the investigation in accordance with the HSWA Permit conditions. Chevron's investigations conducted to date have provided a significant understanding of sediment quality in the areas of the waterways proximate to the Facility. The Facility's 2013 Hazardous and Solid Waste Amendments Permit Renewal and Permit Modification I requires that the RCRA Facility Investigation (RFI) be completed for the three water bodies (HSWA Permit Module III, Page 25 and 26). During our September 17, 2018 meeting we agreed upon an approach to fill in existing data gaps through the completion of a supplemental sediment sampling effort; the proposed field sampling workplan for this effort is provided as an attachment to this letter (Attachment 1), the Supplemental Field Sampling and Analysis Plan (SFSAP)) and discussed in more detail below. Chevron is committed to performing the final investigatory tasks identified in this letter and the SFSAP to complete the HSWA Permit investigation for the water bodies as soon as possible.

As requested, Chevron is also providing the following response to the August 31, 2018 letter from the Environmental Protection Agency (EPA) (Attachment 2), which contained recommendations and comments from the New Jersey Department of Environmental Protection (NJDEP) concerning the three surface water bodies. The response to this letter and the SFSAP incorporate the comments, agreements and information discussed in the September 17, 2018 meeting between Chevron, EPA and NJDEP, and supersedes the NJDEP's March 24, 2017 letter.

The EPA August 31, 2018 comment letter is separated into two parts. The first part of the letter contains the EPA cover letter and the second part of the letter contains NJDEP recommendations and comments as an attachment. The NJDEP recommendations/comments are separated into General Comments and Specific Comments. The Specific Comments address each of the water bodies; Woodbridge Creek, Spa Spring Creek and the Arthur Kill. The following is the full text of the August 31, 2018 EPA Cover Letter and NJDEP comments, presented in sections that are followed by Chevron's response to comments (RTC).

EPA Cover Letter

Cover Letter Paragraph 1 - The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1 (a)14; 2.1 (d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's Ecological Evaluation Technical Guidance (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

Chevron Response to Cover Letter Paragraph 1 – Chevron will complete the RCRA Facility Investigation (RFI) for the water bodies as specified in the 2013 Hazardous and Solid Waste Amendments (HSWA) permit renewal and Permit Modifications I (Module III, Page 25 and 26). Once agreed upon, this response to comment letter and the attached sediment sampling workplan and support documentation will fulfill the requirement of the 2013 (HSWA) Permit. Please note that the reference to N.J.A.C. 7:26E-5.1(e) appears to be incorrect as it is not part of the investigative regulatory requirements.

Cover Letter Paragraph 2 - Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

Chevron Response to Paragraph 2 – A Sediment SFSAP is included with this letter as Attachment 1. The Sediment SFSAP incorporates the comments and information discussed, and the agreements reached, in the September 17, 2018 meeting. The objective of the SFSAP is for this to be the last round of sampling and analysis to fulfill the requirements of the 2013 HSWA Permit. As previously

discussed in prior RFI reports and at the September 17, 2018 meeting, these water bodies are located in a historically industrialized/urban area with many other adjacent industrial facilities present in the vicinity in addition to Chevron.

NJDEP General Comments

General Comment 1 - Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.

Chevron Response to General Comment 1 – During the September 17, 2018 meeting, Chevron noted that known current and historic site conditions including the location of former facility waste water/stormwater outfalls, and the location of proximate waste management units were used as basis for identifying sediment sample locations in Chevron's prior two sediment sampling investigations of the waterbodies. Chevron identified and provided known information on these current and former outfalls and waste management units in the Description of Current Conditions (DOCC), which was originally submitted to the EPA/NJDEP in 1994 pursuant to the original HSWA Permit. The DOCC further identified Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the Facility and their known or suspected discharge mechanisms to the water bodies. The information obtained from the DOCC, a review of historic aerial photographs and subsequent information obtained from completion of the RCRA Facility Investigation for these SWMUS and AOCs formed the basis of selecting sediment samples.

Available information on the history of the New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permits (NJPDES-DSW) permits for the former Chevron Perth Amboy Refinery is summarized in the DOCC (pages 2-31 through 2-34; and is included as Attachment 3). The former Chevron Perth Amboy Refinery held NJPDES-DSW permit No. NJ000021 which permitted the discharge of treated waste waters and storm water to Woodbridge Creek through the Effluent Treatment Plant (DSN 005) and Spa Spring Creek (DSN 004). As provided in the DOCC, the initial NJPDES-DSW permit appears to have been issued in 1974 (then a federal NPDES permit).

Sediment samples from transect SED-05 on Woodbridge Creek was specifically placed at the ETPs outfall DNS 005. Sediment transect SED-04 is downstream of this outfall and is still adjacent to the ETP. Sediment transect SED-03 was placed further downstream of SED-04 to monitor potential discharges from SWMU 40 (the Old Pond), which likely served as an oil/water separator

prior to the construction of the current ETP.

Similarly, other sediment transects sampled during the 2002 and 2014 were purposely located adjacent to former and current waste water treatment/discharge areas as identified in the DOCC and subsequent documents. Sediment sample SED-11 was placed at DSN 004 in Spa Spring Creek to evaluate sediment quality at that location. As discussed in the September 17, 2018 meeting, the investigations of Woodbridge Creek, Spa Spring Creek, and the Arthur Kill included identification of known and potential contaminant sources from the site including all known direct and/or indirect discharges. The results and discussion from this data can be found in both Section 9 of the 2003 RFI report and the November 2016 Supplemental Baseline Ecological Evaluation. Chevron does not have detailed information regarding the specific contaminants, mass estimates and timeframe/durations of process waste discharges. An electronic copy of the DOCC was recently provided to the EPA by Chevron on September 24, 2018. A summary of the history of operations related to the adjacent waterbodies previously provided to the USEPA and NJDEP in the DOCC and subsequent RFI reports will be included in a final report along with the results obtained from implementation of the proposed SFSAP.

General Comment 2 - Chevron submitted an updated data sheet to EPA on June 29, 2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

Chevron Response to General Comment 2 – As noted in the September 17, 2018, Chevron will provide data as requested in all future reports. Please note that in prior reports, data that was listed as ND were accompanied by a number in parentheses that indicated the MDL.

NJDEP Specific Comments - Woodbridge Creek

Woodbridge Creek Comment 1 - Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and the NJDEP are requesting Chevron use USEPA's ProUCL method including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.

Chevron Response to Woodbridge Creek Comment 1 – Chevron will collect eight (8) additional background samples along Woodbridge Creek, in the vicinity of SED-10, to comply with USEPA's ProUCL method. Locations are discussed in the attached response (See attached SFSAP). Please

note that SED-09 transect represents potential upstream off-site source conditions.

Woodbridge Creek Comment 2 - EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SEO -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.

Chevron Response to Woodbridge Creek Comment 2 - As shown on Figure 2 in Attachment 1 (SFSAP), Chevron will add two additional transects in between SED-06 and SED-09. Samples will be collected from the surface interval and from the subsurface interval exhibiting the greatest potential for contamination, determined by photoionization detector or visual observation. As discussed in the September 17, 2018, samples will be analyzed for extractable petroleum hydrocarbons (EPH), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), priority pollutant Metals (PP Metals), total organic compounds (TOC) and particle grain size\ (but excluding Pesticides). As agreed upon during the September 17, 2018 meeting, Chevron does not need to further delineate hot spots to comply with the requirements of 2013 HSWA Permit.

Woodbridge Creek Comment 3 - SED-06 – SED-03

a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters.

Chevron Response to Woodbridge Creek Comment 3

a. These transects were sampled in 2002 for a full suite of analytes. In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously.
b. As discussed, the September 17, 2018 meeting, sediments were characterized with COPECs above Ecological Screening Criteria from bank to bank using extrapolation, therefore, more defined delineation from sample locations A and C to the shoreline is not necessary.

Woodbridge Creek Comment 4 - EPA is requiring an additional transect to sample for all contaminats (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01.The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. Ifresults show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream

Chevron Response to Woodbridge Creek Comment 4
Due to underground gas, product and fuel lines, and overhead bridges and railroad trestles, a vibrocore sample transect in between SED-03 and SED-02 is not feasible. During the 2012 sampling event, Williams Pipeline utility locator indicated that it was unsafe to use the vibracore rig in this area. It is possible that a shallow sediment could be collected from this transect using an Ekman Dredge sampler. The feasibility of this transect depends on the approval from the utility owners. At the meeting, Chevron indicated that a transect at a location between SED-01 and SED-02 (See SFSAP) is not on or adjacent to Chevron property. Regardless, Chevron will complete a transect here and analyze for the parameter list discussed above in Woodbridge Creek Comment 2. As agreed upon during the September 17, 2018 meeting, Chevron does not need to further delineate hot spots to comply with the requirements of 2013 HSWA Permit.

Woodbridge Creek Comment 5 - SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface).

Chevron Response to Woodbridge Creek Comment 5 - These transects were sampled in 2002 for a full suite of analytes (VOCs, SVOCs, PP metals and PCBs). In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron agrees to resample all past locations for EPH analysis where EPH was not analyzed previously.

Woodbridge Creek Comment 6 - SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface).

Chevron Response to Woodbridge Creek Comment 6 - These transects were sampled in 2002 for a full suite of analytes (VOCs, SVOCs, PP metals and PCBs). In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron agrees to resample all past locations for EPH analysis where EPH was not analyzed previously.

As specified in the 2016 Supplemental BEE, samples recollected from the subsurface interval were collected at depths with the greatest potential for environmental impact. Sediment depth, unlike a soil horizon, is transient and variable. Considering the 10-year gap between the sampling events, it was determined that returning to the same depth of the original sample would not provide the most representative data. For the SFSAP, Chevron will collect the deeper sediment samples from the depth intervals exhibiting the greatest potential for environmental impact based on field observations, following the prior methodology and as described above.

Woodbridge Creek Comment 7 - SED -19:

a. Add additional point (A) along transect and sample for full suite of parameters
b. Resample transects for all parameters for all points and at consistent depths (surface and

subsurface)

Chevron Response to Woodbridge Creek Comment 7

a. *As discussed during the September 17, 2018 meeting and in the 2016 Supplemental BEE, a sample was not feasible in this location. Riprap stone was installed along the shoreline, on the Motiva side of the creek, where the sample was to be collected. Vibracore sampling techniques do not allow for a sample to be advanced.*

b. *As discussed at the September 17, 2018 meeting, EPH was analyzed in 2014 when this sample was collected. Therefore, additional sampling at this location is not necessary.*

Woodbridge Creek Comment 8 Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Woodbridge Creek Comment 8 – As discussed in the September 17, 2018 meeting, Chevron has added an additional 4 transects (12 Sample locations, in addition to 8 natural background samples), to Woodbridge Creek.

Woodbridge Creek Comment 9 - A transect is needed between the former Chevron Refinery Site and DITSWED-08 . Please explain whether horizontal and vertical delineation is complete in the DITSWED-8 area.

Chevron Response to Woodbridge Creek Comment 9 - An additional transect between Chevron and DITSWED-08 is not warranted. Former sediment sample locations SED-06 A, B and C on Transect SED-06 are in line with DITSWED-08, sediment sample DITSED-B08S, and the location of sample SED-06 A is adjacent to DITSWED-08.

Chevron does not own the property where DITSWED-08 is located and is not responsible for the requested work related to it. DITSWED-08 is located on Block 732.A, Lot 1, a 15.5 acre parcel of property owned by North Field Extension, LLC ("NFE, LLC"). NFE, LLC acquired Block 732.A, Lot 1 and a second parcel (the two parcels are collectively referred to as the "Northern Parcels") in September 2013 from Chevron. The conveyance of the Northern Parcels to NFE, LLC was part of a litigation settlement.

Under the settlement, Chevron agreed with NFE, LLC and its principal parties, C.P. Chemicals, Inc., Phibro Animal Health Corporation and Legacy Vulcan Corp. (collectively, the "NFE Parties"), to convey the Northern Parcels to NFE, LLC only if EPA agreed (i) to remove the Northern Parcels from Chevron's HSWA permit and its requirements and (ii) to obligate the NFE Parties to enter into an administrative order on consent with EPA to investigate and remediate the Northern Parcels. EPA was an integral part of the discussions that led to this arrangement and it was given all test data that existed at the time to review and understand the site conditions. As planned, in July 2013, EPA removed the Northern Parcels from the obligations of Chevron's

HSWA permit, and in September 2013 it entered into an Administrative Order on Consent with the NFE Parties requiring them to investigate and remediate the Northern Parcels. Since a central component of this arrangement was to eliminate any Chevron obligation related to contamination at the Northern Parcels, Chevron is not required to perform investigation or remedial work related to DITSWED-08 under the HSWA Permit.

As part of the settlement, Chevron agreed to perform a very specific, limited scope of work—to excavate a small, isolated area of soil. Also, as part of the settlement, the NFE Parties agreed to perform "any required investigation or remediation of any and all contaminants in the Northern Parcels in accordance with the requirements of applicable law". This obligation was "without regard to the source of the contamination". Other than the limited excavation work noted above, the NFE Parties are responsible for any required investigation, delineation and remediation of contamination at the Northern Parcels, including any obligations related to the DITSWED-08 area. A copy of the Settlement Agreement is included as Attachment 4 for your reference. See Paragraphs 4(a) and 4(d) for the pertinent provisions.

Woodbridge Creek Comment 10 - Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

Chevron Response to Woodbridge Creek Comment 10 - The discharge area was closed during these activities until the engineered wetland was complete. No sediment was excavated from Woodbridge Creek and activities were isolated to the area where the work was completed. There were no impacts to sediment during the construction of the engineered wetlands.

NJDEP Specific Comments - Spa Spring Creek

Spa Spring Creek Comment 1 - Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.

Chevron Response to Spa Spring Creek Comment 1 - Chevron will collect four (4) additional background samples along Spa Spring Creek to comply with USEPA's ProUCL method. The location of these additional background samples are included in the SFSAP.

Spa Spring Creek Comment 2 - EPA requires additional sampling at all former transects and points for sub-surface sediment.

Chevron Response to Spa Spring Creek Comment 2 – As discussed during the September 17, 2018 meeting and in Section 4.1.1 of the 2016 Supplemental BEE, the sediment lens at these locations is very thin (approx. 6"), and there is no subsurface sediment to be collected.

Spa Spring Creek Comment 3 - Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Spa Spring Creek Comment 3 - The Spa Spring Creek adjacent to Chevron is relatively short distance, and there are already two transects and a sample collected from the DSN004 outfall location. In addition to the existing and planned background samples in Spa Spring Creek, additional transects will be added above and below the confluence of Spa Spring Creek and Woodbridge Creek. These locations will provide conditions related to Spa Spring Creek.

Spa Spring Creek Comment 4 - Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

Chevron Response to Spa Spring Creek Comment 4 - The location of this discharge point is presented in the attached SFSAP, Figure 3. A history of this discharge point and the corresponding NJPDES Permit Number was described in Section 2.4.4 of the 2003 RFI report. A summary of the information is provided as Attachment 3.

NJDEP Specific Comments - Arthur Kill

Arthur Kill Comment 1 - EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.

Chevron Response to Arthur Kill Comment 1 – During the 2002 sampling event, sediment sample cores from the Arthur Kill collected by Chevron did not show evidence of free product (see sediment boring logs, 2003 RFI Report, Appendix B). Additionally, as discussed during our September 17, 2018 meeting the two background samples collected by Chevron in the Arthur Kill in 2002 (SED-16-C and SED-17-C; results discussed in Section 9 of the 2003 RFI Report) showed higher concentrations of contaminants than the samples taken adjacent to Chevron. Additionally, the Chevron Dock area was subject to maintenance dredging, most recently event conducted by Chevron was in 2003 (discussed in Chevron Response to Arthur Kill Comment 3, below). Chevron therefore does not believe additional sampling and analysis in the Arthur Kill is necessary.

Arthur Kill Comment 2 - Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Arthur Kill Comment 2 –As discussed above, Chevron believes that the existing sediment data from the Arthur Kill, as presented in the 2003 RFI Report, is sufficient and

additional sampling is not warranted.

Arthur Kill Comment 3 - EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

Chevron Response to Arthur Kill Comment 3 - As discussed at the September 17, 2018 meeting, Chevron's Arthur Kill dock area (Area A [Berths 2, 3 and 4] and Area B (Tanker Berth]) has been subject to prior maintenance dredging by Chevron. Dredging information for this area is provided in Attachment 5, including the 1997 NJDEP Land Use Permit for maintenance dredging and an aerial photograph base map with an outline of the dredged area that includes the location, depths and volumes associated with the dredging activities (Figure A-1). The dredging was completed during November 2003. The dredging material was approved for upland placement by the NJDEP as clean fill and was used as backfill in the former East Yard Basin.

We look forward to your review and approval of the attached sediment investigation workplan. Chevron is committed to completing the final investigatory tasks specified in the HSWA Permit for the water bodies as soon as possible.

If you require additional information regarding this response letter or the attached workplan, please contact me at (732) 738-2023.

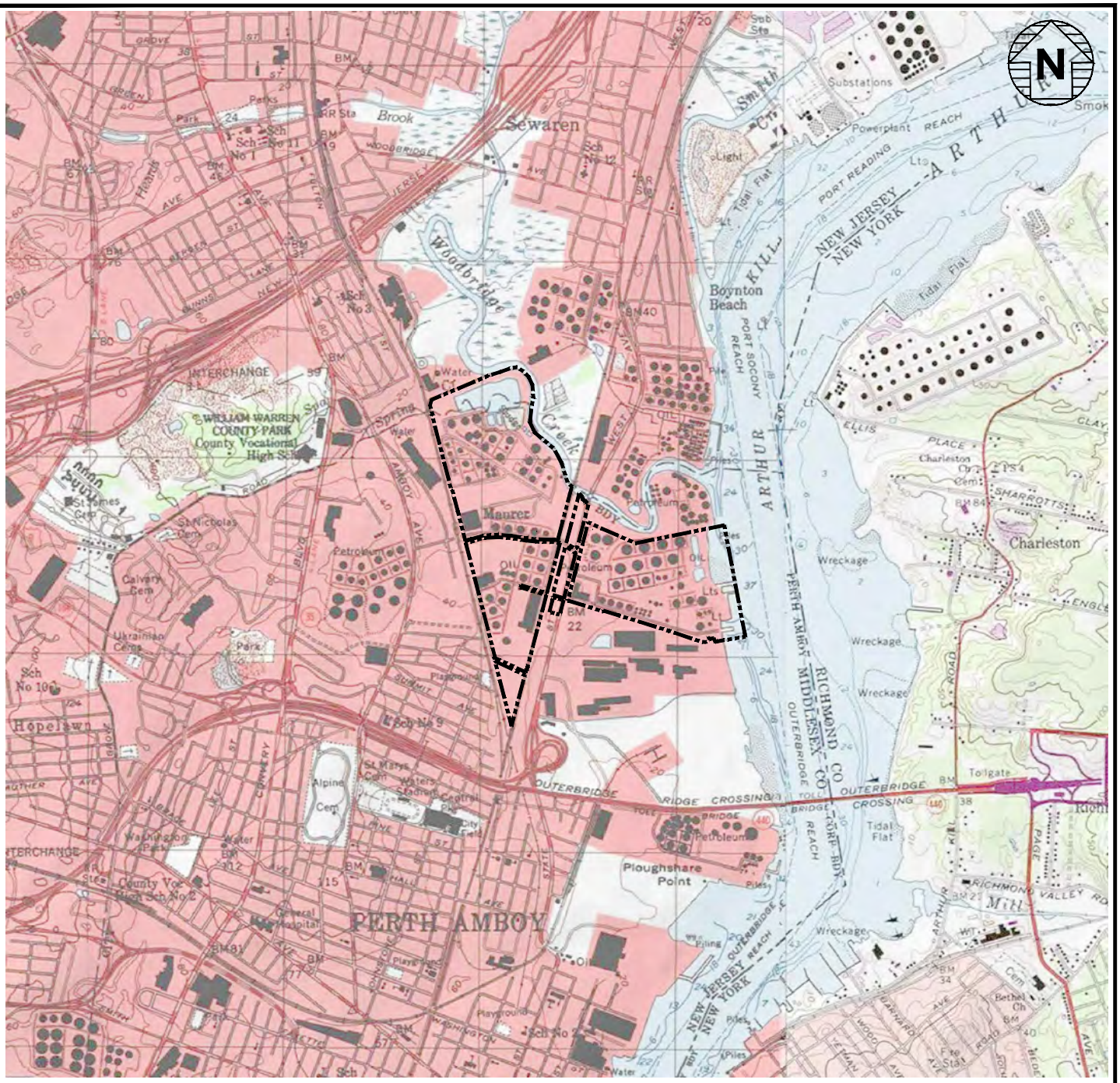
Sincerely,

Robert Mancini
Project Manager, Downstream

cc: Lynn E. Vogel – NJDEP

Enclosures (as described)

FIGURES



SOURCE: PERTH AMBOY, N.J. QUADRANGLE, ARTHUR KILL, N.J. QUADRANGLE,
7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)
HTTP://GOTO.ARCGISONLINE.COM/MAPS/USA_TOPO_MAPS

LEGEND

FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY

0 2500 FT.
APPROXIMATE SCALE

PROJECT:

CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:

SITE LOCATION MAP

DRAWN BY:	M. GIAMBATTISTA	PROJ NO.:	194098
CHECKED BY:	T.REINOLD		
APPROVED BY:	T. REINOLD		**FIGURE 1**
DATE:	OCTOBER 2018		

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

FILE NO.: FIGURE 1.dwg

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ATTACHMENTS

ATTACHMENT 1

ATTACHMENT 1

Sediment Field Sampling and Analysis Plan With QAPP

FORMER CHEVRON PERTH AMBOY FACILITY
SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN
SEDIMENTS

EPA I.D. # NJD081982902

TRC Project No. 230668

Date: November 19, 2018

Prepared for:

Chevron USA

Prepared by:

TRC Environmental Corporation
41 Spring Street
New Providence, New Jersey 07947

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Appendix B: Electronic Copy of Supplemental Field Sampling and Analysis Workplan.

SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN
SEDIMENTS
FORMER CHEVRON PERTH AMBOY FACILITY
PERTH AMBOY, MIDDLESEX COUNTY, NEW JERSEY
EPA I.D. # NJD081982902

1.0 INTRODUCTION

TRC Environmental Corporation (TRC), on behalf of Chevron USA (Chevron) has prepared this Supplemental Field Sampling and Analysis Plan (SFSAP) for collection and analysis of additional sediment samples from Woodbridge Creek, Spa Spring Creek, and the Arthur Kill proximate to the former Chevron facility located in the City of Perth Amboy, Middlesex County, New Jersey (the Facility). This SFSAP is being submitted pursuant to the Hazardous and Solid Waste Amendments (HSWA) Permit Renewal and Permit Modification I issued by the United States Environmental Protection Agency (EPA) in 2013 to Chevron USA, Inc. – Buckeye Perth Amboy Terminal LLC **(**EPA I.D. # NJD081982902). The Facility's 2013 HSWA Permit requires that the RCRA Facility Investigation (RFI) be completed for the three water bodies (see 2013 HSWA Permit, Module III, Condition B.2. Page 25 and 26). The investigation of these surface water bodies began in 2002 as part of the Facility wide RFI. This SFSAP proposes supplemental sediment sampling to complete this investigation, including data gaps identified in previous phases of the RFI for the three water bodies. Once completed, this sampling effort is intended to be the final phase of the RFI for the three water bodies.

The Facility is located near the confluence of Woodbridge Creek and the Arthur Kill in an older urban/industrial area of Perth Amboy (Figure 1). The SFSAP was prepared as part of the overall response to a letter from the USEPA, containing recommendations and comments from the New Jersey Department of Environmental Protection (NJDEP) dated August 31, 2018. The August 31, 2018 letter requested additional sediment sample collection in Facility-adjacent waters, as further discussed at a subsequent meeting on September 17, 2018 between Chevron, the USEPA, and the NJDEP. The SFSAP incorporates comments and information discussed during the meeting, and in the responses to the USEPA/NJDEP included in Chevron's letter dated November 15, 2018.

The Facility has completed several phases of a RCRA Facility Investigation (RFI) for the three surface water bodies pursuant to the HSWA Permit. In 2002, Chevron collected approximately 16 surface water samples and 44 sediment samples from water bodies adjacent to the Facility (Woodbridge Creek, Spa Spring Creek, and the Arthur Kill), some or all of which were analyzed for organic and inorganic chemical constituents including volatile organic compounds (VOCs), semi-VOCs (SVOCs), polychlorinated biphenyls (PCB), and Metals. The results of the 2002 surface water and sediment investigation were provided to NJDEP and EPA in the Baseline Ecological Evaluation (BEE) that was included as Section 9 in Chevron's November 2003 Resource Conservation and Recovery Act (RCRA) Facility Investigation Report (RFI Report) and Chevron's February 2008 Supplemental RFI Report (SRFI Report). The 2002 sediment sampling event identified various organic compounds (primarily SVOCs) and metals in various sediment samples. The presence of potentially petroleum stained sediments was identified at some locations based on field observations. Contaminants of Potential Ecological Concern (COPECs) were identified

and analytical results were compared to ecological screening criteria. Some sediment samples had concentrations of these compounds in excess of ecological screening criteria.

In 2014, Chevron conducted a supplemental sediment investigation of Spa Spring Creek and Woodbridge Creek to further investigate these waterbodies under the HSWA Permit and respond to comments raised by NJDEP and EPA on their review of Chevron's 2003 BEE Report. As part of the 2014 supplemental field work, Chevron completed 14 additional sediment cores and collected approximately 14 additional sediment samples from Woodbridge Creek and Spa Spring Creek. The results of this supplemental work were provided in Chevron's Supplemental Ecological Evaluation Report, dated 2016 (Supplemental EE). As part of the Supplemental EE, Chevron completed the re-evaluation of COPECs, collected additional sediment samples in Spa Spring Creek and Woodbridge Creek including analysis for Extractable Petroleum Hydrocarbons (EPH; this analytical method was not available during the prior 2002 investigation) and further evaluated potential contaminant migration pathways to surface water. In addition, a bathymetric survey was completed in the lower portion Woodbridge Creek.

1.1 SURFACE WATER BODIES

Three surface water bodies border portions of the Facility along its northern boundary (Spa Spring Creek and Woodbridge Creek) and eastern boundary (Arthur Kill) (see Figure 2). In the vicinity of the Facility, Woodbridge Creek and Spa Spring Creek are tidal estuarine waters, with Woodbridge Creek having several prominent meanders along its course. Thus, water flow and elevation in the creeks are controlled by the diurnal tide cycle. Woodbridge Creek is bounded by mudflats and tidally-flowed wetlands, as well as numerous industrial properties. At high tide, the Creek is approximately 100 feet wide as it flows past the Facility. Woodbridge Creek empties into the Arthur Kill several hundred feet north of the Facility's East Yard.

In the vicinity of the Facility, Spa Spring Creek is a smaller, manmade channel that empties into Woodbridge Creek along the northern boundary of the Facility. Immediately upstream of the Facility, Spa Spring Creek flows through an industrial area. Prior to construction of the northern portion of the Facility's Main Yard, Spa Spring Creek naturally flowed through the location of the former North Field Basin (currently Chevron's wetlands creation project area).

The Arthur Kill itself is a tidal strait connecting the Kill van Kull and Newark Bay to the north with Raritan Bay and the Raritan River to the south. Tidal surges come from both ends, with an average flushing time of two weeks and an average semi-diurnal tidal range of 1.6 meters (5.3 feet). The major freshwater inputs are the major tributaries of the Arthur Kill: the Rahway River, the Elizabeth River, and the Fresh Kills, which contribute about 38 percent (122 cubic feet per second (ft^3/sec)), with the balance of 62 percent (200 ft^3/sec) coming from smaller tributaries, sewage treatment plants, combined sewer overflows, and industrial discharges. The salinity of the Arthur Kill varies from 17 to 27 ppt at the southern end to nearly freshwater in some of the tributary mouths. The Arthur Kill is an important industrial/commercial water way and is surrounded by one of the most densely populated coastal areas in the world.

Vast modifications of the physical features of the Arthur Kill were made to serve the New York/New Jersey harbor area. The highly industrialized waterway is dredged to an average

channel depth of nine meters (30 feet) and much of the shoreline is comprised of bulkheads or rip-rap. In addition to vegetated wetland areas, the vicinity contains extensive interspersed areas of man-made structures, including railroad yards, oil tank farms, bulkheads, docks, road systems, one of New York City's largest landfills, a power plant, former petroleum and metal refineries, and numerous industrial and residential buildings, both occupied and abandoned.

Historically, the Facility has discharged treated storm water and/or wastewaters to outfalls located in Spa Spring Creek and Woodbridge Creek. The Facility's current NJPDES permitted storm water/wastewater discharge (operated by the current owner, Buckeye Perth Amboy Terminal, LLC) is located in Woodbridge Creek.

1.2 OBJECTIVE

The objective of the supplemental investigation is to complete the RFI of Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, and thus fulfill the requirements set forth in the Facility's HSWA Permit. Specifically, this investigation is intended to supplement the prior investigations conducted in 2002 and 2014, in accordance with the August 31, 2018 USEPA/NJDEP letter and comments, as revised pursuant to the September 17, 2018 meeting.

2.0 METHODS AND STUDY DESIGN

This section outlines the proposed sampling methods and laboratory analyses for the proposed sediment sampling. The SFSAP will be implemented in accordance with the NJDEP's *Technical Requirements for Site Remediation* (TRSR), the NJDEP's *Ecological Evaluation Technical Guidance*, Version 2.0, August 2018 (EETG), and the NJDEP's 2005 *Field Sampling Procedures Manual* (FSPM). Details of sample collection, handling, and quality assurance are presented in the Quality Assurance Project Plan (QAPP) included as Appendix A. As noted above, the objective of the SFASP is to complete the RFI. The methods being employed to achieve this objective include supplementing the existing set of sediment data obtained from the sampling conducted in 2002 and 2014 with the data to be furnished from implementing the SFSAP. The sample locations, depth intervals and analytical parameters proposed herein are intended to be in accordance with the USEPA and NJDEP August 31, 2018 comments and technical discussion at the September 17, 2018 meeting and are considered sufficient to complete the RFI.

The field sampling proposed in the SFSAP will be targeted to sediment sampling locations within Woodbridge Creek, Spa Spring Creek, and the Arthur Kill. Field activities to be performed as part of the SFSAP are summarized as follows:

- Sediment sampling, to be completed utilizing Vibracore® drilling method where possible.
- Sediment sampling in some of the shallow surface water areas where a boat could not access may be obtained by hand, or a Ponar dredge in areas where utility mark outs prevent drilling due to utilities/pipelines.
- Field observations, characterization, and screening of sediment samples for field indications of contamination (e.g., photo-ionization detector [PID], odors, staining); and,
- Laboratory analysis of sediment samples for the similar analytical parameters as those analyzed in the 2002 and 2014 sediment investigations as presented in Section 2.2, below. Note that EPH did not exist as an approved petroleum hydrocarbon analytical method in 2002; sediment samples were analyzed for EPH during the 2014 sediment field investigation and EPH will be included in the analytical parameters proposed in this SFASP for this final phase of the investigation).

The results of this field work will be documented in a supplemental Woodbridge Creek, Spa Spring Creek and Arthur Kill RFI report. The supplemental report will be a comprehensive RFI report for the three water bodies incorporating the results of the prior Facility investigations.

2.1 SAMPLE COLLECTION

Samples will be collected from on-shore or from a boat that will navigate to each sediment location using shipboard Geographical Positioning System (GPS) equipment or equivalent. To the extent possible, the sampling program will proceed in a direction, upstream or downstream, opposite the tidal flow at the time of sampling. A total of up to 52 sediment samples will be collected for field screening and laboratory analysis. Table 1 provides a summary of all samples to be collected as proposed herein and the associated laboratory analytical parameters proposed for each sample. The location of the proposed sediment sample locations are shown on Figure 2. Final field sample locations may be adjusted based on field conditions at the time of sampling.

The sampling locations shown on Figure 2 were identified and discussed at the working session between Chevron, EPA, and NJDEP during the September 17, 2018 Facility meeting. A summary of the selection of sampling locations and analytical parameters can be found in Chevron's November 15, 2018 response letter to EPA, accompanying this SFSPWP. In summary the proposed sampling locations were selected to do one of three things (1) fill in data gaps with new sample locations, (2) provide additional background data as requested by EPA so that EPA's statistical background analysis as contained in the USEPA's ProUCL Guidance could be run, and (3) revisit previously sample locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed.

Additional Background Locations Woodbridge Creek: Chevron will collect eight (8) additional background samples along Woodbridge Creek, in the vicinity of existing background location SED-10, to provide a more robust background data set for analysis with USEPA's ProUCL method. These additional background locations for Woodbridge Creek are designated as SED-WCBG-1 through SED-WCBG-8 on Figure 2 and Table 1. Sample depths and analytical parameters are provided on Table 1.

Additional Background Locations Spa Spring Creek: Chevron will collect four (4) additional background samples along Spa Spring Creek to provide a more robust background data set for analysis with USEPA's ProUCL method comply. These additional background locations are designated as SED-SSBG-1 through SED-SSBG-4 on Figure 2 and Table 1. Sample depths and analytical parameters are provided on Table 1.

Data Gaps Woodbridge Creek New Boring Locations: Chevron will add two additional transects (three borings per transect) in between SED-06 and SED-09. These additional transects are SED-23-A,B,C and SED-24-A,B,C as shown on Figure 2 and Table 1. Samples will be collected from the surface interval and from the subsurface interval exhibiting the greatest potential for contamination, determined by field observations.

Chevron will attempt to collect shallow sediment samples between existing transects SED-03 and SED-02. During the 2014 sampling event Chevron attempted to collect a VibraCore sample transect at this location. The pipeline companies which own and/or operate underground petroleum pipelines at this location refused to allow drilling access for safety reasons. Chevron will re-engage the underground utility owners and attempt to obtain a shallow transect using a Ponar or Ekman Dredge sampler. The feasibility of completing this transect depends on the access approval of the utility owners. This additional transect is SED-25-A,B,C as shown on Figure 3 and Table 1.

Chevron is also proposing an additional Woodbridge Creek transect between existing transects SED-01 and SED-02 even through this transect is not on or adjacent to Chevron property. This additional transect is SED-22-A,B,C as shown on Figure 2 and Table 1. Sample depths and analytical parameters are provided on Table 1.

Data Gap Samples EPH Analysis at Existing Boring Locations: Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not analyzed previously. These EPH only sample locations are identified below and on Table 1. Their location can be found on Figure 2.

SED-01-A	SED-04-B	SED-07-C
SED-01-B	SED-04-C(R)	SED-08-A
SED-01-C	SED-05-A	SED-08-B
SED-02-A	SED-05-B	SED-09-A(R)
SED-02-B(R)	SED-05-C	SED-09-B
SED-02-C(R)	SED-06-A	SED-09-C(R)
SED-03-A	SED-06-B(R)	SED-10-A
SED-03-B(R)	SED-06-C	SED-10-B
SED-03-C(R)	SED-07-A	SED-10-C
SED-04-A	SED-07-B	

Data Gap Additional Vertical Samples at Existing Boring Locations: During the 2014, investigation only deeper samples were taken at boring locations SED-19-B and SED-19-C. Shallow samples to fill in this data gap will be taken at Sed-19-B and Sed-19-C. These two samples for the SED-19 transect are shown on Figure 2 and Table 1. Both samples will be analyzed for the full suite of parameters including EPH as shown on Table 1.

2.1.1 Sediment Sampling

Where possible and consistent with 2014 sediment sampling in Woodbridge Creek, sediment cores will be advanced using Vibracore® drilling methods to refusal or a total depth of 10 feet below the sediment surface, or to the top of the underlying parent material (till, clay, or sand units), whichever is first encountered. Sediment physical conditions and related field observations (e.g., color, texture, consistency, odors, visual indication of petroleum hydrocarbons, etc.) will be recorded with the field notes. The sediment samples will be screened with a calibrated photo-ionization detector (PID) and measurements recorded.

The goal of this investigation is to supplement the data set generated from the 2002 and 2014 sampling events. In general, samples will be collected from 4 new transects; older locations will be revisited in Woodbridge Creek, Spa Spring Creek and the Arthur Kill; and from additional background locations in Woodbridge Creek, Spa Spring Creek. Sampling locations are represented on Figure 2 and sample depths and analysis are summarized on Table 1. All locations will be advanced to the interface of the sediment and the parent material or refusal. While Vibracore® drilling is proposed for most sample collection, some sediment samples, including those between SED-02 and SED-03, will be collected manually from shallow intervals using a stainless steel Ponar dredge due to the presence of buried utilities or other hazards, subject to access being granted to collect samples by the operators of the local utilities.

2.2 SAMPLE ANALYSIS

The laboratory analytical parameters will generally match those from previous sediment sampling events conducted at the Facility in 2002 and 2014, as discussed during the September 2018 meeting. A summary of the proposed analytical methods for sediment samples is provided below:

Sediment Analytical Parameters

Parameter	**Method**
Volatile Organic Compounds (TCL)	USEPA 8260C
Semi-volatile Organic Compounds (TCL)	8270D/8270D-SIM
Metals (TAL)	6010C, 7471B
Extractable Petroleum Hydrocarbons (EPH)	NJDEP EPH Method Revision 3
Grain size determination	D1498-76M
Total Organic Carbon (TOC)	Lloyd-Khan

TAL = USEPA Target Analyte List; see QAPP for specific list of analytes.
TCL = USEPA Target Compound List; see QAPP for specific list of analytes.

The laboratory analysis of sediment samples will be performed by a NJDEP-certified laboratory. Quality assurance procedures for sampling, sample handling/preservation, and laboratory requirements are described in the QAPP (Appendix A).

All samples collected from the 0-0.5 foot interval below the sediment surface will be analyzed for EPH (total and fractionated), with other parameters included in selected samples as noted in Table 1, which includes other sample information.

3.0 DELIEVERABLE

A supplemental sediment investigation report will be prepared providing the results of the field work and laboratory sample analyses conducted as part of this field effort. The supplemental report will be a comprehensive report on all three water bodies, combining the results of the 2002 and 2014 surface water/sediment investigations into a final waterbody RFI report intended to fully address the relevant provisions of Module III Condition B.2. (Pages 25 and 26) of the Facility's 2013 HSWA Permit.

Similar to previous reports, sediment data obtained from this investigation will be screened against applicable ecological screening criteria. EPA's ProUCL software will be used to evaluate the expanded background data set to be obtained from Woodbridge Creek and Spa Spring Creek. The report will also incorporate the results of soil and groundwater data from adjacent SWMUs and AOCs. A review of the Facility's waste management practices as they potentially relate to the water bodies as well as relevant surrounding site history and land use will be provided. The type, nature, and extent of sediment contamination in the three water bodies will be provided in the report.

4.0 SCHEDULE

The proposed activities described in this workplan will be completed as follows, subject to timely EPA approval:

Pre-mobilization/mobilization:	1 Month Following Workplan Approval
Field sampling:	2 to 3 Months Following Workplan Approval
Laboratory testing and analysis:	3 to 4 Months Following Workplan Approval
Final Supplemental Sediment Report:	3 Months Following Receipt of Lab Data

Completion of field sampling and related activities will be conducted in accordance with safety protocols established by Chevron, and the anticipated schedule is subject to change based on operational conditions, weather, etc.

5.0 REFERENCES

New Jersey Department of Environmental Protection *Protocol for Addressing Extractable Petroleum Hydrocarbons* (Version 5.0). Site Remediation Program. August 9, 2010.

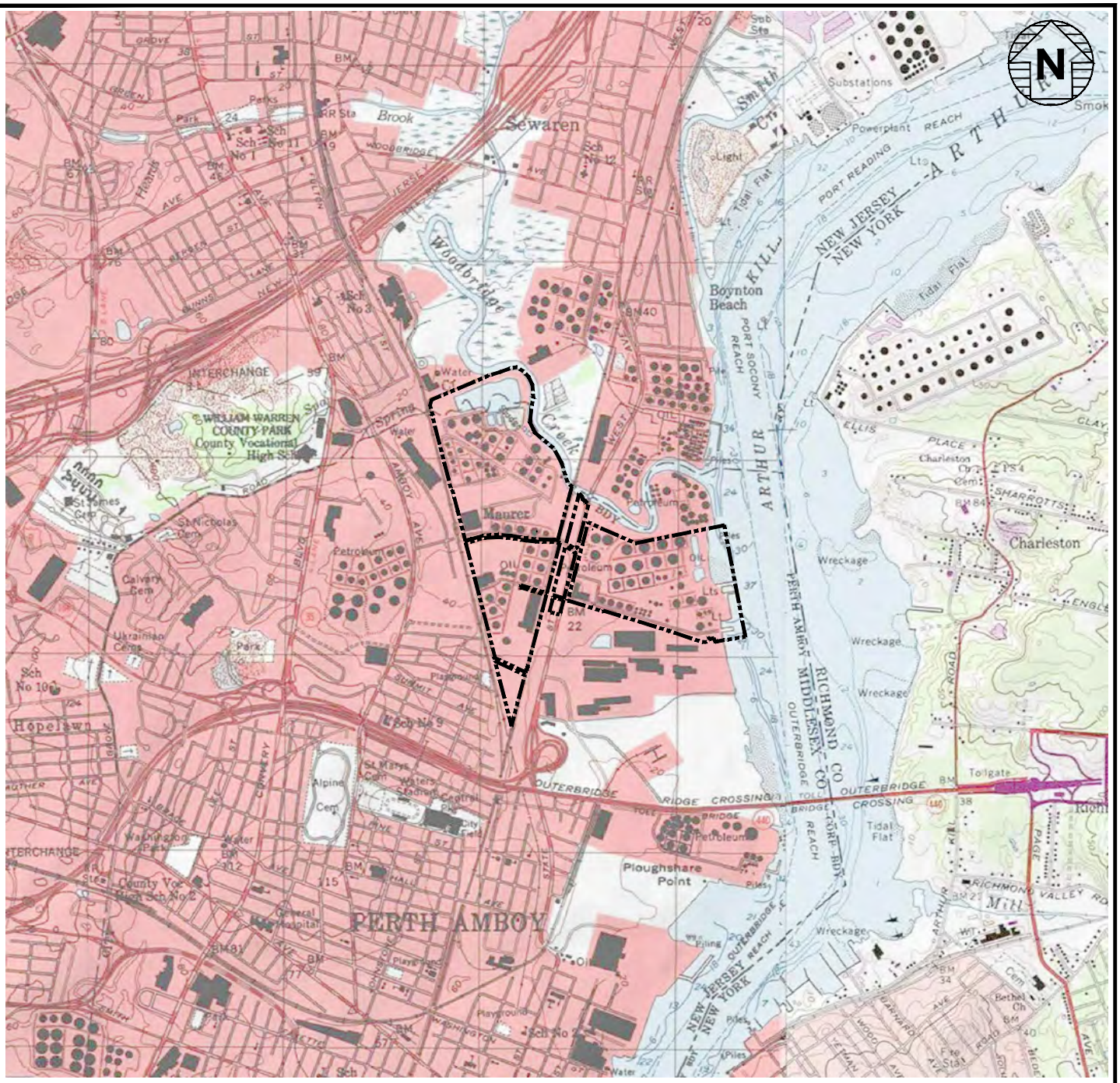
New Jersey Department of Environmental Protection *Extractable Petroleum Hydrocarbons Methodology*, Version 3.0. Site Remediation Program. August 2010.

New Jersey Department of Environmental Protection. August 2018. *Ecological Evaluation Technical Guidance.* (Ver. 2.0)

New Jersey Department of Environmental Protection May 2012 *Technical Requirements for Site Remediation.*

FIGURES

FIGURES



SOURCE: PERTH AMBOY, N.J. QUADRANGLE, ARTHUR KILL, N.J. QUADRANGLE, 7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)
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LEGEND

FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY

0 2500 FT.

APPROXIMATE SCALE

PROJECT:

CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:

SITE LOCATION MAP

DRAWN BY:	M. GIAMBATTISTA	PROJ NO.:	194098
CHECKED BY:	T.REINOLD	**FIGURE 1**	
APPROVED BY:	T. REINOLD		
DATE:	OCTOBER 2018		

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Suite 102
New Providence, NJ 07974
Phone: 908.988.1700

FILE NO.: FIGURE 1.dwg

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DRAWING NAME: M:\Cad Files\Vision Projects\194098\Phase 000003\2018_Sedi ent FSAP\FSAP\ FIGURE 1.dwg --- PLOT DATE: Novel er 15, 2018 - 1:25PM --- LAYOUT: Lai out1 (2)
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24x36 --- ATTACHED XREF'S: --- ATTACHED IMAGES: J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7; Y4_-He M_400x400;
DRAWING NAME: M:\Cad Files\Vision Pro ects\194098\Phase 000003\2018_Sedi ent FSAP\FSAP\ FIGURE 2_R1.dwg --- PLOT DATE: Nove er 15, 2018 - 1:25PM --- LAYOUT: La out1

PROPOSED SAMPLE LOCATIONS

Sample Name	Sample Depth	Analysis	Location
SED-WCBG-1[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-2[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-3[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-4[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-5[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-6[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-7[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-8[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-01-A	0.0-0.5	EPH	Woodbridge Creek
SED-01-B	0.0-0.5	EPH	Woodbridge Creek
SED-01-C	0.0-0.5	EPH	Woodbridge Creek
SED-02-A	0.0-0.5	EPH	Woodbridge Creek
SED-02-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-02-C(R)	0.0-0.5	EPH	Woodbridge Creek
SED-03-A	0.0-0.5	EPH	Woodbridge Creek
SED-03-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-03-C(R)	0.0-0.5	EPH	Woodbridge Creek
SED-04-A	0.0-0.5	EPH	Woodbridge Creek
	3.25-3.75	EPH	
SED-04-B	0.0-0.5	EPH	Woodbridge Creek
SED-04-C(R)	0.0-0.5	EPH	Woodbridge Creek
	1.5-2.0	EPH	
SED-05-A	0.0-0.5	EPH	Woodbridge Creek
SED-05-B	0.0-0.5	EPH	Woodbridge Creek
SED-05-C	0.0-0.5	EPH	Woodbridge Creek
SED-06-A	0.0-0.5	EPH	Woodbridge Creek
SED-06-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-06-C	0.0-0.5	EPH	Woodbridge Creek
SED-07-A	0.0-0.5	EPH	Spa Spring Creek
SED-07-B	0.0-0.5	EPH	Spa Spring Creek
SED-07-C	0.0-0.5	EPH	Spa Spring Creek
SED-08-A	0.0-0.5	EPH	Spa Spring Creek
SED-08-C	0.0-0.5	EPH	Spa Spring Creek
SED-09-A(R)	0.0-0.5	EPH	Woodbridge Creek
SED-09-B	0.0-0.5	EPH	Woodbridge Creek
SED-09-C(R)	0.0-0.5	EPH	Woodbridge Creek
	0.5-1.0	EPH	
	4.5-5.0	EPH	
SED-10-A	0.0-0.5	EPH	Woodbridge Creek
SED-10-B	0.0-0.5	EPH	Woodbridge Creek
SED-10-C	0.0-0.5	EPH	Woodbridge Creek
SED-19-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-19-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-22-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-22-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-22-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-25-A[3]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-25-B[3]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-25-C[3]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-SSBG-1	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-2	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-3	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-4	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first
[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field
[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler

LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- R.R. TRACKS
- UNIMPROVED ROADWAY
- WATER BODY — SPA SPRING CREEK
- SED-16-C ▲ FORMER SEDIMENT SAMPLE LOCATION (2002 AND 2014)
- NEW SEDIMENT SAMPLE LOCATION
- FORMER SEDIMENT SAMPLE LOCATION TO BE REVISITED
- SEDIMENT LOCATION LIMITED TO MANUAL SURFACE SAMPLING (0 – 0.5 FEET) DUE TO BURIED UTILITIES. LOCATION SUBJECT FOR APPROVAL FROM RESPECTIVE PIPELINE COMPANIES.
- REQUESTED SEDIMENT LOCATION NOT ACCESSIBLE
- DISCHARGE POINT

NOTES:
1) ALL SAMPLING LOCATIONS SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND ACCESSIBILITY.
2) ALL LOCATIONS ARE UNDERSTOOD TO BE WITHIN LIMITS OF WATERWAYS – MORE PRECISE LOCATION INFORMATION WILL BE DETAILED IN SUPPLEMENTAL REPORT.

0 300 FT.
APPROXIMATE SCALE

PROJECT:
CHEVRON FACILITY
PERTH AMBOY, NEW HERSEY

TITLE:
PROPOSED SEDIMENT SAMPLE LOCATIONS

DRAWN BY:	O. DE LEON	PROJ. NO.:	890 - 194098
CHECKED BY:	S. PAPAGEORGE		FIGURE 2
APPROVED BY:	T. REINOLD		
DATE:	SEPTEMBER 2018		

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

FILE NO.: FIGURE 2_R1.dwg

TABLES

TABLE

Table 1
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Sample Name	Sample Depth	Analysis	Location
SED-WCBG-1[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-2[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-3[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-4[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-5[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-6[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-7[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-WCBG-8[2]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-01-A	0.0-0.5	EPH	Woodbridge Creek
SED-01-B	0.0-0.5	EPH	Woodbridge Creek
SED-01-C	0.0-0.5	EPH	Woodbridge Creek
SED-02-A	0.0-0.5	EPH	Woodbridge Creek
SED-02-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-02-C(R)	0.0-0.5	EPH	Woodbridge Creek
SED-03-A	0.0-0.5	EPH	Woodbridge Creek
SED-03-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-03-C(R)	0.0-0.5	EPH	Woodbridge Creek
SED-04-A	0.0-0.5	EPH	Woodbridge Creek
	3.25-3.75	EPH	
SED-04-B	0.0-0.5	EPH	Woodbridge Creek
SED-04-C(R)	0.0-0.5	EPH	Woodbridge Creek
	1.5-2.0	EPH	
SED-05-A	0.0-0.5	EPH	Woodbridge Creek
SED-05-B	0.0-0.5	EPH	Woodbridge Creek
SED-05-C	0.0-0.5	EPH	Woodbridge Creek
SED-06-A	0.0-0.5	EPH	Woodbridge Creek
SED-06-B(R)	0.0-0.5	EPH	Woodbridge Creek
SED-06-C	0.0-0.5	EPH	Woodbridge Creek
SED-07-A	0.0-0.5	EPH	Spa Spring Creek

Table 1
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Sample Name	Sample Depth	Analysis	Location
SED-07-B	0.0-0.5	EPH	Spa Spring Creek
SED-07-C	0.0-0.5	EPH	Spa Spring Creek
SED-08-A	0.0-0.5	EPH	Spa Spring Creek
SED-08-C	0.0-0.5	EPH	Spa Spring Creek
SED-09-A(R)	0.0-0.5	EPH	Woodbridge Creek
SED-09-B	0.0-0.5	EPH	Woodbridge Creek
SED-09-C(R)	0.0-0.5	EPH	Woodbridge Creek
	0.5-1.0	EPH	
	4.5-5.0	EPH	
SED-10-A	0.0-0.5	EPH	Woodbridge Creek
SED-10-B	0.0-0.5	EPH	Woodbridge Creek
SED-10-C	0.0-0.5	EPH	Woodbridge Creek
SED-19-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-19-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
SED-22-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-22-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-22-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-23-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-A	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-24-B	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	

Table 1
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Sample Name	Sample Depth	Analysis	Location
SED-24-C	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
	0.5-1.0	VOCs	
	TBD[1]	EPH, VOCs, SVOCs, Metals, TOC and grain size	
SED-25-A[3]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-25-B[3]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-25-C[3]	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Woodbridge Creek
SED-SSBG-1	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-2	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-3	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek
SED-SSBG-4	0.0-0.5	EPH, SVOCs, Metals, TOC and grain size	Spa Spring Creek

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.

[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field

[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler

APPENDICES

APPENDIX A

APPENDIX A:

Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN
SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN

FORMER CHEVRON FACILITY
1200 EAST STATE STREET - PERTH AMBOY, NEW JERSEY
November 2018

Introduction

TRC Environmental Corporation (TRC) has prepared the following *Quality Assurance Project Plan* (QAPP) for the November 2018 Supplemental Field Sampling and Analysis Plan (SFSAP) prepared for the former Chevron facility located in Perth Amboy, Middlesex County, New Jersey (the Site).

The SFSAP described collection and analysis of sediment samples in response to an August 31, 2018 letter from the New Jersey Department of Environmental Protection (NJDEP) and United States Environmental Protection Agency (USEPA) that requested further sampling and analysis of environmental media in Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, all saline tidal waterways adjacent to the Site. The Supplemental Field Sampling and Analysis Plan (SFSAP) was prepared with respect to the agencies' comments in the letter, and in further discussion during a meeting between Chevron, the NJDEP and the USEPA on September 17, 2018. The data obtained from the proposed field activities and laboratory analysis will be compared to published NJDEP ecological screening criteria (ESCs) to further evaluate sediment quality in the aforementioned waters.

This QAPP was prepared in general accordance with the New Jersey Department of Environmental Protection's (NJDEP's) *Technical Requirements for Site Remediation* (TRSR; N.J.A.C. 7:26E-2.2) and the applicable sections of the NJDEP's *Quality Assurance Project Plan Technical Guidance* (QTG). It should be noted that the QAPP is respective of data quality indices that are not media specific, as described in Appendix B of the QTG, included herein as Attachment 1.

Project/Problem Definition

The SFSAP are being implemented to address the NJDEP/USEPA's request for additional data to further evaluate sediment in the Site-adjacent waterways. The contaminants of concern, which are also Contaminants of Potential Ecological Concern (COPECs) as defined by the NJDEP, were identified over the course of previous environmental and ecological investigations of sediments. The proposed sampling program includes analysis of the same parameters using the same methods employed in the prior investigations for consistency as per the September 2018 meeting. In addition to new locations, sampling will also be performed at selected former sediment sample locations. TRC intends to use the data in a future report.

Project Objectives

The primary objective of the proposed sampling is to provide the NJDEP/USEPA with sufficient data to satisfy the concerns presented in their August 2018 letter and September 2018 meeting, and concurrence among the attendees as to how best to address the agencies concerns.

Meeting the project objective will be supported by:

- Collection of sufficient sediment chemical data consistent with past investigations and as defined through discussions with regulatory reviewers and the chemical constituents listed in Attachment 2.

- Collection of sediment samples and laboratory analysis of the USEPA's parameters (as per prior investigations and as noted herein) for Woodbridge Creek and Spa Spring Creek.

- Collection of Total Organic Carbon (TOC) and sediment grain size distribution data.

- Field measurement of water quality parameters including pH, temperature, conductivity, salinity, oxidation-reduction potential, dissolved oxygen, and turbidity.

Data Quality Objectives

The data quality objective (DQO) process was developed to define the acceptance criteria for the laboratory analytical data to be collected as part of the SFSAP. The acceptance criteria include precision, accuracy, representativeness, comparability, completeness and sensitivity. Specific Data Quality Indicators (DQIs) for the investigation are briefly discussed below:

Precision:

Precision will be determined by collecting field duplicate samples for analysis at a rate of 1 per 20 sediment samples, if sufficient sample volume is obtainable. Duplicate samples will be co-located with the associated field sample. Duplicate sample results are to be evaluated based upon the Reportable Percent Difference (RPD) and unless otherwise noted, the higher of the concentrations are to be used. Acceptable RPD values are outlined in the New Jersey Data of Known Quality (NJDKQP) acceptance criteria for each method.

Accuracy:

Data accuracy will be determined through laboratory compliance with the applicable DQIs identified in Attachment 1, including adherence to sample preservation and holding times, instrument calibration, analysis of method blanks and duplicates, matrix spike analyses, spiking, etc as outlined per NJ DKQP Technical Guidance.

Representativeness:

Sampling locations and methodology, in accordance with the SFSAP, were chosen and designed to generate data representative of site conditions with regards to COPECs. The SFSAP includes collection of samples/media biased towards suspected areas of contamination based upon previous studies and at targeted areas representative of historically-detected petroleum contamination across a range of concentrations. Required sample quantities and volumes to be collected are consistent with the SFSAP and laboratory analytical method requirements.

Comparability

The data collected for sediment sample analysis will be analyzed per standard USEPA methods as outlined in the Analytical Data/Quality Assurance Table included in this QAPP. No data from the Site has been collected from biological tissues for analysis to-date with respect to the proposed analyses. It is anticipated that the resultant data will be comparable to that obtained from similar studies completed for the Site using the same sample preparation and analytical methods. Physical parameter data (grain size, TOC) will also be comparable to that historically collected at the Site.

Analyses will be performed by the following New Jersey-certified laboratories:

Laboratory	**NJDEP Certification No.**	**Analyses to be Performed**
TRC 41 Spring Street New Providence, NJ 07974 908-988-1700 Contact: Matt Beaupre	20043	Water Quality Indicator Parameters – pH, temperature, specific conductance, salinity, and dissolved oxygen
Eurofins Lancaster Laboratories Environmental, LLC 2425 New Holland Pike, Lancaster, PA 17605 717-656-2300 Contact: Megan Moeller	12129	TAL/TCL (VOC, SVOC, Metals); EPH, TOC, Grain Size Distribution, Percent Solids

Completeness

It is anticipated that 100% of the proposed samples will be usable with respect to analytical completeness. However, sampling completeness may fall below 100% due to the behavior and mobility of biota at the Site. Therefore, it is possible that some samples will not be collected (*e.g.*, if no fish are available due to seasonally low water conditions, etc.). Where this occurs, an explanation will be provided in the investigation report regarding the lack of data, which will be described as the percentage of samples collected with respect to the planned number of samples.

Sensitivity

Sensitivity requirements are a function of the laboratory's analytical reporting limits (RLs), which are summarized in Attachment 2 for each analytical. It is expected that laboratories RL's and/or Method Detection Limits (MDL's) will achieve the necessary Project Quantitation Limits (PQL's).

Project Team Responsibilities

This section identifies the contact information and the responsibilities of management, quality assurance (QA), field and laboratory personnel involved with this project.

Personnel	Title	Organization	Telephone No.	Responsibilities
Todd Reinold	**Project Manager**	TRC	908-988-1725 908-358-4656	Oversees technical aspects of project and primary contact with client project
Eric O'Conner	**Site Safety Officer**	TRC	908-988-1737 551-208-4155	Health & Safety Bayway and LPS Supervisor
Eric O'Conner	**Field Team Leader**	TRC	908-988-1737 551-208-4155	Supervises field sampling and coordinates all field activities, communicates with Project Manager
Dr. Robert Lippencott	**TRC Technical Director**	TRC	908-988-1628	Oversees field measurement equipment, internal quality assurance program and staff adherence to Standard
Megan Moeller	**Contract Laboratory Project Manager**	Eurofins Lancaster Laboratories	717-656-2300	Oversees project in laboratory and laboratory staff adherence to Standard Operating Procedures; maintains contact with TRC

Management Responsibilities

Project Manager

The Project Manager will serve as the primary point of contact to the client for technical matters as they relate to the project plans and regularly communicate with the Technical Director and Field Team Leader. The Project Manager will ensure that all the technical, administrative and regulatory compliance objectives are met on a day-to-day basis. Other duties may include:

- Assisting with project task scoping and conceptual model development,
- Assuring adherence to project plans and obtaining approvals for any changes to these plans,
- Assuring that approved procedures meet project objectives,
- Coordinating field and office activities with the Field Team Leader and Contract Laboratory Project Manager(s)
- Initiating corrective actions,
- Monitoring schedules for field, analytical and data validation activities associated with the field sampling and office activities;
- Reviewing and editing key technical deliverables;
- Assigning duties to project staff and orienting the staff to the specific needs and requirements of the project;
- Assisting in the coordination of all field tasks, communications, reports, and technical reviews, and other support functions, and facilitating activities with the technical requirements of the

project;

- Scheduling and coordinating field and office activities with the Principal-in-Charge, Project QA Manager, and Field Team Manager;
- Implementing recommendations made by the Project Technical Director/QA Manager,
- Ensuring the successful completion of the project in terms of budget, schedule, and data quality objectives;
- Interpreting site data and providing input into the development and finalization of key technical deliverables; and,
- Maintaining the project file.

Quality Assurance Responsibilities

Project Technical Director

The Project Technical Director/QA Manager has the overall responsibility for quality assurance oversight. The Project QA Manager will communicate directly with the Principal-in-Charge, the Project Manager and the Field Team Leader. Aside from the QA role, he oversees and provides corrective action suggestions on the technical aspects of the project. Specific responsibilities may include:

- Reviewing and approving QA procedures;
- Delegation of QA review tasks to staff;
- Assuring adherence to the QAPP and documenting any approved changes to the project plans;
- Ensuring that QA audits of the various project phases are conducted as required;
- Providing technical QA assistance to project staff;
- Following up on corrective actions;
- Ensuring that data collection is conducted in accordance with the QAPP; and,
- Reporting on the adequacy, status and effectiveness of the QA program.

Field Responsibilities

Field Team Leader and Site Safety Officer

The Field Team Leader and Site Safety Officer have the overall responsibility for the completion of all field activities in accordance with the QAPP and the other project plans and is the

communication link between the field team, subcontractors and TRC project management. Specific responsibilities may include:

- Understanding and implementing the QAPP;
- Mobilizing and demobilizing the field team and subcontractors to and from the Site;,
- Coordinating activities in the field;
- Assigning specific duties to field team members;
- Ensuring site security and access;
- Overseeing and coordinating field data collection in accordance with the workplan;
- Resolving logistical problems that could hinder the implementation of field activities or meeting specific data quality objectives, including equipment malfunctions, weather-dependent working conditions or personnel conflicts;
- Implementing field quality control procedures including issuing and tracking of measurement testing equipment, the proper labeling, handling, storage and shipment of samples, chain-of-custody procedures, and control and collection of field documentation;
- Summarizing and interpreting site data;
- Providing input into the development and finalization of key technical deliverables;
- Ensuring that all field activities are being implemented in accordance with the Health and Safety Plan (HASP);
- Evaluating new hazards and operation changes when necessary; and,
- Correcting all HASP non-compliance situations immediately and stopping work in cases of immediate danger.

Field Staff

The Field Staff will report directly to the Field Team Leader. The responsibilities of the field team may include:

- Understanding and implementing the QAPP requirements as they relate to their specified duties;
- Collecting samples and field measurements and decontaminating equipment in accordance with NJDEP guidance and the documented procedures stated in the QAPP;
- Ensuring that field instruments are properly calibrated, operated, and maintained and that adequate documentation is maintained for all instruments;
- Collecting the required QA samples and documenting the QA sample collection details,
- Ensuring that field documentation is complete, legible and accurate; and,
- Documenting and communicating any non-conformance or potential data quality issues to the Field Team Leader.

Laboratory Responsibilities

TRC Laboratory Project Manager

The TRC Laboratory Project Manager is ultimately responsible for the data produced by the laboratory. Specific responsibilities may include:

- Implementing and adhering to QA and corporate policies and procedures with TRC's laboratory;
- Approving Standard Operating Procedures (SOPs);
- Maintaining adequate staffing and equipment; and,
- Reviewing internal/external audits findings and implementing corrective actions.

Laboratory QA Manager
The Laboratory QA Manager reports directly to the TRC Laboratory Project Manager. Specific responsibilities may include:

- Approving the laboratory SOPs;
- Ensuring and improving quality within the laboratory;
- Supervising and providing guidance and training to laboratory staff;
- Addressing all client inquiries involving data quality issues;
- Performing QA audits and assessments;
- Tracking internal and external findings of QA audits; and,
- Coordinating laboratory certification and accreditation programs.

Contract Laboratory Project Manager
The Contract Laboratory Project Manager is the primary point of contact between the contract laboratory and TRC. Specific responsibilities may include:

- Maintaining communication with the client and contract laboratory staff on project status;
- Monitoring, reviewing and evaluating the progress and performance of projects;
- Reporting client inquiries involving data quality issues or data acceptability to Laboratory QA Manager and the operations staff; and,
- Reviewing data packages for completeness and compliance to client requirements/ specifications.

Laboratory Analyst/Technician
Each analyst or technician is responsible for:

- Evaluating instrument performance;
- Performing technical procedures and data recording in accordance with documented procedures;
- Performing and documenting calibration and preventative maintenance;
- Performing data processing and data review procedures;
- Reporting non-conformance to the Laboratory Manager or other appropriate personnel; and,
- Ensuring sample and data integrity by adhering to internal chain-of-custody procedures.

Laboratory Sample Custodian
The Sample Custodian ensures the implementation of proper sample receipt procedures,

including maintenance of the chain-of-custody. Other responsibilities may include:

- Notifying the Laboratory Project Manager of any discrepancies with incoming samples;
- Logging samples into the laboratory tracking system;
- Ensuring that all samples are stored in the proper equipment; and,
- Overseeing sample disposal.

Sample Collection and Documentation

All investigation activities to be conducted will be consistent with the TRSR, NJDEPS 2005 *Field Sampling Procedures Manual* (FSPM), the EETG and the Workplan.

A record of all field observations and procedural methodologies will be kept in bound field books throughout the duration of the field effort. The TRC field team will review all field notes recorded each day for legibility, accuracy and completeness. The field notes will include the date, names and affiliation of personnel on-site, chronology of activities including entry and exit times, weather conditions, level of personnel protection, site observations, field equipment measurements, sampling details, sketches and diagrams, information pertaining to photographs, page number and the signature of the author. All directives given by the Project Manager and other field decisions related to the additional delineation sampling will be recorded in the field book (e.g., area to be further delineated, sampling rationale, new sampling identification numbers, and analytical parameters).

Site maps will be maintained, and all sampling locations will be marked in the field. Plotted data can include GPS coordinates and photograph identification numbers.

Sample Handling and Custody Requirements

All sample identification will follow or be consistent with the sampling summary tables provided in the sampling workplan. The establishment of a standard sample designation/labeling protocol is essential to ensure adequate quality assurance/quality control and to allow tracking of each sample and the associated analytical data. Proper labeling allows for tracking of sampling beginning from the time of sample collection, through analysis, and following project completion should future data correlation be deemed necessary. The sample identification will be recorded on the chain-of-custody forms accompanying each sample shipment and recorded in the field books.

The TRC field personnel will coordinate with the laboratory for shipment and receipt of sample containers and coolers. Upon completion of sampling, the chain-of-custody will be filled out and returned with the samples to the laboratory. An important consideration for the collection of environmental data is the ability to demonstrate that the analytical samples have been obtained from pre-determined locations and that they have reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal must be documented to accomplish this. Documentation will be accomplished through a chain-of-custody form that records each sample and the names of the individuals responsible for sample collection, transport, and receipt. Sample custody will be initiated by field personnel upon collection of samples. Sample labels will be securely affixed to each sample container. Sample labels will clearly identify the

sample, and can include the following information:

- Site name and designated project number;
- Sampling location;
- Sample matrix (media type), e.g., animal tissue type (rodent, crab, fish, soil, etc.)
- Sample identification number (following the unique sample identification included on the media specific sampling summary tables);
- Date and time the sample was collected, and;
- Sample preservation.

The TRC field personnel will physically inspect all sample containers prepared for pickup or shipment prior to shipment. Samples will be packaged to prevent breakage or leakage during transport and will be delivered to the laboratory by a laboratory sample courier, TRC or an overnight delivery service.

The chain-of-custody will be carefully reviewed by TRC field personnel and compared with the contents of the accompanying cooler to confirm the accuracy of the custody record. Each individual who has the samples in his or her possession will sign the chain-of-custody. The original chain-of-custody record will be sealed in a watertight envelope and placed inside the shipping container. The shipping container will be sealed prior to being given to the laboratory sample courier.

Upon delivery at the laboratory, the laboratory sample custodian (or designated laboratory technician) will take possession of the samples. The sample custodian will open the shipping container, verify that the custody tape is intact, examine all sample containers for damage, measure and record the cooler temperature, compare the cooler contents with the chain-of-custody, verify that the holding times have not been exceeded, record, and sign and date the chain-of-custody record. The sample custodian will record any discrepancies or problems on the chain-of custody record and notify the Contract Laboratory Project Manager, who will subsequently notify the TRC Project Manager or QA Manager.

In addition, the sample custodian will notify the Laboratory Project Manager of the sample arrival. The sample custodian will attach labels with a unique laboratory identification to each sample container and place them in proper laboratory storage. The samples will be entered into the laboratory tracking system with all pertinent information including lab tracking number, project name, TRC sample identification, type of sample media, requested analysis, data and time of lab receipt of samples, and sample collection time and date. Evidence of the chain-of-custody and additional documentation will be placed in a file maintained by the laboratory.

Sample Quality Assurance and Quality Control

A New Jersey-certified laboratory will provide all sample containers for all environmental and quality assurance samples to be collected. If proposed as part of the workplan, duplicate samples, equipment field blanks and trip blanks will be collected during each sampling event for the same analytical parameters being proposed to assess and validate the quality of data generated. Field blanks are collected from decontaminated sampling equipment at a rate of one per day or 1 per 20

samples (whichever is less). Trip blanks are made by the laboratory and are transported in the coolers with the sample containers. Trip blanks are to be submitted to the laboratory at a rate of 1 per 20 VOC samples. Duplicates are generally collected at a rate of one for every 20 samples collected and analyzed for the same analytical parameters. Matrix spike/matrix spike duplicate (MS/MSD) samples are generally collected at a rate of one for every 20 samples collected. Additional sample volume will be collected to allow the laboratory to perform the MS/MSD testing when available.

The following Analytical Methods / Quality Assurance Summary Tables summarize the sampling program for all environmental and quality assurance samples to be collected.

Analytical Methods / Quality Assurance Summary Table

Matrix	Analysis	Number of Samples (estimated)	Field Duplicates	Trip Blanks	Field Equipment Blanks	Sample Volume/ Container (number, size and type)	Preservation	Maximum Holding Time (prep/ analysis)	Analytical Method
Sediment	Grain Size Distribution	TBD	NA	N/A	NA	1 32 Oz Glass	Sealed and cooled to 4°C	6 Months	ASTM D422-63
Sediment	TCL Volatile Organics	TBD	1 / 20 samples	1/20 samples	1/20 samples	3x5 gram Encore samplers	Sealed and cooled to 4°C	48 hours	8260C
Sediment	TCL Semi Volatile Organics	TBD	1 / 20 samples	NA	1/20 samples	1 4 oz Glass	Sealed and cooled to 4°C	Extraction: 14 Days Solid Analysis: 40 Days	8270D/SIM
Sediment	TAL Metals	TBD	1 / 20 samples	N/A	1/20 samples	1 4 oz Glass	Sealed and cooled to 4°C	6 Months for 6010; 28 days for 7471	6010/7471
Sediment	Total Organic Carbon	TBD	1 / 20 samples	N/A	NA	1 2 oz Glass	Sealed and cooled to 4°C	28 Days	9060A
Sediment	pH	TBD	NA	N/A	NA	1 4 Oz Glass	Sealed and cooled to 4°C	ASAP (24 hours)	SM4500

Field Equipment Calibration

All field equipment will be calibrated in accordance with the manufacturer's instructions and the Equipment Calibration Table provided below. In addition, all equipment to record water quality indicator parameters will be calibrated in accordance with the manufacturer's instructions and TRC's standard operating procedures (SOPs) for the water quality indicator parameters (e.g., pH, temperature, specific conductance and dissolved oxygen) per TRC's Quality Control Manual and under TRC New Jersey DEP Certified laboratory certification.

Any equipment which provides unusual responses or questionable results will be re-calibrated or replaced to ensure satisfactory equipment performance. If extreme vapor concentrations are measured during field screening, the equipment will be re-calibrated to ensure proper field measurements. Any equipment that has been shown to be defective, will be deactivated, labeled and stored at a specified place until it can be repaired.

The TRC sampling team will record the daily field equipment calibration activities in the field book with a clear description of equipment type, manufacturer name and identification number, calibration test performed and results, time and date.

Field Equipment Calibration Table

Sampling Equipment	Calibration/Maintenance Activity	Frequency	Acceptance Criteria	Correction Action	Responsible Person
Temperature	Calibration in accordance with Equipment Manual	Calibrated Quarterly	NA	NA	Field Team Leader
pH	Calibration in accordance with Equipment Manual	Daily - before Use	The buffer checks should be within +/- 0.2 of the true values	Re-Calibrate or Service	Field Team Leader
Conductivity	Calibration in accordance with Equipment Manual	Daily - before Use	NA	NA	Field Team Leader
Dissolved Oxygen	Calibration in accordance with Equipment Manual	Daily - before Use	Refer to Manual	Re-Calibrate or Service	Field Team Leader

Field Equipment Decontamination

All disposable, dedicated sampling equipment will be used only once and discarded after sampling. All reusable field sampling equipment will be appropriately decontaminated after each use.

The following decontamination sequence is the minimum that will be employed on all reusable field sampling equipment prior to and following sample collection events. This decontamination procedure may be expanded to include additional decontamination steps, in conformance with the NJDEP's *Field Sampling Procedures Manual*.

- Non-phosphate detergent plus tap water wash
- Tap water rinse
- Distilled/deionized water rinse
- Air dry
- Wrap Equipment in Aluminum (or Place in Plastic Bag)

All fluids generated during decontamination activities will handled in accordance with the NJDEP's *Field Sampling Procedures Manual*.

Laboratory Deliverables

Upon receipt of laboratory results for various sampling events, TRC will evaluate the data for accuracy and validity. All analytical data will be submitted in hard copy and in an electronic deliverable format which adheres to the guidelines specified in the NJDEP's *Site Remediation Program Electronic Data Interchange Manual*.

In accordance with these requirements, TRC will complete a HAZSITE Data Entry Application for the individual laboratory data sets generated and include the information on a diskette with the report submittal to NJDEP. The HAZSITE application is electronic, menu driven, specifies all required fields and valid entries, and includes administrative checks. In addition, these data will be summarized in tabular form and plotted on site maps for submission to NJDEP.

ATTACHMENT 1:

Method Specific DQI Tables (Appendix B of NJDEP Quality Assurance Project Plan Technical Guidance)

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be check every 6 months	A minimum of 3 different concentration standards across the ICP range; one should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi- point calibration curve; linear curve fit with correlation coefficient $\geq$0.995.	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Initial Calibration Blanks (ICB)	After ICV	Must be matrix-matched (and same concentration of acid found in standards and samples); ICB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 of every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. all samples since last acceptable CCV	Analyst

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Sensitivity	A	Continuing Calibration Blanks (CCB)	After each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL	Re-calibrate, if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSB: 80-120% recovery ICSA: non-spiked analytes ≤ 2x RL	Re-analyze; if still out; adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80- 120% recovery; Soil/Sediment/solid LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out; redigest & Re-analyze LCS & all field samples in batch	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Re-analyze, qualify data	Analyst/Data Reviewer

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per < 20 field samples	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Post digestion spike	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per ≤ 20 field samples if less than acceptable accuracy and precision data	Perform 5x dilution on same sample used for MS. % Difference ≤ 10% for results >50x IDL (which will most likely equate to 10X RL).	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ linear calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Represent-ativeness	S & A	Field Duplicate Sample [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

Table 1 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6010B (*Inductively Coupled Plasma-Mass Spectrometry*, December 1996 and February 2007) and (*Quality Assurance and Quality Control Requirements and Performance Standards for SW846 Method 6010B, Trace Metals by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP)*).

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Linear Dynamic Range (LDR)	At a minimum the LDR should be check every 6 months	A minimum of 3 different concentration standards across the ICP range one should be near the upper limit of the range.	NA	Analyst
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of a calibration blank plus a standard per manufacturing recommended procedures; RL standard may be included in multi- point calibration curve; linear curve fit with correlation coefficient ≥0.998.	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; must contain all target analytes ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Sensitivity	A	Low Level Initial Calibration Verification	For method 6010C, LLICV must be analyzed at the beginning of the run before any samples and at the end of the run.	Same source as calibration standards; must contain all target analytes at the RL 70-130% recovery	Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL	Analyst
Accuracy	A	Initial Calibration Blanks (ICB)	After ICV	Must be matrix-matched (and same conc. of acid found in standards and samples); ICB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; must contain all target analytes CCV: 90 - 110% recovery	Re-analyze; if still out, Re-calibrate and reanalyze. All samples since last acceptable CCV	Analyst
Sensitivity	A	Low Level Continuing Calibration Verification	For method 6010C, LLCCV must be analyzed at the beginning of the run before any samples and at the end of the run.	Same source as initial calibration standards; must contain all target analytes at the RL 70-130% recovery	Re-analyze. If still out, Re-calibrate/re-analyze. Suspend all analyses until LLICV meets criteria unless all results > 10x RL	Analyst
Sensitivity	A	Continuing Calibration Blanks (CCB)	After each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL	Re-analyze ; if still out, Re-calibrate and reanalyze.	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Interference Check Standards (ICSA and ICSAB)	Daily after calibration	ICSA & ICSB: 80-120% recovery ICSA: non-spiked analytes ≤ 2x RL	Re-analyze; if still out, adjust interference and background correction, and/or linear ranges as needed & recalibrate and reanalyze all field samples since last complaint ICSA & ICSB	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must contain all target analytes and be matrix-specific; Aq. LCS: 80- 120% recovery; Soil/Sediment/sol-id LCS: vendor control limits (95% confidence limits)	Re-analyze, if still out' redigest & Re-analyze LCS & all field samples in batch	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per < 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Re-analyze, qualify data	Analyst/Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample and qualify data	Analyst/Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per < 20 field samples	Must be performed on a Site field sample. For soil and aqueous samples: Results ≥ 5xRL, RPD ≤ 20% aqueous, 35% solids; Results < 5xRL: absolute difference between results ≤ RL.	Lab narrates outlier; qualify data	Analyst/Data Reviewer

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Post digestion spike	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Should be performed if MS/MSD recoveries were unacceptable: 80-120% recovery	Lab narrates outlier; qualify data	Analyst/Data Reviewer
Accuracy	A	Serial Dilution	1 per ≤ 20 field samples if less than acceptable accuracy and precision data are generated	Perform 5x dilution on same sample used for MS % Difference < 10% for results >10x RL.	Lab narrates outlier qualify data	Analyst/Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ linear calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range; report from diluted analysis	Analyst/Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Sample [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved per SW-846 Chapter 3 Table 3-2	Lab narrates outlier. Potential data usability issue	Data Reviewer

Table 2 QAPP Worksheet All Matrices – Metals (ICP) USEPA SW-846 6010C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum $\geq$ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Accuracy/ Sensitivity	S & A	Holding Time (HT)	every field sample	For aqueous and soil samples six months. If Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier. Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous Potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, January 2012 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 6010C (*Inductively Coupled Plasma-Mass Spectrometry*, Revision 3 February 2007).

Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Initial Calibration	Daily prior to sample analysis	Minimum of 5 calibration levels plus blank; low level standard at level of RL; linear regression with a correlation coefficient r $\geq$ 0.995	Re-optimize instrument and re-calibrate, repeat until successful	Analyst
Accuracy	A	Initial Calibration/ Initial Calibration Verification (ICV)	Daily after calibration	Separate-source from calibration standards; ICV: 90-110% recovery	Re-analyze; if still out, Re-calibrate as required by method; suspend all analysis until ICV meets criteria	Analyst
Accuracy	A	Continuing Calibration Verification (CCV)	1 of every 10 samples and at end of run	Same source as calibration standards; conc. near mid-point of calibration curve; CCV: –80 - 120% recovery	Re-analyze and, if still out, Re-calibrate and Re-analyze all samples since last acceptable CCV	Analyst
Sensitivity	A	Initial and Continuing Calibration Blanks (ICB and CCB)	After ICV and after each CCV	Must be matrix-matched (and same conc. of acid found in standards and samples); CCB: < ± RL	Re-analyze; if still out, Re-calibrate, reanalyze.	Analyst
Sensitivity	A	Low Level Calibration Check Standard	Daily only if RL standard is not included in initial calibration	Low Level Check Standard: 70-130% recovery	Recalibrate/reanalyze unless all results > 10x RL	Analyst
Accuracy & Sensitivity (Contamination)	A	Method Blank (MB)	1 per digestion batch - not to exceed 20 field samples	Must be digested with samples using same preparation method and amount of acids; MB: < RL	Re-analyze; if still out redigest & re-analyze all samples unless all detected results > 10x MB level	Analyst

Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Laboratory Control Sample (LCS)	1 per digestion batch - not to exceed 20 field samples	Must be matrix-specific; aqueous LCS: 80-120% recovery; Soil/Sediment LCS vendor control limits (95% confidence)	Re-analyze, if still out; redigest (soil/sed.) & Re-analyze LCS & all field samples in batch	Analyst/ Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. Aq.: Results RPD ≤ 20%; Soil/Sediment: Results, RPD ≤ 35%;	Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	S & A	Matrix Spike (MS) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample; MS: 75-125% recovery; professional judgment if sample concentration > 4x spike level	Evaluate LCS, unspiked sample, re-analyze, if necessary, and qualify data	Analyst/ Data Reviewer
Precision	S & A	Matrix Spike Duplicate (MSD) [Site-specific QC]	1 per ≤ 20 field samples	Must be performed on a Site field sample Aq.: Results ≥ 5xRL, RPD ≤ 20%; Results < 5xRL: absolute difference between results ≤ RL. Soil/Sediment: Results ≥ 5xRL, RPD ≤ 35%; Results < 5xRL: absolute difference between results ≤ 2xRL	Lab narrates outlier; Re-analyze, qualify data	Analyst/ Data Reviewer
Accuracy	A	Quantitation	Not applicable	RL ≤ results ≤ upper calibration range on a sample-specific basis. Report all Aq. results in µg/L or mg/L and all Soil/Sediment results in mg/Kg on a dry-weight basis.	Perform dilution to bring analyte within linear range, report from diluted analysis	Analyst/ Data Reviewer
Overall Precision & Representative ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	Aq.: Results ≥ 5xRL: RPD ≤ 30%; Results < 5xRL: professional judgment; Soil/Sediment: Results ≥ 5xRL: RPD ≤ 50%; Results < 5xRL: professional judgment	Potential data usability issue; indication of sample heterogeneity	Data Reviewer

Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy (preservation)	S & A	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	Soil/Sediment: ≤ 6º C per SW-846 Chapter 3 Table 3-2 but allow for < 2º C if freezing samples are intact	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy (preservation)	S & A	Sample preservation	Every field sample	Aq.: Total Metals: HNO_3 pH < 2; (Dissolved Metals: filter on site or at the lab then HNO_3 pH < 2 but cannot be used for regulatory compliance) Soil/Sediment: collect unpreserved and keep cold (see above)	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous and Soil/Sediment: HT = 28 days from collection to analysis i f Soil/Sediment samples are frozen, HT arrested and HT begins when thawed. Samples can be maintained frozen for 1 year from collection.	Lab narrates outlier; Potential data usability issue	Data Reviewer
Accuracy & Sensitivity (Contamination)	S & A	Equipment Rinsate Blank (EB)	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Aqueous EB: < RL Soil/Sediment EB <RL on solid equivalent basis	Aqueous potential data usability issue, Soil/Sediment: non-matrix matched aqueous EB use professional judgment	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	Minimum ≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator

Table 3 QAPP Worksheet All Matrices - Mercury SW-846 Method 7471B and 7470A
Measurement Performance Criteria & QC Samples Table– Mercury

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, April 2014 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Method References = USEPA SW-846 Method 7471B (*Mercury in Solid or Semisolid Waste by Manual Cold Vapor Technique*, February 2007) and USEPA SW-846 Method 7470A (*Mercury in Aqueous Samples by Manual Cold Vapor Technique*, September 1994).

Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 4 of USEPA-SW846 Method 8260B	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: RF for SPCCs Section 7.3.5.4; %RSD ≤ 15% for all compounds except CCC's which must be ≤30% RSD or "r" ≥ 0.99; SIM: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds; regression analysis, if used, must not be forced through the origin	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per preparatory batch of up to 20 field samples (matrix-specific)	Targets analytes must be < RL except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if a MS/MSD was not performed	Must be performed on a Site field sample. RPDs ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70- 130% for all compounds.	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	3 per sample including QC	Minimum of 3 IS , Areas 50-200% of the most recent CCV; RTs ±30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 20% for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ⩽ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to < 2 with HCL or per SW-846 Table 4-1 preservatives.	Potential data usability issue	Data Reviewer

Table 4 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260B
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method.	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260B (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260B* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4- dioxane.

Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	BFB Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8260C	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCV fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; Full Scan: %RSD ≤ 20% for all compounds and minimum RF found in Table 4 or "r" ≥ 0.99; SIM: %RSD ≤ 20% and minimum RF found in Table 4 or "r" ≥ 0.99 for all compounds;	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per preparatory batch of up to 20 field samples (matrix-specific)	Targets analytes must be < RL except for common laboratory contaminates (acetone, methylene chloride and MEK) which must be < 5x RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 40-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field samples per matrix	Must contain all target analytes, performed on Site field sample, recovery criteria same as MS; RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per preparatory batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 40-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if a MS/MSD was not performed	Must be performed on a Site field sample. RPDs ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 surrogates at retention times across GC run for all matrices; surrogates must be between 70- 130% for all compounds.	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	3 per sample including QC	Minimum of 3 IS , Areas 50-200% of the most recent midpoint CCV standard; RTs ± 30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan and SIM*: min RRF criteria met; %D or % Drift ≤ 20% for all compounds	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ⩽ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Analyses within 14 days of collection (7 days if unpreserved). Aqueous samples adjust pH to < 2 with HCL or per SW-846 Table 4-1 preservatives.	Potential data usability issue	Data Reviewer

Table 5 QAPP Worksheet All Matrices – VOAs by USEPA SW-846 8260C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, April 2014, to be compliant with EPA Region 2 guidance and meets the data quality needs of the Department.

2. Volatile Organic Compound analyses via USEPA SW-846 Method 8260C (*Quality Assurance and Quality Control Requirements for SW-846 Method 8260C* or 8260C *Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).*

** Potentially "difficult" analytes include: acetone, methyl ethyl ketone, 4-methyl-2-pentanone, 2-hexanone, dichlorodifluoromethane, bromomethane, chloromethane, carbon disulfide, 1,2-Dibromo-3-chloropropane, chloroethane, naphthalene, trichlorofluoromethane, and 1, 4- dioxane.

Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	DFTPP Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270C	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; *Full Scan*: RF ≥ 0.05 for SPCCs; %RSD ≤ 15% for all compounds except CCCs which must be ≤20% RSD or "r" ≥ 0.99; *SIM*: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples	Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and narrate issue	Analyst/Data Reviewer

Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 20-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per < 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. RPD ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for Acid surrogates	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	6 per sample including QC	Minimum of 6 IS , Areas 50-200% of the most recent CCV standard; RTs ± 30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hours prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan*: %D or %Drift ≤ 20% for CCCs and ≤ 30% for all other compounds *SIM*: %D or %Drift ≤ 30%	Recalibrate as required by method; note outliers in narrative.	Analyst

Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Quantitation	Every sample	RL ⩽ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer

Table 6 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270C
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.
2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW- 846 Method* 8270D *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).* 8270D:

** Potentially "difficult" analytes include: benzenthiol, benzoic Acid, 2,4-dintrophenol, 3&4 – methylphenol, 4-nitrophenol, pentachlorophenol, phenol, aniline, aramite, A,A-dimethylphenethylamine, benzidine, benzaldehyde, benzyl Alcohol, caprolactam, chlorobenzilate, 3,3'- Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p- (dimethylamine)azobenzene, decane, famphur, hexachlorocyclopentadiene, hexachloroethane, hexachlorophene, hexachloropropene, kepone, 4,4'-methylenebis(2-chloroaniline), methapyrilene, methyl methanesulfonate, methyl parathion, n-nitrosodimethylamine, 4-nitroquinoline-1-oxide, 2-Picoline, parathion, pentachloroethane, pentachlorobenzene, pentachloronitrobenzene, phorate, pronamide, pyridine, p-phenylenediamine, o- tricresyl phosphate and Tetraethyl. Please note that many of the surrogates may fall outside of the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4,6-tribromophenol and terphenyl-d14.

Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	DFTPP Tune	Every 12 hours	Method tune criteria based on criteria in Table 3 of USEPA-SW846 Method 8270D	Perform instrument maintenance; reanalyze until acceptable	Analyst
Accuracy	A	Initial Calibration (ICAL)	Initially and when CCAL fails	Minimum 5-standards; must contain all targets and lowest standard ≤ RL; *Full Scan*: RF see Table 4 for minimum RF; %RSD ≤ 20% for all compounds or "r" ≥ 0.99; *SIM*: %RSD ≤ 20% or "r" ≥ 0.99 for all compounds	Recalibrate as required by method; analysis cannot proceed without a valid initial calibration	Analyst
Accuracy/ Sensitivity	A	Method Blank	1 per extraction batch of up to 20 field samples	Must be matrix matched; Phthalates < 5xRL; All other Targets < RL, surrogates in criteria	Reanalyze and, if necessary, re-extract. Report non-conformance in narrative; compounds present in blank should be flagged "B" in samples, if detected.	Analyst
Accuracy	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery 70-130% except for difficult analytes** which must exhibit % recovery between 20-160%	Evaluate LCS, unspiked sample, reanalyze, if necessary, and qualify data and Narrate issue	Analyst/Data Reviewer

Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Precision	A	Matrix Spike/ Matrix Spike Duplicate [Site-specific QC]	1 per ≤ 20 field per matrix samples	Must contain all target analytes, performed on Site field sample, % recovery criteria same as MS. RPDs ≤ 20% for waters and ≤ 30% for solids	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Laboratory Control Sample (LCS)	1 per extraction batch of up to 20 samples	Must contain all target analytes, be matrix-matched; % Recovery 70- 130% except for difficult analytes ** must exhibit percent recoveries between 20-160%.	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Precision	A	Sample Duplicate (DUP)	1 per ≤ 20 field samples if an MS/MSD was not performed	Must be performed on a Site field sample. RPD ≤ 20% for waters and ≤ 30% for solids for results > 2x RL	Reanalyze, if necessary, qualify data and narrate issues of non-conformance	Analyst/Data Reviewer
Accuracy	A	Surrogates	Every sample including QC	Minimum of 3 base-neutral and 3 acid surrogates at RTs across GC run; for solids Matrices must be between 30-130% for all compounds; for water matrices 30-130% for BN surrogates and 15-110% for acid surrogates	Reanalyze, if necessary, qualify data	Analyst/Data Reviewer
Accuracy	A	Internal Standards (IS)	6 per sample including QC	Minimum of 6 IS, Areas 50-200% of the most recent t CCV standard; RTs ± 30 sec. from midpoint ICAL standard	Reanalyze and qualify data	Analyst/Data Reviewer

Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy	A	Continuing Calibration Verification (CCV)	1 every 12 hour prior to analysis of samples	Concentration level near mid-point of ICAL curve containing all target compounds; *Full Scan*: %D or %Drift ≤ 20% for CCCs and ≤ 30% for all other compounds; *SIM*: %D or %Drift ≤ 30%	Recalibrate as required by method; note outliers in narrative.	Analyst
Accuracy	A	Quantitation	Every sample	RL ⩽ results ≤ upper calibration range on a sample-specific basis; IS must be used; and RL ⩽ results ≤ upper calibration range on a sample-specific basis; IS must be used; and average response factors or curve-statistics generated from the ICAL must be used for quantitation. Results reported between the MDL and RL qualified "J"	Perform dilution to bring analyte within linear range, qualify data	Analyst/Data Reviewer
Sensitivity	A	Reporting of Non-Detects	Every sample	Reported at the sample-specific RL which must be ≤ PRL	Potential data usability issue	Data Reviewer
Overall Precision & Representative-ness	S & A	Field Duplicate Samples [Site-specific QC]	1 per 20 field samples	RPD ≤ 30% for waters or RPD ≤ 50% for solids w/results > 2x RL; Professional judgment for results < 2xRL	Potential data usability issue	Data Reviewer
Accuracy (preservation)	S	Temperature Blank or other Cooler Temperature Reading	1 Temperature reading per cooler to be recorded upon receipt at lab	≤ 6º C; allow for < 2º C if samples intact sample preservation per SW-846 Chapter 4 Table 4-1	Potential data usability issue	Data Reviewer

Table 7 QAPP Worksheet All Matrices – - SVOAs by USEPA SW-846 8270D
Measurement Performance Criteria & QC Samples

Data Quality Indicator (DQI)	QC Measure for Sampling (S), Analytical (A), or both (S&A)	QC Sample or Activity	Frequency / Number	QC Acceptance Limits (Measurement Performance Criteria)	Corrective Action (CA)	Person(s) Responsible for CA
Accuracy/ Sensitivity	S & A	Holding Time (HT)	Every field sample	Aqueous samples extracted within 7 days of collection; extract analyzed within 40 days of extraction. Soil/Sediment samples extracted within 14 days of collection; extract analyzed within 40 days of extraction. If Soil/Sediment samples are frozen, HT arrested and extraction HT continues when thawed. Solid samples can be maintained frozen for 1 year from collection.	Potential data usability issue	Data Reviewer
Accuracy/ Sensitivity	S	Equipment Blank [Site-specific QC]	Not Required if using dedicated sampling equipment. If performing decontamination of equipment, collect 1 EB per 20 field samples collected by the same method	Target analytes < RL	Potential data usability issue	Data Reviewer
Data Completeness	S & A	Calculate from valid/usable data collected	Not applicable	≥ 90% Overall	Potential data usability / data gap issue	Data Reviewer/ Investigator
Comparability	S & A	Based on Method (SOP) and QAPP/FSP protocols	Not applicable	Comparison between historical data for qualitative integrity of the data. Comparison between spatially similar samples.	Potential data usability issue	Data Reviewer/ Investigator

NOTES:

1. This table was prepared by NJDEP, January 2011 to be compliant with EPA Region 2 guidance and meet the data quality needs of the Department.

2. Semivolatile Organic Compound analyses via USEPA SW-846 Method 8270D (*Quality Assurance and Quality Control Requirements for SW- 846 Method* 8270D *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectroscopy [GC/MS]).* 8270D:

** Potentially "difficult" analytes include: Benzenthiol, Benzoic Acid, 2,4-Dintrophenol, 3&4 – Methylphenol, 4-Nitrophenol, Pentachlorophenol, Phenol, Aniline, Aramite, A,A-Dimethylphenethylamine, Benzidine, Benzaldehyde, Benzyl Alcohol, Caprolactam, Chlorobenzilate, 3,3'- Dimethylbenzidine, 1,4-Dioxane, 7,12-Dimethylbenz(a)anthracene, Diallate, Dibenz(a,j)acridine, Diphenylamine, Disulfoton, p- (dimethylamine)azobenzene, Decane, Famphur, Hexachlorocyclopentadiene, Hexachloroethane, Hexachlorophene, Hexachloropropene, Kepone, 4,4'-methylenebis(2-chloroaniline), Methapyrilene, Methyl methanesulfonate, Methyl parathion, n-Nitrosodimethylamine, 4-Nitroquinoline-1-oxide, 2-Picoline, Parathion, Pentachloroethane, Pentachlorobenzene, Pentachloronitrobenzene, Phorate, Pronamide, Pyridine, p-Phenylenediamine, o-
tricresyl phosphate and Tetraethyl. Please note that many of the surrogates fall outside or the 15 – 110% range 2-Fluorophenol, Phenol-d5, 2,4, 6- Tribromophenol and Terphenyl-d14.

ATTACHMENT 2:

Reporting List and Project Quantitation Limits

VOC's-8260 (mg/kg)	Cas No.	*ER-L*	*ER-M*	*MDL*	Laboratory PQL
Acetone	67-64-1	--	--	*0.006*	*0.02*
Benzene	71-43-2	*0.34*	--	*0.0005*	*0.005*
Bromochloromethane	74-97-5	--	--	*0.0006*	*0.005*
Bromodichloromethane	75-27-4	--	--	*0.0004*	*0.005*
Bromoform	75-25-2	--	--	*0.005*	*0.01*
Bromomethane	74-83-9	--	--	*0.0007*	*0.005*
2-Butanone (MEK)	78-93-3	--	--	*0.001*	*0.01*
Carbon Disulfide	75-15-0	--	--	*0.0006*	*0.005*
Carbon tetrachloride	56-23-5	--	--	*0.0005*	*0.005*
Chlorobenzene	108-90-7	--	--	*0.0005*	*0.005*
Chloroethane	75-00-3	--	--	*0.001*	*0.005*
Chloroform	67-66-3	--	--	*0.0006*	*0.005*
Chloromethane	74-87-3	--	--	*0.0006*	*0.005*
cis-1,2-Dichloroethene	156-59-2	--	--	*0.0005*	*0.005*
cis-1,3-Dichloropropene	10061-01-5	--	--	*0.0004*	*0.005*
Cyclohexane	110-82-7	--	--	*0.0005*	*0.005*
1,2-Dibromo-3-chloropropane	96-12-8	--	--	*0.0004*	*0.005*
Dibromochloromethane	124-48-1	--	--	*0.0004*	*0.005*
1,2-Dibromoethane	106-93-4	--	--	*0.0004*	*0.005*
1,2-Dichlorobenzene	95-50-1	--	*0.013*	*0.0005*	*0.005*
1,3-Dichlorobenzene	541-73-1	--	--	*0.0005*	*0.005*
1,4-Dichlorobenzene	106-46-7	--	*0.11*	*0.0004*	*0.005*
Dichlorodifluoromethane	75-71-8	--	--	*0.0006*	*0.005*
1,1-Dichloroethane	75-34-3	--	--	*0.0005*	*0.005*
1,2-Dichloroethane	107-06-2	--	--	*0.0006*	*0.005*
1,1-Dichloroethene	75-35-4	--	--	*0.0005*	*0.005*
1,2-Dichloropropane	78-87-5	--	--	*0.0005*	*0.005*
1,3-Dichloropropene (total)	542-75-6	--	--	*N/A*	*0.005*
Ethylbenzene	100-41-4	*1.4*	--	*0.0004*	*0.005*
2-Hexanone	591-78-6	--	--	*0.001*	*0.01*
Isopropylbenzene	98-82-8	--	--	*0.0004*	*0.005*
Methyl Acetate	79-20-9	--	--	*0.001*	*0.005*
Methyl Tert Butyl Ether (MTBE)	1634-04-4	--	--	*0.0005*	*0.005*
4-methyl-2-pentanone (MIBK)	108-10-1	--	--	*0.001*	*0.01*
Methylcyclohexane	108-87-2	--	--	*0.0006*	*0.005*
Methylene chloride	75-09-2	--	--	*0.002*	*0.005*
Styrene	100-42-5	--	--	*0.0003*	*0.005*
1,1,2,2-Tetrachloroethane	79-34-5	--	--	*0.0004*	*0.005*
Tetrachloroethene	127-18-4	*0.45*	--	*0.0005*	*0.005*
Toluene	108-88-3	*2.5*	--	*0.0006*	*0.005*

trans-1,2-Dichloroethene	156-60-5	--	--	*0.0005*	*0.005*
trans-1,3-Dichloropropene	10061-02-6	--	--	*0.0003*	*0.005*
Freon 113	76-13-1	--	--	*0.0006*	*0.01*
1,2,3-Trichlorobenzene	87-61-6	--	--	*0.005*	*0.01*
1,1,1-Trichloroethane	71-55-6	--	--	*0.0006*	*0.005*
1,1,2-Trichloroethane	79-00-5	--	--	*0.0005*	*0.005*
Trichloroethene	79-01-6	*1.6*	--	*0.0005*	*0.005*
Trichlorofluoromethane	75-69-4	--	--	*0.0007*	*0.005*
1,2,4-Trichlorobenzene	120-82-1	--	*0.0048*	*0.005*	*0.01*
Vinyl Chloride	75-01-4	--	--	*0.0006*	*0.005*
m,p-Xylene	179601-23-1	--	--	*N/A*	*N/A*
o-Xylene	95-47-6	--	--	*0.0004*	*0.005*
Xylenes (total)	1330-20-7	*0.12*	--	*0.001*	*0.005*

SVOC's-8270/8270SIM (mg/kg)	**Cas No.**	***ER-L***	***ER-M***	***MDL***	***Laboratory PQL***
Acenaphthene	83-32-9	*0.016*	*0.5*	*0.003*	*0.017*
Acenaphthylene	208-96-8	*0.044*	*0.64*	*0.003*	*0.017*
Acetophenone	98-86-2	--	--	*0.023*	*0.05*
Anthracene	120-12-7	*0.085*	*1.1*	*0.003*	*0.017*
Atrazine	1912-24-9	--	--	*0.033*	*0.17*
Benzaldehyde	100-52-7	--	--	*0.067*	*0.17*
Benzo(a)pyrene	50-32-8	*0.43*	*1.6*	*0.007*	*0.017*
Benzo(a)anthracene	56-55-3	*0.261*	*1.6*	*0.003*	*0.017*
Benzo(b)fluoranthene	205-99-2	--	*1.8*	*0.003*	*0.017*
Benzo(ghi)perylene	191-24-2	*0.17*	--	*0.007*	*0.017*
Benzo(k)fluoranthene	207-08-9	*0.24*	--	*0.003*	*0.017*
BHC (Benzohexachloride)	608-73-1	*0.003*	--	*N/A*	*N/A*
1,1-Biphenyl	92-52-4	--	--	*0.017*	*0.037*
bis(2-Chloroethoxy)methane	111-91-1	--	--	*0.017*	*0.037*
bis(2-Chloroethyl)ether	111-44-4	--	--	*0.023*	*0.05*
bis(2-Chloroisopropyl)ether	108-60-1	--	--	*0.017*	*0.037*
bis(2-Ethylhexyl)phthalate	117-81-7	*0.18216*	*2.64651*	*0.067*	*0.17*
4-Bromophenyl-phenylether	101-55-3	--	--	*0.02*	*0.05*
Butyl benzyl phthalate	85-68-7	--	*0.063*	*0.067*	*0.17*
Caprolactam	105-60-2	--	--	*0.033*	*0.17*
Carbazole	86-74-8	--	--	*0.017*	*0.037*
2-Chloronaphthalene	91-58-7	--	--	*0.007*	*0.033*
2-Chlorophenol	95-57-8	--	*0.008*	*0.017*	*0.037*
4-Chlorophenyl-phenylether	7005-72-3	--	--	*0.017*	*0.037*
Chrysene	218-01-9	*0.384*	*2.8*	*0.003*	*0.017*
Dibenz(a,h)anthracene	53-70-3	*0.063*	*0.26*	*0.003*	*0.017*

Dibenzofuran	132-64-9	--	--	*0.017*	*0.037*
3,3'-Dichlorobenzidine	91-94-1	--	--	*0.1*	*0.33*
2,4-Dichlorophenol	120-83-2	--	*0.005*	*0.017*	*0.037*
Diethyl phthalate	84-66-2	--	*0.006*	*0.067*	*0.17*
2,4-Dimethyl phenol	105-67-9	--	--	*0.017*	*0.037*
Dimethyl phthalate	131-11-3	--	--	*0.067*	*0.17*
Di-n-butyl phthalate	84-74-2	--	*0.058*	*0.067*	*0.17*
4,6-Dinitro-2-methylphenol	534-52-1	--	--	*0.17*	*0.5*
2,4-Dinitrophenol	51-28-5	--	--	*0.37*	*1*
Dinitrotoluene (2,4-2,6-mixture)	25321-14-6	--	--	*N/A*	*0.2*
2,4-Dinitrotoluene	121-14-2	--	--	*0.067*	*0.17*
2,6-Dinitrotoluene	606-20-2	--	--	*0.02*	*0.05*
Di-n-octyl phthalate	117-84-0	--	--	*0.067*	*0.17*
1,4-Dioxane	123-91-1	--	--	*0.1*	*0.33*
Fluoranthene	206-44-0	*0.6*	*5.1*	*0.003*	*0.017*
Fluorene	86-73-7	*0.019*	*0.54*	*0.003*	*0.017*
Hexachlorobenzene	118-74-1	*0.02*	--	*0.003*	*0.017*
Hexachlorobutadiene	87-68-3	--	*0.0013*	*0.02*	*0.05*
Hexachlorocyclopentadiene	77-47-4	--	--	*0.17*	*0.5*
Hexachloroethane	67-72-1	--	*0.073*	*0.033*	*0.17*
Indeno(1,2,3-cd)pyrene	193-39-5	*0.2*	--	*0.007*	*0.017*
Isophorone	78-59-1	--	--	*0.017*	*0.037*
2-Methylnaphthalene	91-57-6	*0.07*	*0.67*	*0.01*	*0.033*
2-Methylphenol	95-48-7	--	--	*0.027*	*0.067*
3&4-Methylphenol	65794-96-9	--	--	*0.02*	*0.05*
Naphthalene	91-20-3	*0.16*	*2.1*	*0.007*	*0.017*
2-Nitroaniline	88-74-4	--	--	*0.02*	*0.05*
3-Nitroaniline	99-09-2	--	--	*0.067*	*0.17*
4-Nitroaniline	100-01-6	--	--	*0.067*	*0.17*
Nitrobenzene	98-95-3	--	--	*N/A*	*0.2*
2-Nitrophenol	88-75-5	--	--	*0.017*	*0.037*
4-Nitrophenol	100-02-7	--	--	*0.17*	*0.5*
n-Nitrosodi-n-propylamine	621-64-7	--	--	*0.02*	*0.05*
n-Nitrosodiphenylamine	86-30-6	--	--	*0.017*	*0.037*
p-Chloroaniline	106-47-8	--	--	*0.033*	*0.17*
p-Chloro-m-cresol	59-50-7	--	--	*0.017*	*0.037*
Pentachlorophenol	87-86-5	--	*0.017*	*0.037*	*0.17*
Phenanthrene	85-01-8	*0.24*	*1.5*	*0.003*	*0.017*
Phenol	108-95-2	--	*0.13*	*0.023*	*0.05*
Pyrene	129-00-0	*0.665*	*2.6*	*0.003*	*0.017*
1,2,4,5-Tetrachlorobenzene	95-94-3	--	--	*0.017*	*0.037*
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	*0.067*	*0.17*

2,4,5-Trichlorophenol	95-95-4	--	*0.003*	*0.02*	*0.05*
2,4,6-Trichlorophenol	88-06-2	--	*0.006*	*0.02*	*0.05*

Metals-6010C/7471 (mg/kg)	**Cas No.**	***ER-L***	***ER-M***	***MDL***	**Laboratory PQL**
Aluminum	7429-90-5	--	*18000*	*11.8*	*60.0*
Antimony	7440-36-0	--	*9.3*	*1.70*	*10.0*
Arsenic	7440-38-2	*8.2*	*70*	*1.20*	*10.0*
Barium	7440-39-3	--	*48*	*0.150*	*1.00*
Beryllium	7440-41-7	--	--	*0.100*	*1.00*
Cadmium	7440-43-9	*1.2*	*9.6*	*0.100*	*1.00*
Calcium	7440-70-2	--	--	*24.3*	*100*
Chromium	7440-47-3	*81*	*370*	*0.210*	*3.00*
Cobalt	7440-48-4	--	*10*	*0.146*	*1.00*
Copper	7440-50-8	*34*	*270*	*0.500*	*4.00*
Cyanide	57-12-5	--	--	*0.18*	*0.50*
Iron	7439-89-6	--	--	*5.00*	*40.0*
Lead	7439-92-1	*47*	*218*	*0.600*	*3.00*
Magnesium	7439-95-4	--	--	*1.67*	*20.0*
Manganese	7439-96-5	--	*260*	*0.900*	*4.00*
Mercury	7439-97-6	*0.15*	*0.71*	*0.187*	*0.800*
Nickel	7440-02-0	--	*52*	*0.210*	*2.00*
Potassium	7440-09-7	--	--	*19.8*	*100.0*
Selenium	7782-49-2	--	*1*	*1.50*	*10.0*
Silver	7440-22-4	*1*	*3.7*	*0.400*	*2.00*
Sodium	7440-23-5	--	--	*46.2*	*200*
Thallium	7440-28-0	--	--	*0.897*	*6.00*
Vanadium	7440-62-2	--	*57*	*0.200*	*2.00*
Zinc	7440-66-6	*150*	*410*	*0.400*	*4.00*

APPENDIX B

APPENDIX B:

Electronic Copy of Supplemental Field Sampling and Analysis Plan

ATTACHMENT 2

ATTACHMENT 2

August 31, 2018 EPA/NJDEP Letter Regarding
Former Chevron Perth Amboy Facility
Water Body Sediment Sampling

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

AUG 31 2018

Robert Mancini
Project Manager, Refining Business Unit
Chevron Environmental Management Company
1200 State Street
Perth Amboy, New Jersey 08861

Re: Chevron Waterbody Sediment Sampling
Former Chevron Perth Amboy Facility
Perth Amboy, Middlesex County, New Jersey
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1(a)14; 2.1(d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's *Ecological Evaluation Technical Guidance* (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at vargas.ricardito@epa.gov.

Sincerely,

Ricardito Vargas

Ricardito Vargas
Project Manager
Hazardous Waste Programs Branch

Enclosure

cc: Lynn Vogel, NJDEP (electronic copy only)

Chevron/Buckeye, Perth Amboy, NJ
EPA and NJDEP Recommendations/Comments for 2018 Sediment Sampling
September 2018

General Comments

1. Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.
2. Chevron submitted an updated data sheet to EPA on June 29,2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

Specific Comments

Woodbridge Creek

1. Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and NJDEP are requesting Chevron to use USEPA's ProUCL method, including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.
2. EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SED -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.
3. SED-06 – SED-03
    a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
    b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters
4. EPA is requiring an additional transect to sample for all contaminates (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01. The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show

hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream.

5. SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
6. SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
7. SED -19:
    a. Add additional point (A) along transect and sample for full suite of parameters
    b. Resample transects for all parameters for all points and at consistent depths (surface and subsurface)
8. Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
9. A transect is needed between the former Chevron Refinery Site and DITSED-08. Please explain whether horizontal and vertical delineation is complete in the DITSED-8 area.
10. Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

Spa Spring Creek

1. Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.
2. EPA requires additional sampling at all former transects and points for sub-surface sediment.
3. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
4. Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

Arthur Kill

1. EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.
2. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
3. EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

ATTACHMENT 3

ATTACHMENT 3

Excerpt from 1994 Description of Current Conditions

The 1991 Closure Plan revisions proposed mechanical dewatering, thermal separation, and recycling of the sludge and soils from the North Field Basin, East Yard Basin, and the Surge Pond as the primary remedial method. No change in technology (bioremediation) was proposed for closure of the landfarm.

The October 1991 "Surface Impoundments and Landfarm Closure Plan" was approved by the NJDEP. The approval for this document was issued in the form of a NJPDES Discharge to Groundwater Permit. This permit, NJPDES-DGW NJ0080390, incorporates the proposals for closure in the above referenced documents and is the regulatory mechanism for implementing closure. This permit is further discussed in Section 2.5.1.4.

2.5.1.3 New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) Permits

NJPDES permit No. NJ0000221 allows the discharge of Refinery process and stormwater to be discharged to surface waters, which include Spa Spring Creek and Woodbridge Creek. Chevron has three main discharge points regulated under the current version of this permit: 004, 005, and 006.

Discharge point discharge serial number (DSN) 004 initially consisted of power plant water softener regeneration water and storm water runoff from non-process areas of Chevron, as well as from property owned by others and from public roads. This single terminal discharge point, renamed DSN 004A, is now monitored by two upstream monitoring points, identified as DSN 004B and DSN 004C. The purpose of these two monitor points is to accurately monitor Chevron's contributions to the Spa Spring Creek outfall by assessing Chevron's contribution to outfall DSN 004A before they are mixed with off-site sources. Since the Power Plant has been decommissioned and no longer contributes its wastewater stream, the Refinery has requested that the monitoring of discharge point DSN 004B be eliminated.

Discharge point No. 005 consists of process water and contaminated stormwater runoff that is treated using the Refinery ETP, a biological waste water treatment facility. The ETP utilizes API separator, IAF units, an equalization basin, biodisks, clarifiers, and a Post-Aeration Basin prior to discharge into Woodbridge Creek.

Discharge to point No. 006 reflects stormwater runoff from the undeveloped portions of Amboy Field to the Amboy Ditch. Discharge point 006 was added to the original permit as a modification in October 1992.

The following is a historical breakdown of the NJPDES Permit No. NJ0000221 issuances with key information:

June 1974 to Approximately 1979 -- Available records indicate that the Refinery was operating under an National Pollutant Discharge Elimination (NPDES) DSW permit during this period. The NJDEP was not the implementing agency at this time. No relevant information for this period is currently available. Archived records may contain additional information, if required.

July 3, 1979 to Approximately 1984 -- Available records for this permit describe only discharge point 004, described as effluent from power plant to Spa Spring Creek. It is likely that the ETP discharge was also covered by this permit. Although these permits are generally issued for five year periods it appears that they have remained in effect past their expiration until successful negotiation of the new permit.

Units Covered
DSN 004 -- Power Plant - non-contact cooling water from turbo generator condenser.

Significant Changes from Previous Issuance -- No copies of an earlier permit were located, however it appears from this permit that this discharge point has been regulated since 6/14/74.

Parameters Monitored -- Flow, Ph, Temperature (winter and summer), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), Specific Conductance, Settleable Matter, Total Organic Carbon (TOC), and Oil and Grease.

Discharge Point(s) Used
DSN 004: Ditch to Spa Spring Creek to Woodbridge Creek.

Monitoring Events -- Flow and Temperature were reportedly continuously monitored. TOC, Oil and Grease, and pH bimonthly. No indication was given regarding the frequency of sampling for the remaining analytes.

January 25, 1985 to approximately 1990 -- Allowed the discharge of process and storm water to be discharged to surface waters from an industrial commercial facility. Permit transferred from the previous federal jurisdiction to the NJDEP.

Units Covered/Discharge Points Monitored -- Two discharge points were covered by this permit: DSN 004 and DSN 005.

DSN No. 004 - Spa Spring Creek- covers power plant water softener regeneration water and stormwater runoff from non-process areas of Chevron, as well as from property owned by others and from public roads.

DSN No. 005 - Woodbridge Creek - covers process water and contaminated stormwater runoff that is treated by an Effluent Treatment Plant (ETP) using mechanical and biological methods. The ETP utilizes an API separator, IAF units, equalization, biodisks, clarifiers, and Post-Aeration Basin prior to discharge into Woodbridge Creek.

Significant Changes from Previous Issuance -- Significant changes in this permit include the change of jurisdiction and the definite inclusion of DSN 005, located at the outfall of the ETP.

Parameters Monitored --

DSN 004 - Flow (MGD), COD, BOD, TSS, Fecal Coliforms, Total Chlorine Residual, Temperature, pH, Petroleum Hydrocarbons, Oil and Grease, Floating Solids, Foam

DSN 005 - Flow (MGD), COD, BOD, TSS, Fecal Coliforms, Total Residual Chlorine, Temp, pH, Petroleum Hydrocarbons, Oil and Grease, Ammonia, Sulfide, Chromium (total and Hexavalent) Floating Solids, Foam TSS, 96 Hr. acute mycid bioassay

Monitoring Events -- In accordance with permit requirements. Bioassay testswere conducted quarterly, other parameters were required monthly.

October 1992 Modification -- This modification reflects the stormwater runoff from undeveloped portions of Amboy Field to the unpermitted discharge point entering a ditch along Amboy Avenue identified in NJDEP correspondence. The NJDEP issued the Refinery an NOV for an "unpermitted discharge to surface water ditch on Amboy Road" on September 16, 1992. The NJDEP described remedial action consisting of, "apply for permit modification for existing NJPDES permit to include ditch or seek general stormwater permit for the discharge."

Units Covered -- Discharge to point No. 006 reflects stormwater runoff from the Amboy field to the Amboy Ditch. Discharge point 006 was added to the original permit as a modification in October 1992. Average flow estimated to be 50 gallons per minute.

According to a file memorandum "no limits will be placed on the parameters being monitored. Once enough data has been collected to demonstrate that the water in the ditch is harmless sampling may be discontinued."

August 1, 1993 to July 31, 1998 -- On June 25, 1993, NJDEP issued a Final NJPDES Discharge to Surface Water Permit Reissuance, which became effective August 1, 1993. Revisions to the permit enable the Refinery to accurately monitor contributions to the Spa Spring Creek outfall, and to monitor discharges associated with the sludge dewatering operations.

Units Covered/Discharge Points Monitored --
DSN 004A, 004B, 004C - Spa Spring Creek Outfalls
DSN 005 - Effluent Treatment Plant
DSN 005A - Parshall Flume from WTP
DSN 006A - Runoff from undeveloped portion of Amboy Field to Amboy Ditch

Significant Changes from Previous Issuance -- The single terminal discharge p known as DSN 004, has been identified as DSN 004A, and two upstream monitoring points, identified as DSN 004B and DSN 004C have been added.

The final reissuance also incorporated several modifications to the draft permit, primarily with respect to the additional discharges from the ETP which would occur during the sludge dewatering phase of the surface impoundment closure activities.

Parameters Monitored --
DSN 004A - not monitored
DSN 004B and DSN 004C: flow (MGD), pH, TSS, Chloroform, COD, Total Lead, Petroleum Hydrocarbons, Thallium, Total Zinc

DSN 005 - Effluent Treatment Plant
DSN 005A - Flow (mgd), Temperature, BOD's, TSS, Oil and Grease, COD, Ammonia as N, Sulfide, Phenolic Compounds, Total Chromium, Hexavalent Chromium, pH, Total Recoverable Cadmium, Total Recoverable Nickel, Total Recoverable Arsenic, Total Recoverable Zinc, Chronic Toxicity
DSN 006A - COD, Flow, TSS, Total Petroleum Hydrocarbons, pH

2.5.1.4 NJPDES - Discharge to Groundwater (DGW) Permits

On January 7, 1993 Chevron received a final New Jersey Pollutant Discharge Elimination System - Discharge to Groundwater permit for the Refinery. This permit governs and is the mechanism for closure of three surface impoundments on the Refinery, the East Yard Basin, the North Field Basin, and the Surge Pond; and one land treatment facility, the Landfarm. This permit approves and incorporates by reference the October 1991 Surface Impoundments and Landfarm Closure Plan that was developed for these areas. Assessment of compliance is established through

ATTACHMENT 4

ATTACHMENT 4

Settlement Agreement

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UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY

CHEVRON U.S.A. INC., Plaintiff, v. AMERICAN CYANAMID COMPANY, et al., Defendants.	Civil Action No. 97-1572 (DMC)

SETTLEMENT
AGREEMENT AND CONSENT ORDER

This Settlement Agreement and Consent Order (the "Consent Order") is made by and between Chevron U.S.A. Inc. ("Chevron"), American Cyanamid Company ("American Cyanamid"), C.P. Chemicals, Inc. ("C.P."), Philipp Brothers Chemicals, Inc. (now known as Phibro Animal Health Corporation) ("PAHC"), Rhone-Poulenc, USA Inc. (now known as Bayer CropScience Inc.) ("Bayer"), Legacy Vulcan Corp. (formerly named Vulcan Materials Company) ("Legacy Vulcan"), Stolthaven Perth Amboy, and North Field Extension, LLC ("NFE, LLC") (individually, a "Party" and collectively, "Parties").

WHEREAS, Chevron owns property known as Block 729, Tax Lot 2, Block 732 A, Tax Lot 1 and Block 734 A, Tax Lot 1 located in Woodbridge Township, Middlesex County, New Jersey, also known as the North Field Extension (the "NFE"); and

WHEREAS, in 1994 the United States Environmental Protection Agency ("EPA") issued to Chevron a permit pursuant to the Hazardous and Solid Waste Amendments of 1984 to the Resource Conservation and Recovery Act ("HSWA"), specifically permit number

NJD081982902 (the "HSWA Permit"), under which Chevron is obligated to undertake certain actions at the NFE; and

WHEREAS, Chevron filed litigation on March 26, 1997, against American Cyanamid, C.P., ICI American Holdings, Inc., Imperial Chemicals Industries PLC, PAHC, Bayer, Stauffer Management Company, Legacy Vulcan (then named Vulcan Materials Company), Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc. and ICI Americas, Inc. in the United States District Court for the District of New Jersey relating to investigation and remediation of contamination at the NFE; and

WHEREAS, on August 14, 1997, after notice to the EPA, Chevron filed an Amended Complaint (the "Amended Complaint") against the above-listed defendants; and

WHEREAS, on April 3, 1998, an Order was entered by consent of the parties dismissing without prejudice the following defendants from the action: Imperial Chemical Industries PLC, Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc., ICI American Holdings Inc., ICI Americas Inc. and Stauffer Management Company; and

WHEREAS, on June 1, 1998, defendants C.P., PAHC, American Cyanamid and Legacy Vulcan (the "Third Party Plaintiffs") filed Third Party Complaints against Alumet Corporation ("Alumet"), Howmet Corporation ("Howmet"), Stolthaven Perth Amboy ("Stolthaven"), and Shell Oil Company and Shell Oil Products (collectively, "Shell"); and

WHEREAS, on September 14, 1998, the Third Party Plaintiffs filed Amended Third Party Complaints against Alumet, Howmet, Stolthaven and Shell; and

WHEREAS, on December 9, 1998, an Order was entered by consent of the Parties dismissing Howmet; and

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WHEREAS, in or about July 2002, the Parties and Alumet entered into a Settlement Agreement and Consent Order of Dismissal (the "2002 Settlement") to resolve the above-captioned matter (the "Litigation"); and

WHEREAS, in 2005 disputes arose amongst the Parties concerning the 2002 Settlement; and

WHEREAS, the Parties wish to and have agreed to resolve the Litigation as set forth in this Consent Order; and

WHEREAS, the Litigation was pending or settled on the date of the enactment of P.L. 2009, C.60, and concerned, *inter alia*, remediation pursuant to the Resource Conservation and Recovery Act, 42 U.S.C. § 6921 *et seq.* ("RCRA"); and

WHEREAS, the Parties agree that this Consent Order reflects the full and complete agreement amongst the Parties.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is acknowledged, and intending to be legally bound hereby, without trial of any issues or any findings of fact or law, and without any admission by any Party, the Parties agree, and it is hereby ordered and decreed, as follows:

1. **Effect of Consent Order on 2002 Agreement.**

(a) Effective upon the execution of this Consent Order by all of the Parties and entry by the Court, except as set forth in Paragraphs 9(c), 10(a) and 10(b) herein, the Parties agree that this Consent Order represents the full and complete agreement amongst the Parties with respect to the Litigation. Effective upon execution of this Consent Order by all of the Parties and entry by the Court, except as set forth in Paragraphs 9(c), 10(a) and 10(b) herein, and

except for the dismissal without prejudice of Shell Oil Company and Shell Oil Products, the 2002 Settlement is superseded by this Consent Order.

(b) Without limiting the effect of Paragraph 1(a) above, the Parties expressly acknowledge and agree that upon execution of this Consent Order by all of the Parties and entry by the Court, the Due Diligence Period and the Sampling Parties'[1] (hereinafter referred to as the "Acquiring Parties") right to opt out of the 2002 Settlement have expired.

2. **Conveyance of the Northern Parcels of the NFE.**

(a) Within thirty (30) days from the date of entry of this Consent Order by the Court, NFE, LLC and Chevron will execute a Contract for Sale of Real Estate (the "Contract of Sale") in the form attached hereto as Exhibit "A" for conveyance of Block 732.A, Tax Lot 1 and for Block 729, Tax Lot 2, as such lots are set forth on the Minor Subdivision Sketch Plat approved by the Township of Woodbridge on May 23, 2007 (collectively, the "Northern Parcels") to NFE, LLC attached as Attachment 1 of Exhibit A.

(b) Closing under the Contract of Sale (the "Closing") will occur as set forth in Paragraph 3(f) of this Consent Order.

(c) Under the Contract of Sale, Chevron will convey fee title to the Northern Parcels (subject to all easements, licenses, etc. for existing pipelines and/or rights-of-way identified in First American Title Insurance Company commitment to Insure Title No. ST01-33258 (the "Commitment") and as described in Paragraph 5 of Exhibit "A" to this Consent Order) by way of a quitclaim deed, with covenants against Grantor's acts, in the form attached as

[1] The "Sampling Parties" identified in the 2002 Settlement are C.P., PAHC, and Legacy Vulcan.

Attachment 6 to Exhibit A, to NFE, LLC, an entity established by the Acquiring Parties. Chevron shall retain easements over the Northern Parcels that will include access to its existing pipeline properties and to Block 734.A, Tax Lot 1 (the "Southern Parcel") as set forth in the Roadway Easement Agreement and Pipeline Easement Agreement the forms of which are attached as Attachments "3.A." and "3.B." of Exhibit "A" of this Consent Order. Chevron, the Acquiring Parties, and NFE, LLC (collectively, the "Primary Parties") shall deliver at the Closing the executed Access Agreement for Investigation and/or Remediation Work as provided for in Paragraph 5 of this Consent Order, in the form attached as Exhibit "B" of this Consent Order. NFE, LLC shall be authorized to fulfill all obligations described in this Consent Order with respect to the Acquiring Parties.

(d) For sixty (60) days from the date of entry of this Consent Order by the Court, the Acquiring Parties and NFE, LLC shall have the right, at their sole cost and expense, to obtain an updated title commitment (the "First Updated Commitment") and to notify Chevron of any exceptions, conditions or defects other than those contained in the Commitment ("New Exceptions") which New Exceptions Chevron shall cure prior to Closing. The Commitment is attached as Attachment 4 of Exhibit "A" to this Consent Order. At any time prior to Closing, the Acquiring Parties and NFE, LLC shall have the right, at their sole cost and expense, to obtain a second updated Commitment (the "Second Updated Commitment") to identify any additional exceptions, conditions or defects that may have arisen after the First Updated Commitment ("Additional Exceptions"), which Additional Exceptions Chevron shall cure, provided that, at Chevron's option, Closing will not be delayed if title insurance will cover the Additional Exceptions raised by the Second Updated Commitment and Chevron agrees to pay any incremental cost associated with causing title insurance to provide such coverage. Chevron's

obligation to cure under this Paragraph 2(d) shall survive the Closing, to the extent not satisfied prior to Closing, and the removal of the exception, condition or defect may be accomplished by challenge, payment or other cure.

(e) Except as otherwise set forth in Paragraph 2(f), prior to conveyance of the Northern Parcels, none of the Primary Parties shall meet or substantively communicate with the New Jersey Department of Environmental Protection ("DEP") or EPA or another governmental, quasi-governmental or regulatory agency regarding the NFE without first advising each other. Except as otherwise set forth in Paragraph 2(f), prior to conveyance of the Northern Parcels, all meetings and conference calls with governmental agencies regarding the NFE shall be scheduled to include all of the Primary Parties, to the extent permitted by the applicable regulatory agencies. Advance notice of any meeting shall be provided even if the agency does not agree to schedule such meeting so that the Primary Parties can attend. Except as otherwise set forth in Paragraph 2(f), the Primary Parties agree to provide each other with copies of any documents regarding the NFE submitted to the DEP, EPA or other governmental, quasi-governmental or regulatory agency prior to conveyance of the Northern Parcels.

(f) Notwithstanding the provisions of Paragraph 2(e), (i) the Acquiring Parties and NFE, LLC are not required to provide Chevron with advance notice or an opportunity to participate in the Acquiring Parties' and NFE, LLC's negotiations with EPA or DEP concerning the Order (defined in Paragraph 3(f)(i), below); (ii) Chevron is not required to provide the Acquiring Parties or NFE, LLC with advance notice or an opportunity to participate in Chevron's negotiations with EPA or DEP concerning the HSWA Permit Modification (defined in Paragraph 3(f)(ii), below); (iii) the Primary Parties each has the right to speak with EPA or DEP, with the other Primary Parties' participation, to assess the status of the other Primary

Party(ies)'s discussions concerning the Order or the HSWA Permit Modification, as applicable, but not to negotiate; (iv) the Acquiring Parties and NFE, LLC will submit their proposed findings of fact and work plan for the Order no later than thirty days after entry of this Consent Order by the Court; and (v) as applicable, the Primary Parties will provide to each of the other Primary Parties copies of the Order and the HSWA Permit Modification both when the terms of such documents have been finalized and also when such documents have been fully executed or obtained, as the case may be.

(g) Both before and after conveyance of title to the Northern Parcels, all Parties shall have the right to request any documentation submitted to the DEP, EPA, or other governmental, quasi-governmental, or regulatory agency regarding the NFE. The costs incurred for the production by Chevron, NFE, LLC, the Acquiring Parties or any other Party of any requested documents shall be borne by the requesting Party.

3. **Conditions Preceding Conveyance and Closing.** The conveyance under the Contract of Sale described in Paragraph 2, above, shall be subject to satisfaction of the following conditions precedent:

(a) Chevron shall obtain a Modification of the HSWA Permit (the "HSWA Permit Modification") as described more fully in Paragraph 3(f)(ii) below;

(b) The Acquiring Parties and NFE, LLC shall execute a binding Administrative Order on Consent with the EPA (the "Order") as described more fully in Paragraph 3(f)(i) below; and

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(c) The New Jersey Industrial Site Recovery Act, N.J.S.A. 13:1K-6 *et seq.* ("ISRA") shall not be triggered by the conveyance of the Northern Parcels to NFE, LLC. The Parties acknowledge and agree that the DEP issued a letter of non-applicability ("LNA") on or about February 27, 2003 with respect to the NFE. The Parties further covenant and agree that no Party will seek any further determination from DEP regarding the applicability of ISRA to this transaction or the NFE.

(d) At Closing, Legacy Vulcan shall deliver to Chevron a guarantee agreement executed by Legacy Vulcan's parent (Vulcan Materials Company) in substantially the same form as attached hereto as Exhibit I.

(e) The conditions preceding conveyance set forth in Paragraphs 3(a), 3(b) and 3(c), above (collectively, the "Conditions Preceding Conveyance") shall not survive Closing of the conveyance of the Northern Parcels from Chevron to NFE, LLC.

(f) The Parties agree to work cooperatively, diligently, and in good faith to satisfy the Conditions Preceding Conveyance set forth in Paragraphs 3(a) and 3(b), and then to cause the Closing to occur in accordance with the following schedule:

(i) The Acquiring Parties and NFE, LLC will satisfy the Condition Preceding Conveyance relating to the Order, which Order requires the Acquiring Parties and NFE, LLC to investigate and/or remediate pursuant to RCRA the Solid Waste Management Units 46-50 ("SWMUs") and the Areas of Concern 11-12 ("AOCs") on the Northern Parcels (which Order shall be effective as of but not before the Closing), by executing said Order within fourteen (14) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing.

(ii) Chevron will satisfy the Condition Preceding Conveyance relating to the HSWA Permit Modification, under which HSWA Permit Modification the EPA will remove the Northern Parcels including the SWMUs and the AOCs from the HSWA Permit (which HSWA Permit Modification shall be effective as of but not before the Closing), by obtaining said HSWA Permit Modification within eighteen (18) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing.

(iii) The Closing on the conveyance of the Northern Parcels to NFE, LLC will occur within fifteen (15) days after the later of (i) the date the Order has been signed by all applicable parties and becomes a final order or (ii) the date EPA issues its final decision approving the HSWA Permit Modification; or at such date for Closing as the Primary Parties mutually agree upon in writing.

(iv) Subject to Paragraphs 3(f)(iv)(A) and (B) below, if either or both of these two Conditions Preceding Conveyance (relating to the Order and the HSWA Permit Modification) have not been executed or obtained, as applicable, within the time frames set forth in Paragraphs 3(f)(i) and 3(f)(ii), respectively, or if the Closing on the conveyance of the Northern Parcels to NFE, LLC has not occurred within the time frame set forth in Paragraph 3(f)(iii), above, then the Parties agree to negotiate and/or mediate (with the Court-appointed mediator specified in Paragraph 7) cooperatively and in good faith an alternative settlement for a period of forty-five (45) days after such date, or for such longer period as the Primary Parties mutually agree upon in writing (the "Conferral Period"), as follows:

(A) In the event that the Acquiring Parties and NFE, LLC:

(1) do not execute the Order with the EPA within fourteen (14) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing; or

(2) are unwilling or unable to proceed with the Closing within fifteen (15) days after the later of (i) the date the Order has been signed by all applicable parties and becomes a final order and (ii) the date EPA issues its final decision approving the HSWA Permit Modification, or such date for Closing as the Primary Parties mutually agree upon in writing,

Chevron may cause the Conferral Period to commence.

(B) In the event that Chevron:

(1) does not obtain the HSWA Permit Modification within eighteen (18) months after entry of this Consent Order by the Court, or within such longer period as the Primary Parties mutually agree upon in writing; or

(2) is unwilling or unable to proceed with the Closing within fifteen (15) days after the later of (i) the date the Order has been signed by all applicable parties and becomes a final order and (ii) the date EPA issues its final decision approving the HSWA Permit Modification, or such date for Closing as the Primary Parties mutually agree upon in writing,

the Acquiring Parties and NFE, LLC may cause the Conferral Period to commence.

(v) If the Primary Parties cannot agree to an alternative settlement during the Conferral Period, then upon application of the Acquiring Parties, NFE, LLC or Chevron and a showing that the intended purpose of this Consent Order cannot otherwise be accomplished, the Court shall either (A) reopen the litigation or (B) grant such other relief as the Court deems appropriate.

4. Remediation. Upon conveyance of the Northern Parcels to NFE, LLC, the Primary Parties will proceed as follows:

(a) The Acquiring Parties and NFE, LLC shall perform any required investigation or remediation of any and all contaminants in the Northern Parcels in accordance with the requirements of applicable law. The Acquiring Parties and NFE, LLC acknowledge and agree that their obligations under this subparagraph shall be without regard to the source of the contamination and without the right to arbitrate whether any other Party is or should be liable for such contamination.

(b) The Acquiring Parties and NFE, LLC shall perform any required investigation or remediation of chlorinated solvents in the groundwater at both the Northern Parcels and the Southern Parcel in accordance with the requirements of applicable law. The Acquiring Parties and NFE, LLC acknowledge and agree that their obligations under this subparagraph shall be without regard to the source of the chlorinated solvents and without the right to arbitrate whether any other Party is or should be liable for the chlorinated solvents. Until the Acquiring Parties and NFE, LLC obtain a "no further action" letter, Response Action Outcome as defined in N.J.S.A. 58:10C-2, or similar governmental approval relating to chlorinated solvents in the groundwater at the Southern Parcel, Chevron agrees to provide the

Acquiring Parties and NFE, LLC with copies of any request from DEP, EPA, or any other governmental agency, to conduct sampling for chlorinated solvents in groundwater at the Southern Parcel promptly upon receipt, and to notify the Acquiring Parties and NFE, LLC in writing in advance of any sampling it performs, or which another entity performs with Chevron's knowledge, of groundwater at the Southern Parcel which analyzes for chlorinated solvents. The Parties agree that the remediation may satisfy the least stringent standard required by a government agency. To achieve this standard, the Parties may establish engineering or institutional controls, including a deed notice and/or classification exception area (as defined in N.J.A.C. 7:9-6.4), that are acceptable to the governmental agency and the relevant Parties agree to execute such documents reasonably required by the governmental agency to establish such engineering and/or institutional controls.

(c) Chevron shall perform any required investigation or remediation of any and all contaminants in the groundwater at the Southern Parcel in accordance with the requirements of applicable law, except for chlorinated solvents in the groundwater which shall be the responsibility of the Acquiring Parties and NFE, LLC pursuant to subparagraph 4(b) above. Notwithstanding the preceding sentence, in the event DEP or EPA requires investigation or remediation of contaminants in the groundwater at the Southern Parcel as part of any required investigation or remediation of contamination of the Northern Parcels, the Acquiring Parties and NFE, LLC shall perform such work.

(d) The Primary Parties' agreements regarding the DITSWED-08 Area are set forth in Schedule "1," attached hereto and incorporated herein by reference.

(e) Chevron shall perform any required investigation or remediation of any and all contamination of soils or sediments in the Southern Parcel in accordance with the requirements of applicable law. Chevron acknowledges and agrees that its obligations under this subparagraph shall be without regard to the source of the contamination and without the right to arbitrate whether any other Party is or should be liable for such contamination.

(f) Chevron shall be solely responsible for the selection and payment of consultants, engineers, attorneys and any other professionals necessary to fulfill its performance obligations, and for all costs associated with the performance of its obligations, under this Consent Order.

(g) The Acquiring Parties and NFE, LLC shall be solely responsible for the selection and payment of consultants, engineers, attorneys and any other professionals necessary to fulfill their performance obligations, and for all costs associated with the performance of their obligations, under this Consent Order.

(h) With respect to any investigation or remediation conducted at the NFE pursuant to this Consent Order, all Parties participating in the investigation and remediation agree to work cooperatively in order to achieve a result that is efficient and cost effective.

(i) Notwithstanding anything to the contrary in this Paragraph 4, Stolthaven's obligations are as set forth in Paragraph 8 of this Consent Order.

5. **Reciprocal Access Agreement.** Chevron shall provide to the Acquiring Parties and NFE, LLC access over the Southern Parcel as necessary to facilitate performance by the Acquiring Parties and NFE, LLC of their investigation and remediation obligations under this

Consent Order, pursuant to the terms of the Access Agreement for Investigation and/or Remediation Work (the "Access Agreement") which shall be executed in the form attached hereto as Exhibit "B" of this Consent Order. The Acquiring Parties and NFE, LLC shall provide to Chevron access over the Northern Parcels as necessary to facilitate performance by Chevron of its investigation and remediation obligations under this Consent Order, pursuant to the terms of the Access Agreement, which shall be executed in the form attached as Exhibit "B" of this Consent Order.

6. **Limited Defense and Indemnity.**

(a) In the event that (i) one of the Acquiring Parties or NFE, LLC initiates litigation against a third party or reinstates Civil Action No. 97-1572 (DMC) seeking a response action (including investigation or remediation) for contamination including chlorinated solvents on or at, but not emanating from, the NFE; and/or a declaration of responsibility for contamination including chlorinated solvents on or at, but not emanating from, the NFE; and/or recovery of response costs including costs for investigation and/or remediation of contamination including chlorinated solvents on or at, but not emanating from, the NFE, and the third party files litigation against Chevron relating thereto (a "Third Party Claim") or (ii) Chevron initiates litigation against a third party or reinstates Civil Action No. 97-1572 (DMC) seeking a response action (including investigation or remediation) for contamination on or at, but not emanating from, the NFE; and/or a declaration of responsibility for contamination on or at, but not emanating from, the NFE; and/or recovery of response costs including costs for investigation and/or remediation of contamination on or at, but not emanating from, the NFE, and the third party files litigation against any or all of the Acquiring Parties or NFE, LLC relating thereto (also a "Third Party Claim"), then the party initiating or reinstating such litigation against the third

party shall defend and indemnify the party subject to the Third Party Claim provided that the contamination at issue in the newly instituted or reinstituted litigation is the responsibility under this Consent Order of the party initiating or reinstating such litigation. NFE, LLC covenants and agrees it will not initiate any action described in part (i) of this Paragraph unless one or more of the Acquiring Parties also jointly initiates such action in which case NFE, LLC and that (those) Acquiring Party(ies) also initiating such action shall be jointly and severally responsible to defend and indemnify Chevron as set forth in this Paragraph 6(a).

(b) This indemnity and defense shall not cover any action or litigation to the extent it concerns contamination that exists beyond the surveyed property lines of the NFE as delineated in the map attached hereto as Exhibit "C."

(c) Notwithstanding any of the other provisions of this Limited Indemnity, in the event any of the Acquiring Parties or NFE, LLC initiates litigation against Shell regarding chlorinated solvents in the groundwater on or at the NFE, and in the event Shell joins Chevron and claims that the Acquiring Party(ies), NFE, LLC and/or Chevron is responsible not only for investigating and/or remediating chlorinated solvents on or at the NFE, but also for investigating and/or remediating chlorinated solvents that have migrated onto Shell's property from the NFE (such claim regarding chlorinated solvents that have migrated onto Shell's property hereinafter referred to as the "Shell Claim"), then the Acquiring Party(ies) or NFE, LLC who initiated the litigation against Shell shall defend but not indemnify Chevron in that litigation regarding the Shell Claim. In the event a court determines that the source of chlorinated solvents in the groundwater on Shell's property is on or at the NFE, the Acquiring Parties and NFE, LLC acknowledge their responsibility for any required investigation and/or remediation of the chlorinated solvents in the groundwater in both the Northern Parcels and Southern Parcel,

without regard to the source of the chlorinated solvents and without the right to arbitrate whether any other Party is or should be liable for such chlorinated solvents. Nothing in this Paragraph 6(c) changes any of the obligations under Paragraph 6(a) of this Consent Order. NFE, LLC covenants and agrees it will not initiate any action against Shell as described in this Paragraph unless one or more of the Acquiring Parties also jointly initiates such action in which case NFE, LLC and that (those) Acquiring Party(ies) also initiating such action shall be jointly and severally responsible to defend but not indemnify Chevron as set forth in this Paragraph 6(c).

(d) A Party providing defense of a Third Party Claim under Paragraph 6(a) or a Shell Claim under Paragraph 6(c) shall have the option, at its sole cost and expense, to retain counsel for the Party(ies) it defends, provided that such counsel shall be approved by the defended Party(ies), whose approval shall not unreasonably be withheld, conditioned or delayed. The Party(ies) defended under this Paragraph 6 will reasonably cooperate with and assist in defending against any such Third Party Claim or Shell Claim. The Party(ies) indemnified or defended under this Paragraph 6 shall give written notice to the indemnifying or defending Party promptly upon receipt of any Third Party Claim or Shell Claim for which it/they claim protection hereunder.

7. **Mediation.** In the event there is any dispute that arises over the interpretation or implementation of the terms of this Consent Order, the Parties shall have the right to apply to the Court appointed mediator, Judge R. Benjamin Cohen. If Judge Cohen terminates his appointment or is otherwise unable or unwilling to serve as the mediator in this matter, the Parties shall have the right to apply to the Court for appointment of another mediator. All fees and expenses of the mediator and other like costs incurred in common in conducting any such mediation shall be shared equally among the Parties involved in the mediation with Chevron,

Legacy Vulcan and C.P./PAHC each paying a one/third (1/3) share. If any other Party(ies) also participate in the mediation, then that (those) Party(ies), Chevron, Legacy Vulcan and C.P./PAHC shall each pay equal shares of the mediation fees, expenses, and costs.

8. **Stolthaven Pipeline**. Stolthaven shall have the following obligations:

(a) Stolthaven shall comply with the requirements of the Administrative Consent Order entered on or about May 14, 1999 between Stolthaven and the DEP ("1999 ACO") (attached hereto as Exhibit "D"). Stolthaven will maintain responsibility for (i) all on-going clean-up activities involving its 1998 pipeline discharge and (ii) any future remediation costs that may become necessary with respect to any past discharge from its pipeline (defined as any discharge occurring prior to the assumption of liability by a successor of Stolthaven pursuant to an assignment of the Easement Agreement between Stolthaven and Chevron attached as Exhibit "H" to this Consent Order).

(b) Stolthaven will obtain a "no further action" letter ("NFA"), Response Action Outcome as defined in N.J.S.A. 58:10C-2 ("RAO"), or similar governmental approval from DEP with respect to the 1998 pipeline discharge as required by the 1999 ACO. The area being remediated under the 1999 ACO is shown on Exhibit "E" hereto. Stolthaven shall perform the remediation to satisfy the least stringent remediation standard required by DEP. To achieve this standard, Stolthaven may establish engineering or institutional controls, including a Deed Notice and/or Classification Exception Area ("CEA"), that are acceptable to DEP. Chevron will execute those documents required by DEP to establish the institutional and/or engineering controls.

(c) With respect to any other discharges from its pipeline, Stolthaven will obtain an NFA, RAO, or similar governmental approval from DEP using the same remediation standard set forth in Paragraph 8(b).

(d) Stolthaven shall supply Chevron and the Acquiring Parties with a copy of all documents submitted to or received from the DEP or any governmental, quasi-governmental or other regulatory agency in connection with its responsibilities under this Paragraph 8. Chevron shall have the right to review all investigative and remedial activities prior to implementation.

9. Mutual Releases.

(a) Releases.

(i) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, Chevron releases, remises, and forever discharges and waives any and all claims, whether known or unknown, which Chevron ever had, now has or may have in the future against American Cyanamid, Bayer, C.P., PAHC and Legacy Vulcan (the "Defendants") and NFE, LLC which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by Chevron in the Complaint and the Amended Complaint filed in the Litigation.

(ii) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Defendants and NFE, LLC release, remise, and forever discharge and waive any

and all claims, whether known or unknown, which Defendants or NFE, LLC ever had, now have or may have in the future against Chevron which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by the Defendants in the Litigation.

(iii) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Third Party Plaintiffs and NFE, LLC release, remise, and forever discharge and waive any and all claims, whether known or unknown, which Third Party Plaintiffs and NFE, LLC ever had, now have or may have in the future against Stolthaven which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by the Third Party Plaintiffs in the Third Party Complaint, as amended, filed in the Litigation.

(iv) Except for any claims arising out of obligations under this Consent Order, contingent upon payment as set forth in more detail in a separate agreement between Bayer, the Acquiring Parties and NFE, LLC, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Third-Party Plaintiffs and NFE, LLC release, remise, and forever discharge and waive any and all claims, whether known or unknown, which Third-Party Plaintiffs and NFE, LLC ever had, now have or may have in the future against Bayer which relate to actions, occurrences or conditions at the NFE prior to Closing, including, but not limited to, all claims which were or could have been asserted by the Third-Party Plaintiffs and NFE, LLC in the Third Party Complaint in the Litigation.

(v) Except for any claims arising out of obligations under this Consent Order, and subject to Paragraphs 9(a)(vii) through (ix) and 9(b), (d) and (e), effective at the time of Closing, the Third Party Plaintiffs, NFE, LLC, Bayer and Stolthaven release, remise and forever discharge and waive any and all claims, whether known or unknown, the Third Party Plaintiffs, NFE, LLC, Bayer and Stolthaven ever had, now have or may have in the future which relate to actions, occurrences or conditions at the NFE prior to Closing, including but not limited to all claims, cross-claims and counterclaims which were or could have been asserted by and among the Third Party Plaintiffs, NFE, LLC, Bayer, and Stolthaven, or against Chevron.

(vi) The benefit of the Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(v) hereof shall extend to Imperial Chemical Industries PLC, Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc., ICI American Holdings Inc., ICI Americas Inc., and Stauffer Management Company.

(vii) The Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(vi) hereof are not intended to be, and shall not constitute or be construed as, a general release.

(viii) The Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(vi) hereof are not intended to, and shall not, extend or otherwise release or discharge any rights, privileges, benefits, duties, or obligations of any of the Parties hereto set forth in, or otherwise arising under, this Consent Order.

(ix) The Mutual Releases set forth in Paragraphs 9(a)(i) through 9(a)(vi) hereof are not intended to, and shall not, extend or otherwise release or discharge any rights, privileges, benefits, duties, or obligations of any of the Parties hereto with respect to

claims for Natural Resource Damages, as defined below, except to the extent that the damage claim was, is or will be satisfied by any remediation at the NFE performed pursuant to this Consent Order. Natural Resource Damages shall include all claims arising from a discharge of hazardous substances, both known and unknown, recoverable as natural resource damages under applicable law, including without limitation the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq., the Oil Pollution Act, 33 U.S.C. 2701 et seq., the Clean Water Act, 33 U.S.C. 1251 et seq., the Spill Compensation and Control Act, N.J.S.A. 58:10-23.11 et seq., and any other applicable state, federal or common law, statute or regulation, including (A) compensation for the lost value of, injury to, or destruction of the State's resources and services flowing from these resources, including but not limited to the costs of assessments, attorney's fees, consultant's or expert fees, interest, or any other expense or costs, and (B) the restoration, rehabilitation or acquisition of the equivalent of the injured resources and the services flowing from these resources. The Parties acknowledge that in November 2005, Chevron, DEP, and the New Jersey Spill Compensation Fund executed a Natural Resources Damages Settlement Agreement (the "NRD Settlement"). The Parties have copies of the NRD Settlement. Nothing in this Paragraph 9(a)(ix) shall change or affect the protections and benefits Chevron has by virtue of the NRD Settlement.

(b) The releases in Paragraph 9(a) take effect as of the Closing (the transfer of title to the Northern Parcels) which occurs pursuant to the Contract of Sale between Chevron and NFE, LLC.

(c) Alumet.

(i) The Parties acknowledge and agree that the releases of Alumet set forth in the 2002 Agreement became effective as of August 7, 2002 (the "Alumet Release Date"), pursuant to the terms of the 2002 Agreement, and that those releases have at all times been, and continue to be, in effect since the Alumet Release Date.

(ii) The Parties acknowledge and agree that Alumet Corporation was dismissed with prejudice from the Litigation by Order filed on August 7, 2002 (attached hereto as Exhibit "F".)

(d) No admission of liability.

The Parties agree that this Consent Order is the result of a compromise and accord, and shall not constitute or be construed as an admission of any liability or wrongdoing on the part of any of them.

(e) Miscellaneous Provisions Regarding Mutual Releases.

(i) Severability. If any provision of these Mutual Releases, or the application thereof, shall for any reason or to any extent be construed by a Court of competent jurisdiction to be invalid or unenforceable, the remainder of these Mutual Releases, and application of such provisions to other circumstances, shall be interpreted so as to reasonably effect the intent of the Parties hereto.

(ii) Binding Effect, Assignment, and No Third Party Beneficiaries.

These Mutual Releases shall be binding upon and shall inure to the benefit of the Parties hereto, and their respective successors, permitted assigns, affiliates, parents, subsidiaries and

predecessors. Other than as set forth in the preceding sentence, and except as expressly set forth in Paragraph 9(a)(vi) above, there are no third party beneficiaries to this Paragraph 9.

10. Settlement Payments.

(a) The Parties acknowledge and agree that, pursuant to the terms of the 2002 Settlement, the Acquiring Parties paid to Chevron, and Chevron received, the sum of $900,000.00 (Nine Hundred Thousand Dollars). This payment was and remains non-refundable, and was full satisfaction for any and all of Chevron's claims for past costs (investigation, remediation or response costs and attorneys' fees and costs) incurred through the entry of the 2002 Settlement in connection with, in relation to or otherwise attributed or assigned to the NFE by Chevron.

(b) The Parties acknowledge and agree that, pursuant to the terms of the 2002 Settlement, Alumet paid the Acquiring Parties a sum of $75,000.00 (Seventy-five Thousand Dollars) in full satisfaction of Alumet's obligations under the 2002 Settlement.

(c) Each of the Parties hereto may allocate the settlement payments/receipts according to its respective discretion, as long as that allocation does not detrimentally impact upon any other Party.

11. Other Litigation. Nothing in this Consent Order shall restrict any Party from pursuing any nonparty for liability for contamination on or at the NFE. The Parties agree that Imperial Chemical Industries PLC, Zeneca Group PLC, Zeneca Holdings Inc., Zeneca Inc., ICI American Holdings Inc., ICI Americas Inc., Stauffer Management Company, Alumet and Howmet Corporation shall not be considered a nonparty, but Shell shall be considered a nonparty, for purposes of this Paragraph 11. The Court and the Parties acknowledge that the

Entire Controversy Doctrine will not restrict any Party from pursuing any nonparty for such liability.

12. **Jurisdiction.** The Parties shall present this Consent Order to the Court for entry and approval, and for its continued oversight consistent with this Paragraph 12. The Court shall retain jurisdiction of this matter for the purpose of enabling the Parties to this Consent Order to apply to the Court for any further relief that may be necessary to construe, carry out or achieve the terms of this Consent Order, or remedying any breach of the Consent Order, including legal or equitable relief.

13. **Modification.** The terms of this Consent Order shall not be changed, revised or modified except by a written agreement signed by all of the Parties hereto that are or may be impacted by such change, revision, or modification.

14. **Reservation of Rights.** The Parties do not by this Agreement settle any claims, do not release and do hereby reserve any rights they may have, with respect to contamination that may exist beyond the surveyed property lines of the NFE as set forth in Exhibit C, including, without limitation, any and all claims at law or in equity against any other party with respect to such contamination.

15. **Counterparts**. This Consent Order may be signed in counterparts, all of which shall be considered an original and together shall constitute one and the same instrument.

16. **Parties Bound.** Upon execution by all of the Parties and entry by the Court, this Consent Order shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

17. **Press Releases.** The Parties agree that no press release or other forms of public information shall issue in regard to this Consent Order, unless required by law or as may be needed to implement this Consent Order.

18. **Notice**. Any notice required under this Consent Order shall be given as follows:

If to Chevron:

Douglas F. Schleicher, Esq.
Marc Stofman, Esq.
Klehr, Harrison, Harvey, Branzburg & Ellers, LLP
1835 Market Street
Philadelphia, PA 19102
Phone: (215) 569-2795
Fax: (215) 568-6603

If to Legacy Vulcan:

Susanne Peticolas, Esq.
David A. Brooks, Esq.
Gibbons P.C.
One Gateway Center
Newark, NJ 07102-5310
Phone: (973) 596-4751/4719
Fax: (973) 639-6340/8342

If to C.P./PAHC/American Cyanamid:

George J. Tyler, Esq.
Margaret B. Carmeli, Esq.
Tyler & Carmeli, P.C.
1AAA Drive, Suite 204
Robbinsville, New Jersey 08691
Phone: (609) 631-0600
Fax: (609) 631-0651

If to Bayer:

Glen R. Stuart, Esq.
Morgan, Lewis & Bockius LLP
1701 Market Street
Philadelphia, PA 19103
Phone: (215) 963-5883
Fax: (215) 963-5001

If to Stolthaven:

Karen E. Murphy, Esq.
Bressler, Amery & Ross, PC
For overnight delivery:
325 Columbia Turnpike
Florham Park, New Jersey 07932
For first class mail:
P.O. BOX 1980
Morristown, New Jersey 07962
Telephone: (973) 514-1200
Fax : (973) 514-1660

If to NFE, LLC:

Susanne Peticolas, Esq.
Gibbons P.C.
One Gateway Center
Newark, NJ 07102-5310
Phone: (973) 596-4751/4719
Fax: (973) 639-6340/8342

and

George J. Tyler, Esq.
Tyler & Carmeli, P.C.
1AAA Drive, Suite 204
Robbinsville, New Jersey 08691
Phone: (609) 631-0600
Fax: (609) 631-0651

19. **The Litigation**. Unless Closing does not occur, in which case the Parties will proceed as set forth in Paragraph 3(f)(iv) and (v), all claims, defenses, rights and obligations of the Parties shall be merged into and enforceable by and through this Consent Order, and the Litigation shall remain marked settled and closed on the Court docket. The claims asserted in the Litigation by and against Shell have been dismissed without prejudice. In any subsequent litigation, except for litigation to enforce the terms of this Consent Order, this Consent Order shall not be admissible as evidence of liability or allocation with respect to any Party, although the Parties agree that testing results and evidence that would otherwise be admissible shall not be

Execution Version

excluded solely because such evidence was generated and/or produced in connection with the terms of this Consent Order or after the date of the 2002 Settlement.

20. **Authority.** The undersigned represent and warrant that they have full authority to enter into this Consent Order and all other documents executed in connection herewith on behalf of the Party(ies) for whom they represent.

Chevron U.S.A. Inc.

Dated: June 2, 2010

By: _____,
of Klehr, Harrison, Harvey,
Branzburg & Ellers, LLP,
its attorneys of record

Legacy Vulcan Corp.

Dated:

By: _____,
of Gibbons, P.C.,
its attorneys of record

C.P. Chemicals, Inc.

Dated:

By: _____,
of Tyler & Carmeli, P.C.,
its attorneys of record

Phibro Animal Health Corporation, formerly known as Philipp Brothers Chemicals, Inc.

Dated:

By: _____,
of Tyler & Carmeli, P.C.,
its attorneys of record

Execution Version

excluded solely because such evidence was generated and/or produced in connection with the terms of this Consent Order or after the date of the 2002 Settlement.

20. **Authority.** The undersigned represent and warrant that they have full authority to enter into this Consent Order and all other documents executed in connection herewith on behalf of the Party(ies) for whom they represent.

Chevron U.S.A. Inc.

Dated: By:_____,
of Klehr, Harrison, Harvey,
Branzburg & Ellers, LLP,
its attorneys of record

Legacy Vulcan Corp.

Dated: May 28, 2010 By: Susanne Petrocelli
of Gibbons, P.C.,
its attorneys of record

C.P. Chemicals, Inc.

Dated: By: _____,
of Tyler & Carmeli, P.C.,
its attorneys of record

Phibro Animal Health Corporation, formerly known as Philipp Brothers Chemicals, Inc.

Dated: By:_____,
of Tyler & Carmeli, P.C.,
its attorneys of record

excluded solely because such evidence was generated and/or produced in connection with the terms of this Consent Order or after the date of the 2002 Settlement.

20. **Authority.** The undersigned represent and warrant that they have full authority to enter into this Consent Order and all other documents executed in connection herewith on behalf of the Party(ies) for whom they represent.

Chevron U.S.A. Inc.

Dated: By:_____,
of Klehr, Harrison, Harvey,
Branzburg & Ellers, LLP,
its attorneys of record

Legacy Vulcan Corp.

Dated: By: _____,
of Gibbons, P.C.,
its attorneys of record

C.P. Chemicals, Inc.

Dated: June 2, 2010 By: _____,
of Tyler & Carmeli, P.C.,
its attorneys of record

Phibro Animal Health Corporation, formerly known as Philipp Brothers Chemicals, Inc.

Dated: June 2, 2010 By: _____,
of Tyler & Carmeli, P.C.,
its attorneys of record

Execution Version

Cytec Industries as Successor-In-Interest to American Cyanamid Company.

By: _____,

Dated: June 2, 2010

of Tyler & Carmeli, P.C.,
its attorneys of record

Bayer CropScience Inc., by Stauffer Management Company, LLC its litigation agent

By: _____,

Dated:

of Morgan, Lewis & Bockius LLP,
its attorneys of record

Stolthaven Perth Amboy, Inc.

By: _____,

Dated:

of Bressler, Amery & Ross, PC,
its attorneys of record

North Field Extension, LLC

By: _____,

Dated: June 2, 2010

of Tyler and Carmeli, P.C.,

and

By: _____,

Dated:

of Gibbons, P.C.,
its attorneys of record

Execution Version

Cytec Industries as Successor-In-Interest to American Cyanamid Company.

By:_____,

Dated:

of Tyler & Carmeli, P.C.,
its attorneys of record

Bayer CropScience Inc., by Stauffer Management Company, LLC its litigation agent

By:_____,

Dated:

of Morgan, Lewis & Bockius LLP,
its attorneys of record

Stolthaven Perth Amboy, Inc.

By:_____,

Dated:

of Bressler, Amery & Ross, PC,
its attorneys of record

North Field Extension, LLC

By:_____,

Dated:

of Tyler and Carmeli, P.C.,

and

By: _____,

Dated:

of Gibbons, P.C.,
its attorneys of record

Execution Version

Cytec Industries as Successor-In-Interest to American Cyanamid Company.

By:_____,

Dated:

of Tyler & Carmeli, P.C.,
its attorneys of record

Bayer CropScience Inc., by Stauffer Management Company, LLC its litigation agent

By:_____,

Dated:

of Morgan, Lewis & Bockius LLP,
its attorneys of record

Stolthaven Perth Amboy, Inc.

By: Karen E Murphy,

Dated: May 5, 2010

of Bressler, Amery & Ross, PC,
its attorneys of record

North Field Extension, LLC

By:_____,

Dated:

of Tyler and Carmeli, P.C.,

and

By: _____,

Dated:

of Gibbons, P.C.,
its attorneys of record

Execution Version

Cytec Industries as Successor-In-Interest to American Cyanamid Company.

By:_____,

Dated:

of Tyler & Carmeli, P.C.,
its attorneys of record

Bayer CropScience Inc., by Stauffer Management Company, LLC its litigation agent

By:_____,

Dated:

of Morgan, Lewis & Bockius LLP,
its attorneys of record

Stolthaven Perth Amboy, Inc.

By:_____,

Dated:

of Bressler, Amery & Ross, PC,
its attorneys of record

North Field Extension, LLC

By:_____,

Dated:

of Tyler and Carmeli, P.C.,

and

By: Susanne Petricelas

Dated: May 28, 2010

of Gibbons, P.C.,
its attorneys of record

Execution Version

SO ORDERED:

Dated: 6/23/10

By: _____
Honorable Dennis M. Cavanaugh

ATTACHMENT 5

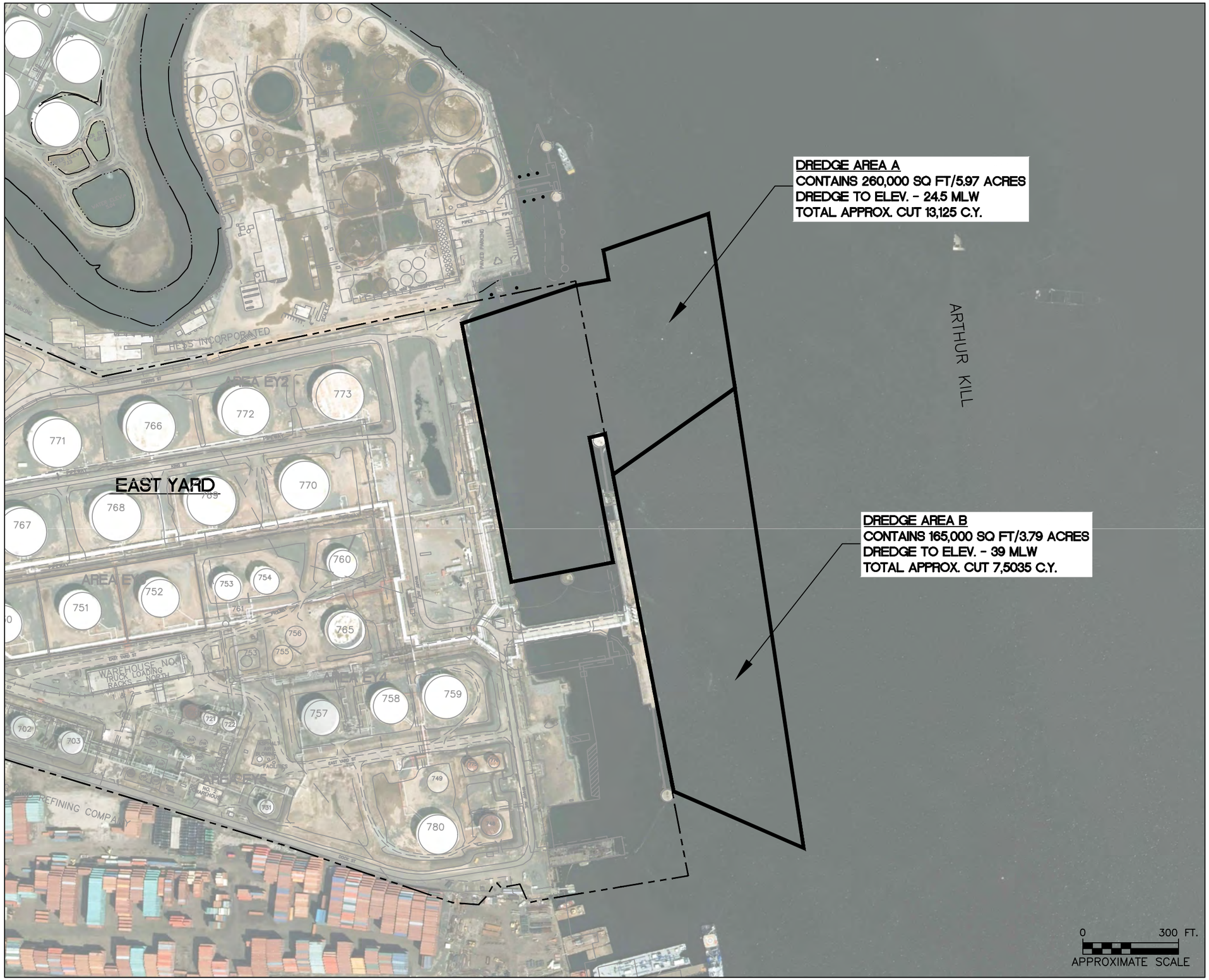
ATTACHMENT 5

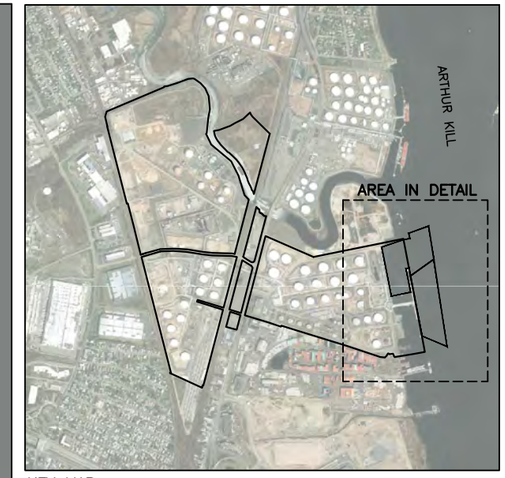
Dredging Documents

Figure 5-1 2003 Arthur Kill Dredging Areas

October 10, 1997 Water Front Development Water Quality Certificate Permit

December 23, 2001 Upland Placement Survey





KEY MAP
SCALE 1"=2500'

LEGEND

DREDGED AREAS

FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY

NOTES:

1) ALL SAMPLING LOCATIONS SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND ACCESSIBILITY.

2) ALL LOCATIONS ARE UNDERSTOOD TO BE WITHIN LIMITS OF WATERWAYS – MORE PRECISE LOCATION INFORMATION WILL BE DETAILED IN SUPPLEMENTAL REPORT.

3) SOURCE OF DREDGING AREAS: "PERTH AMBOY TERMINAL SOUNDING SURVEY" DATED 12/23/2001, PROVIDED BY AQUA FIRMA SURVEYS INC.

PROJECT:

CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:

200□ ARTHUR □ILL DREDGING AREAS

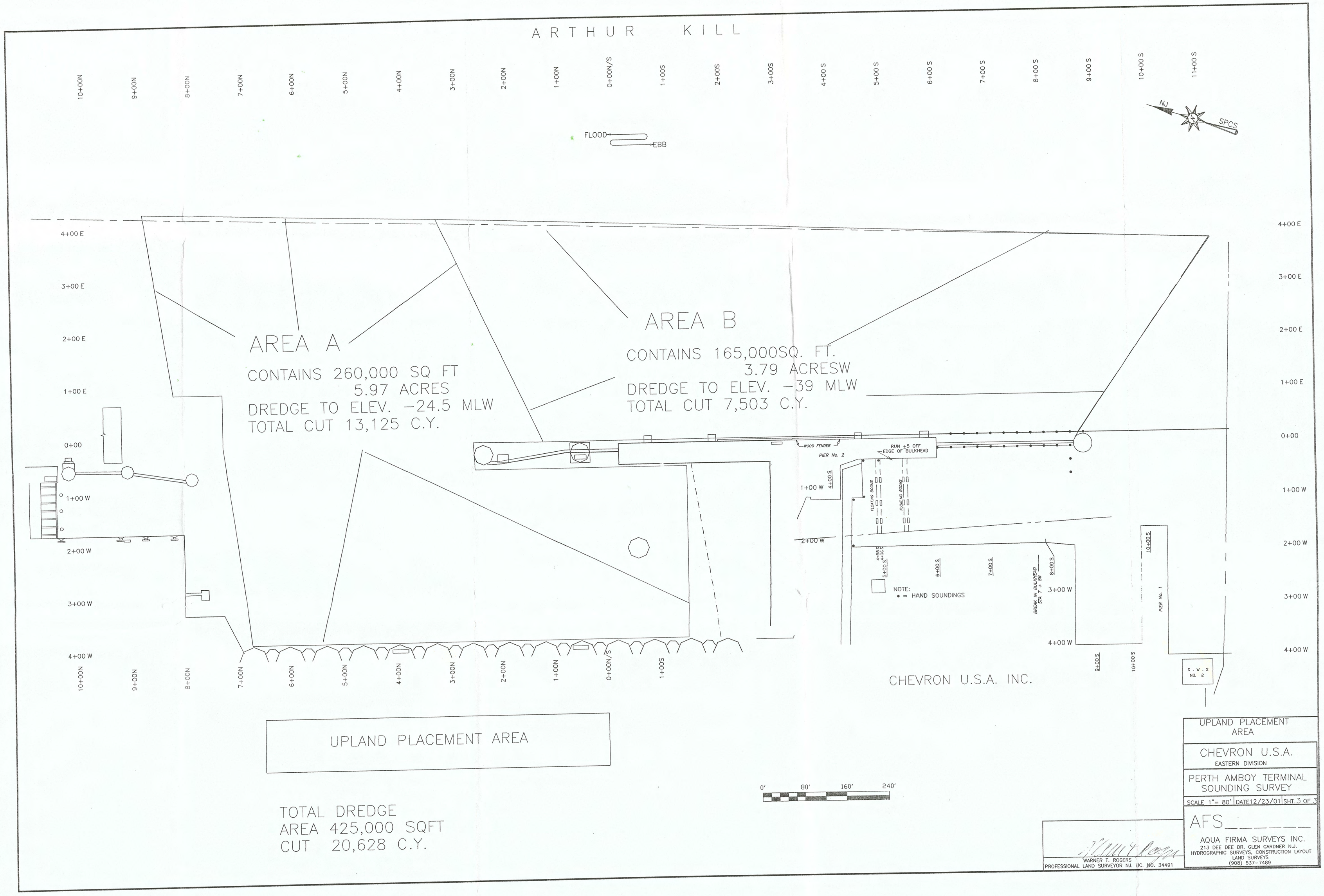
DRAWN BY:	M. GIAMBATTISTA	PROJ NO.:	230668
CHECKED BY:	T. REINOLD	FIGURE 5□1	
APPROVED BY:	R.LIPPENCOTT		
DATE:	OCTOBER 2018		

TRC

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

FILE NO.: FIGURE 2.dwg

11x17 --- USER: ODeleon --- ATTACHED XREF'S: --- ATTACHED IMAGES: J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7; Y4_Hi-M_400x400;
DRAWING NAME: M:\Cad Files\Vision Projects\194098\Phase 000003\2018_Sedi ent FSAP\COVER LETTER\ FIGURE 2.dwg --- PLOT DATE: Nove ber 15, 2018 - 1:25PM --- LAYOUT: 11X17L
Version: 2017-10-21


ARTHUR KILL
10+00N
9+00N
8+00N
7+00N
6+00N
5+00N
4+00N
3+00N
2+00N
1+00N
0+00N/S
1+00S
2+00S
3+00S
4+00 S
5+00 S
6+00 S
7+00 S
8+00 S
9+00 S
10+00 S
11+00 S
FLOOD
EBB
NJ
SPCS
4+00 E
3+00 E
2+00 E
1+00 E
0+00
1+00 W
2+00 W
3+00 W
4+00 W
AREA A
CONTAINS 260,000 SQ FT
5.97 ACRES
DREDGE TO ELEV. -24.5 MLW
TOTAL CUT 13,125 C.Y.
AREA B
CONTAINS 165,000SQ. FT.
3.79 ACRESW
DREDGE TO ELEV. -39 MLW
TOTAL CUT 7,503 C.Y.
WOOD FENDER
PIER No. 2
RUN ±5 OFF
EDGE OF BULKHEAD
FLOATING BOOMS
BREAK IN BULKHEAD
STA 7 + 86
NOTE:
• = HAND SOUNDINGS
PIER No. 1
S.W.S
NO. 2
CHEVRON U.S.A. INC.
UPLAND PLACEMENT AREA
0'
80'
160'
240'
TOTAL DREDGE
AREA 425,000 SQFT
CUT 20,628 C.Y.
WARNER T. ROGERS
PROFESSIONAL LAND SURVEYOR NJ. LIC. NO. 34491
UPLAND PLACEMENT AREA
CHEVRON U.S.A.
EASTERN DIVISION
PERTH AMBOY TERMINAL
SOUNDING SURVEY
SCALE 1"= 80' DATE 12/23/01 SHT. 3 OF 3
AFS
AQUA FIRMA SURVEYS INC.
213 DEE DEE DR. GLEN GARDNER N.J.
HYDROGRAPHIC SURVEYS, CONSTRUCTION LAYOUT
LAND SURVEYS
(908) 537-7489

Att 2

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

(See Issuing Division below)

PERMIT*

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No. 1216-90-0001.12	Application No. Same as Permit No.

Issuance Date	Effective Date	Expiration Date

Name and Address of Applicant	Name and Address of Owner	Name and Address of Operator
Chevron Products Company 1200 State Street Perth Amboy, NJ 08861	Same as applicant	Same as applicant

Location of Activity/Facility *(Street Address)*	Issuing Division	Statute(s)
Perth Amboy City Middlesex County Lot 1 Block 481/484	Land Use Regulation Program	NJSA 12:5-3 NJSA 58:10A-1

Type of Permit	Maximum Approved Capacity, *if applicable*
~~Waterfront Development~~ Water Quality Certificate	N/A

This permit grants permission to:

dredge by a closed clamshell bucket, an area, approximately 1100 feet long by approximately 150' feet wide. Approximately 20,000 cu yds of sediments would be removed initially to a depth of -39 feet below the plane of the mean low water, with two feet of allowable over dredge, and subsequent placement in an on-site designated State approved upland disposal site, known as the East Yard Basin. The stated purpose of this project is to reestablish adequate water depths at the facility for safe navigation of container vessels.

This permit is authorized under and in compliance with Coastal Zone Management Rules for Maintenance Dredging (N.J.A.C. 7:7E-4.2(f))and Dredge Spoil disposal on Land (7:7E-7.12)

The plans hereby approved consist of two sheets (attached) as prepared by the applicant, dated June 17, 1997, unrevised, entitled:

"Chevron Products Company, Perth Amboy Refinery, Perth Amboy, NJ Maintenance Dredging and Upland Placement Project".

Prepared by: Paul Drake

Page 1 of 3

Revised Date	Approved by the Department of Environmental Protection
	Name (Print or Type) _____ Title _____
	Signature _____ Date _____

* *The word permit means "approval, certification, registration, etc."*

(General Conditions are on the Reverse Side)

DEP-007 (1/95)

This permit is issued subject to and provided that the following conditions can be met to the satisfaction of the Land Use Regulation Program. All conditions must be met prior to construction unless otherwise specified. The issuance of this permit does not relinquish any Tidelands claims, if any. All Physical Conditions are subject to on-site compliance inspection. Please notify the Bureau of Enforcement, (401 East State Street, CN 422, Trenton, New Jersey 08625), in writing at least 3 days prior to commencement of construction or site preparation.

Physical Conditions:

1. No debris from any construction activity shall be allowed to enter the waterway. There shall be no barge overflow during dredging operations.

2. The dredged material shall be placed into a scow and transported alongside the berth nearest the disposal area (an unused tank pit). The dredged material shall then be removed from the scow by closed clamshell bucket and placed into trucks on the pier. The trucks would transport the dredged material to the upland disposal area

3. All trucks used to transport dredged material from scows to the East Yard Basin shall have sealed cargo beds or be lined and have sufficient freeboard maintained in the trucks so as to prevent dredged material from leaking during transport.

4. All trucks used to transport dredged material to the East yard Basin shall not be driven through the basin. Dredged material shall be dumped from the edge of the basin.

5. Machinery shall not operate in the basin. Movement of the material within the basin shall be accomplished by dragline or a long arm excavator operating from the basin's edge.

6. Excess water shall be decanted by means of a surface pump or siphon. All decant water shall be processed through the on-site effluent treatment plant and discharged in accordance with the NJPDES permit for that plant.

7. Under no circumstances shall any dredged material or decant water be permitted to escape the East Yard Basin. Once the basin has reached its capacity to contain both the dredged material and free water, the dredging operation must cease. Any discharge of dredge material or water from the basin, other than as provided for by the above conditions, shall constitute a violation of this permit and water quality certificate.

8. Every precaution shall be taken during the transfer of material from the scows to trucks to prevent spilling of the material. All accidental spills shall be cleaned up immediately.

9. This permit is hereby authorized as a one-time permit for the dredging work specified since the volume of the dredge material disposal area in the East Yard Basin will be exhausted upon completion of the authorized work.

10. Any change in the disposal location of the sediments shall require notification to the Land Use Regulation Program and may require additional sediment sampling and testing.

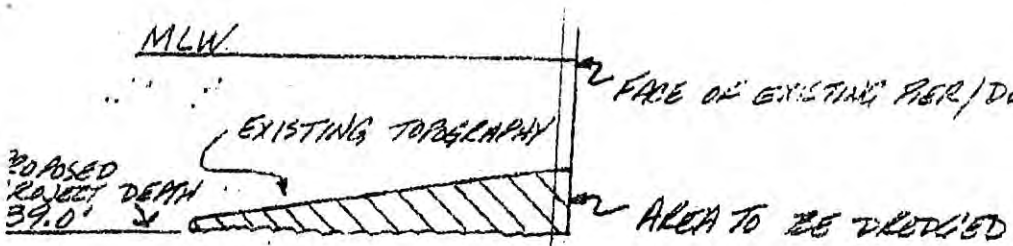
11. Upon completion of the project, the permittee shall complete closure of the East yard Basin as per the approved closure plan and any subsequent amendments thereto.

12. This permit is hereby conditioned upon full compliance with the information to be submitted by Chevron to the Bureau of State Case Management, NJDEP as detailed in their July 17, 1997 letter to Thomas Lambert of Chevron USA Products Company. Failure to comply with the requirements of the Bureau of State Case Management, NJDEP may be cause for revocation of this permit.

Approved by:

Robert B. Piel, Jr., Manager
Bureau of Inland Regulation

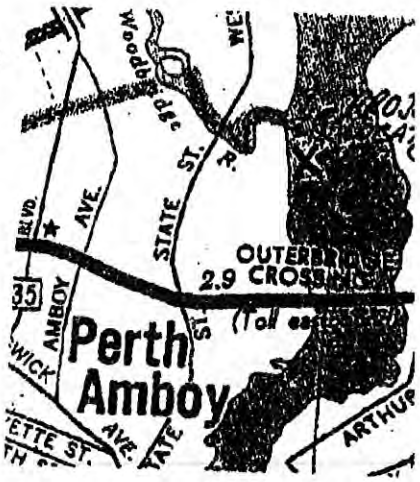
10/9/97
Date



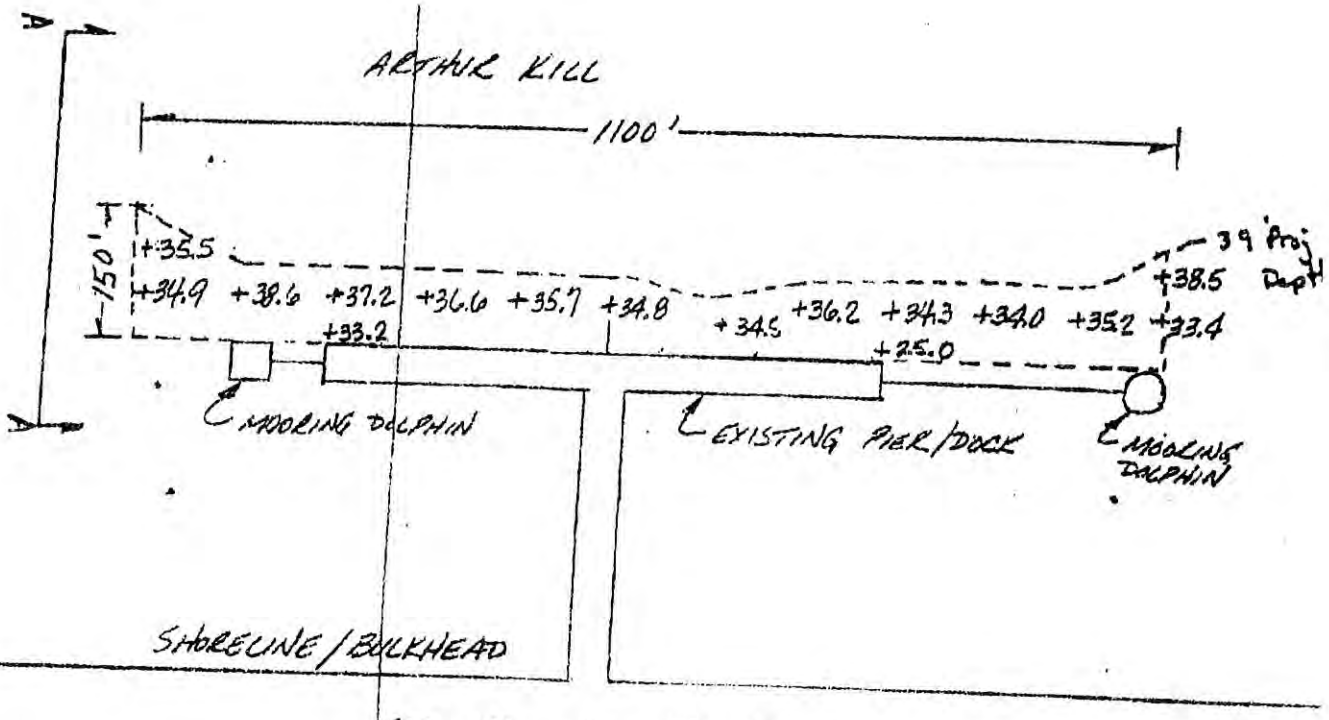
SECTION A-A

40 20 0 20 40 FEET VERTICAL

75 0 75 FEET HORIZONTAL



PROJECT LOCATION



200 100 0 100 200

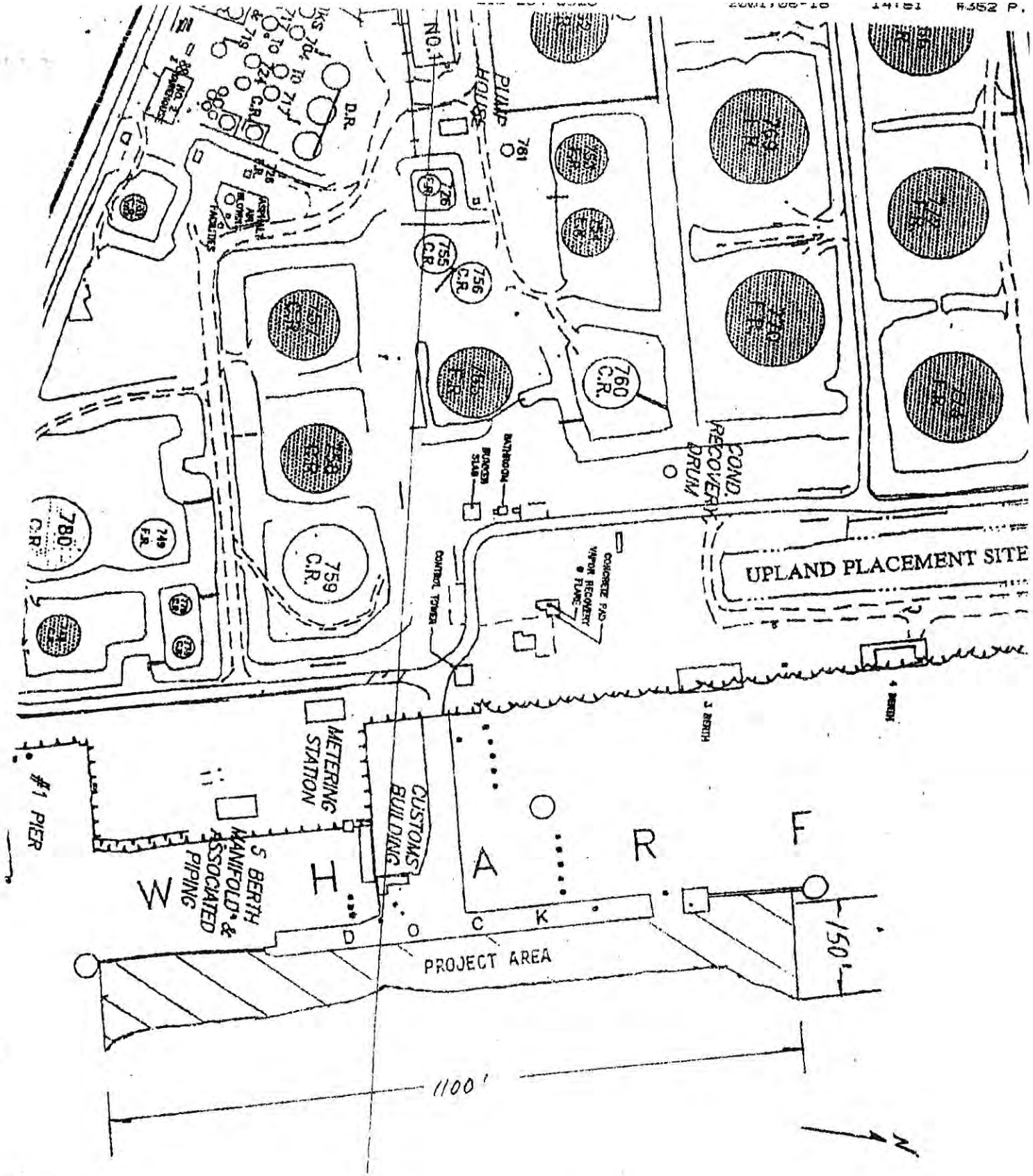
SCALE 1" = 200'

Chevron Products Company, Perth Amboy Refinery, Perth Amboy, NJ

Maintenance Dredging and Upland Placement Project

June 17, 1997

Sheet 1 of 2



Scale 1 inch = 200 feet

CHEVRON PRODUCTS COMPANY, PERTH AMBOY REFINERY, PERTH AMBOY, NJ
MAINTENANCE DREDGING AND UPLAND PLACEMENT PROJECT

Sheet 2 of 2

June 17, 1997

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

AUG 31 2018

Robert Mancini
Project Manager, Refining Business Unit
Chevron Environmental Management Company
1200 State Street
Perth Amboy, New Jersey 08861

Re: Chevron Waterbody Sediment Sampling
Former Chevron Perth Amboy Facility
Perth Amboy, Middlesex County, New Jersey
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1(a)14; 2.1(d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's *Ecological Evaluation Technical Guidance* (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at vargas.ricardito@epa.gov.

Sincerely,

Ricardito Vargas

Ricardito Vargas
Project Manager
Hazardous Waste Programs Branch

Enclosure

cc: Lynn Vogel, NJDEP (electronic copy only)

Chevron/Buckeye, Perth Amboy, NJ
EPA and NJDEP Recommendations/Comments for 2018 Sediment Sampling
September 2018

General Comments

1. Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.
2. Chevron submitted an updated data sheet to EPA on June 29,2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

Specific Comments

Woodbridge Creek

1. Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and NJDEP are requesting Chevron to use USEPA's ProUCL method, including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.
2. EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SED -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.
3. SED-06 – SED-03
    a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
    b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters
4. EPA is requiring an additional transect to sample for all contaminates (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01. The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show

hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream.

5. SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
6. SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
7. SED -19:
    a. Add additional point (A) along transect and sample for full suite of parameters
    b. Resample transects for all parameters for all points and at consistent depths (surface and subsurface)
8. Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
9. A transect is needed between the former Chevron Refinery Site and DITSED-08. Please explain whether horizontal and vertical delineation is complete in the DITSED-8 area.
10. Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

Spa Spring Creek

1. Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.
2. EPA requires additional sampling at all former transects and points for sub-surface sediment.
3. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
4. Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

Arthur Kill

1. EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.
2. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
3. EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
Mail Code 401-05F
P.O. Box 420
Trenton, New Jersey 08625-0420
Telephone: 609-633-1455

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 24, 2017

Robert Mancini
Project Manager
Chevron Environmental Management Co.
1200 State Street
Perth Amboy, NJ 08861

Nov 2003
RFI

Re: Chevron's Supplemental Ecological Report, November 1, 2016
Chevron USA, Inc.
Perth Amboy, Middlesex County, New Jersey
SRP PI# 003621

Dear Mr. Mancini:

The New Jersey Department of Environmental Protection (Department, NJDEP) has completed review of the above report, which was submitted pursuant to the Resource Conservation and Recovery Act (RCRA), Hazardous and Solid Waste Amendments (HSWA) Permit of 2013, and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E (TRSR).

The referenced document was prepared TRC Environmental Corporation for Chevron Environmental Management Company (CEMC). The Department has reviewed the report in accordance with N.J.A.C 7:26E-1.16, 3.6, 4.8, and 5.1 (e), the *Ecological Evaluation Technical Guidance* (EETG), February 2015, and the *Ecological Risk Assessment Guidance for Superfund* (USEPA, 1997). The Department's comments on the above report are provided below.

Background Summary

The 368-acre former Chevron Facility is in Perth Amboy and Woodbridge Townships, and was divided into a series of five "yards," i.e., Central Yard, East Yard, North Field/Main Yard, West Yard, and Amboy Field. Environmentally sensitive natural resources (ESNRs) bounding the site are Woodbridge Creek, Spa Spring Creek, and the Arthur Kill. The former facility received heavy crude oil from tankers and refined it into asphalt cement and intermediate products. Contaminants of potential ecological concern (COPECs) include petroleum product, PAHs and metals.

Comments

1. General comment - The 2002 and 2014 data indicate that free and/or residual product is present in Woodbridge Creek sediment immediately adjacent to, or under influence of, the site over an approximately 1-mile stretch (SED 09 – SED 19) into deep subsurface sediment, as demonstrated by

highly elevated EPH and PAH concentrations (Figures 3 and 4) and information presented in the sediment core logs (Appendix B). In 2014, to comply with N.J.A.C.7:26E and to address prior Department comments, supplemental EPH data were collected in cores from some 2002 locations where EPH had not been analyzed, but where product impact was indicated. These 2014 supplemental cores have clearly indicated high EPH levels and visual/olfactory product indicators at depth. For example, in 2002, at location SED-03-C, total PAHs of approximately 100 mg/kg was measured, but was EPH was not analyzed. In 2014, 40,000 mg/kg EPH was identified at this location at 1.5 – 2', remaining elevated to depth of approximately 6'/refusal. Therefore, data gaps persist at the numerous 2002 locations lacking subsurface EPH data and boring log observations at depth, such as SED-06-A and C; SED-05 A, B, C; SED-04 A and B; SED-01-A, B, C; others. SED-19, the most downstream sample in Woodbridge Creek, is impacted with deep (6-8'), high levels of EPH. but without the subsurface data from SED-01-A, B, C, potential linkage to site cannot be determined. Additionally, it is the Department's opinion that data gaps exist and additional cores should be collected and analyzed for full scan contaminants and EPH where large distances (e.g., @ 1000') exist between transects (e.g., between transects 7 and 6; transects 3 and 2; transects 2 and 1).

In addition to data gaps addressed above, this report should be revised to address potential data gaps in Spa Spring Creek and the Arthur Kill. Only surface data (0 -0.5') from both waterbodies, and no EPH data from the Arthur Kill, are available. Based on findings of contamination at-depth in Woodbridge Creek, deeper cores should be analyzed to reduce uncertainty regarding subsurface contamination in these two water bodies. Additionally, in the Arthur Kill, potential contamination from operations at the docking berths (described on p. 4), such as from over-water fuel transfers from tankers, must be investigated as part of the RI (see comment 5).

2. (p. 9) *Technical Overview* – Text in the 3rd paragraph regarding sediment screening levels of 1700 mg/kg and 17,000 mg/kg for EPH must be corrected. 1700 mg/kg is a soil ecological screening criterion (ESC) based on earthworm reproduction and not applicable to sediment. 17,000 mg/kg describes the residual saturation point in soil and applies only to soil in non-environmentally sensitive natural resources (ESNRs, NJDEP 2010), therefore is also not applicable to sediment (in sediment, samples with concentrations much lower than 17,000 mg/kg EPH can exhibit multiple other indicators of free and residual product). Multiple lines of evidence should be used to identify, characterize, and delineate free and residual petroleum product. Visual and olfactory observations are paramount and considered definitive evidence of product. Chevron is referred to N.J.A.C.7:26E-2.1(a)14 and 2.1(d).

3. (p. 11) 4.1 Background *Sediment Investigations* – The text states that background sediment samples "were organized into four groups," however only data from upstream Spa Spring Creek and downstream Woodbridge Creek are addressed. - Please clarify this. The Department does not consider SED-09 or SED-19 from Woodbridge Creek to be background, due to a product "hot spots." As per the EETG, section 5.3.4, such grossly contaminated locations should not be used for background data. Additionally, SED-09 can be under site influence from tidal flow. The Spa Spring Creek data from SED-20 and 21, and SED-10 from Woodbridge Creek may be appropriate for use as background data, however, as per the EETG, section 5.3.4, subsurface intervals at depths that correspond to site-related sample depth intervals should be collected.

4. (p. 13) 4.3 Contaminants *of Potential Ecological Concern* – this section tabulates onsite soil concentrations within 200' of each of the surface water bodies and compares with sediment ESC. If soil remediation/removal has occurred on-site, please verify that these data are pre-remedial and represent data at all depths (i.e., worst-case), and explain whether more distal on-site soil data would be

important to consider, such as erosional soil near a discharge pipe influent area, soil near upgradient drainage feature, or contaminated soil along preferential contaminant migration pathways such as a pipe bed, etc. Importantly, these soil data tables (pp. 16-24) do not contain EPH data and this report completely lacks information regarding petroleum product use on-site (purpose, location, duration, product transfers/handling, transport), or any information on product soil residuals, spills, discharges, or whether there were any product-related soil remediations (see comment 5).

The Department notes that on the table of on-site soil data within 200'of the Arthur Kill (p.24), soil contains extraordinarily high average and maximum concentrations of Lead at 16,000 mg/kg (530X ESC) and 750,000 mg/kg (70%; 24,000X ESC), respectively. Additionally, the maximum concentration of total PAHs is approximately 3000 mg/kg (750X the ESC) and the maximum concentration of Copper is approximately 4000 mg/kg (250 X ESC). Data from the five (5) Arthur Kill sample are available from only the 0-0.5' interval, therefore sediment samples not were collected in accordance with the EETG section 5.3.3, which recommends a minimum two intervals to fully evaluate linkage to the site.

5. General comment - This report does include a comprehensive evaluation of contaminant migration pathways from source areas to the three water bodies, as required pursuant to N.J.A.C.7:26E-1.16, 3.6 and 4.8 and in accordance with the EETG, USEPA 1997, and the administrative guidance "Investigating Impacts from Contaminated Sites to a Surface Water Body," November 2015. The EE must consolidate existing information from all former "yards" into an ecological conceptual site model for the site and comprehensively describe current and historic contaminant migration from the site to the three surface water bodies via all routes. Consideration should be given to the management of process waste/wastewater, storm water, and direct discharges (e.g., from spills, fuel transfers, tanker operations) for the entire site throughout its complete operating history. Notwithstanding that certain "pipe trenches" and "pipeways" are labeled on Figures 3-5, Chevron must ensure that all drainage systems features (e.g., ditches, channels) and outfalls have been identified and sampled to establish gradients and linkages of site contaminants to those identified in Woodbridge Creek, Spa Spring Creek, and the Arthur Kill. For example, ETRA had reviewed an April 2001 BEE for the 26-acre West Yard. It described that bunker fuel and No. 6 fuel oil were stored in above ground storage tanks, and that a system of storm sewers, catch basins, and two ditches conducted surface runoff to Spa Spring Creek. The report identifies Copper, Lead, Nickel, and Zinc as contaminants of potential ecological concern. Chevron is responsible to ensure that a similar assessment is reported for the entire site/all "yards" and that appropriate data have been collected in all site contaminant migration pathways and outfalls in water bodies. Chevron also needs to address discharges from the North Field Basins and ground water.

6. General comment - It is apparent that the former Chevron site has contributed free and/or residual product and other contaminants to the Woodbridge Creek, however, the requisite ecological conceptual site model and evaluation of contaminant migrations pathways, needed to determine linkages between contaminants on-site and in surrounding surface water bodies, must be completed (see comment 5). For the Remedial Investigation (RI) to be complete, horizontal and vertical delineation of product and other site-related contaminants (e.g., metals and PAHs) in contaminant migration pathways and ESNRs is required pursuant to N.J.A.C 7:26E-1.16, 3.6, and 4.8. Remediation of free and/or residual product is required, pursuant to N.J.A.C 7:26E- 5.1 (e). As per N.J.A.C.7:26E-4.8, contaminants remaining outside of the remediation footprint for product can either be remediated to the ESC or background concentrations (see comment 3 regarding background levels), or an ecological risk assessment in accordance with USEPA,1997 and the EETG can be conducted to develop site-specific ecological risk-based sediment remediation goals. Pursuant to N.J.A.C. 4.9(a)6.ii. (2), Chevron must determine whether a remedial action is planned or required.

7. (p. 28) 5.0 *Conclusions* - the conclusion in the second bullet states that "Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear complete." This report contains no data or documentation of any kind to support this conclusion, and in fact, the information from the 2001 BEE counters this statement.

Path Forward

The *Supplemental Ecological Evaluation Report* must be revised pursuant to the above comments. Again, pursuant to N.J.A.C. 4.9(a)6.ii.(2) Chevron must determine whether a remedial action is planned or required. Because this is a RCRA 2020 site with technical lead delegated to the Department, Chevron is responsible to ensure that USEPA,1997 is followed.

References

NJDEP. August 9, 2010. *NJDEP Protocol for Addressing Extractable Petroleum Hydrocarbons, Version 5.0Appendix 2 "Residual Saturation Values for No. 2 Fuel Oil, Diesel, and Heavier TPH Products"*

USEPA. June, 1997. *Ecological Risk Assessment Guidance For Superfund, process for designing and conducting ecological risk assessments.* EPA 540-R-97-006. Office of Solid Waste and Emergency Response. Washington, DC.

If you have any questions, please contact me at 609-292-3007.

Sincerely,

Anne Pavelka

Anne Pavelka PG, CHMM
Case Manager
Bureau of Case Management

C: Jill Monroe, BGWPA
John Boyer, BEERA
Nancy Hamill, ETRA
Ricardito Vargas, USEPA

ATTACHMENT 2

RELATED CORRESPONDENCE

Date	Document
November 1, 2003	Baseline Ecological Evaluation/2003 RCRA Facilities Investigation completed and RFI Report submitted to the USEPA.
November 1, 2016	Supplemental Ecological Evaluation Completed and Report (SEER) submitted to the USEPA and NJDEP.
March 24, 2017	NJDEP letter regarding the November 2016 SEER
July 31, 2017	Meeting between USEPA, TRC, Chevron
August 31, 2018	USEPA issues comments regarding Chevron Waterbody Sediment Sampling and additional investigation to meet RFI requirements.
September 17, 2018	Meeting between USEPA, TRC, Chevron
November 15, 2018	Submission of response to August 31, 2018 comments and SFSAP to USEPA
March 1, 2019	USEPA/NJDEP Comment Letter on Nov. 2018 SFSAP
July 1, 2019	Submission of Revised SFSAP
July 2, 2019	Response to USEPA's March 1, 2019 Comments on SFSAP
August 7, 2019	Meeting between NJDEP, USEPA, Chevron, Buckeye Pipeline TRC regarding SFSAP
August 21, 2019	Response to USEPA regarding August 7, 2019 Meeting and Presentation of the Revised SFSAP
September 19, 2019	USEPA letter approving the SFSAP, as revised

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Case Management
Mail Code 401-05F
P.O. Box 420
Trenton, New Jersey 08625-0420
Telephone: 609-633-1455

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 24, 2017

Robert Mancini
Project Manager
Chevron Environmental Management Co.
1200 State Street
Perth Amboy, NJ 08861

Nov 2003
RFI

Re: Chevron's Supplemental Ecological Report, November 1, 2016
Chevron USA, Inc.
Perth Amboy, Middlesex County, New Jersey
SRP PI# 003621

Dear Mr. Mancini:

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important to consider, such as erosional soil near a discharge pipe influent area, soil near upgradient drainage feature, or contaminated soil along preferential contaminant migration pathways such as a pipe bed, etc. Importantly, these soil data tables (pp. 16-24) do not contain EPH data and this report completely lacks information regarding petroleum product use on-site (purpose, location, duration, product transfers/handling, transport), or any information on product soil residuals, spills, discharges, or whether there were any product-related soil remediations (see comment 5).

The Department notes that on the table of on-site soil data within 200'of the Arthur Kill (p.24), soil contains extraordinarily high average and maximum concentrations of Lead at 16,000 mg/kg (530X ESC) and 750,000 mg/kg (70%; 24,000X ESC), respectively. Additionally, the maximum concentration of total PAHs is approximately 3000 mg/kg (750X the ESC) and the maximum concentration of Copper is approximately 4000 mg/kg (250 X ESC). Data from the five (5) Arthur Kill sample are available from only the 0-0.5' interval, therefore sediment samples not were collected in accordance with the EETG section 5.3.3, which recommends a minimum two intervals to fully evaluate linkage to the site.

5. General comment - This report does include a comprehensive evaluation of contaminant migration pathways from source areas to the three water bodies, as required pursuant to N.J.A.C.7:26E-1.16, 3.6 and 4.8 and in accordance with the EETG, USEPA 1997, and the administrative guidance "Investigating Impacts from Contaminated Sites to a Surface Water Body," November 2015. The EE must consolidate existing information from all former "yards" into an ecological conceptual site model for the site and comprehensively describe current and historic contaminant migration from the site to the three surface water bodies via all routes. Consideration should be given to the management of process waste/wastewater, storm water, and direct discharges (e.g., from spills, fuel transfers, tanker operations) for the entire site throughout its complete operating history. Notwithstanding that certain "pipe trenches" and "pipeways" are labeled on Figures 3-5, Chevron must ensure that all drainage systems features (e.g., ditches, channels) and outfalls have been identified and sampled to establish gradients and linkages of site contaminants to those identified in Woodbridge Creek, Spa Spring Creek, and the Arthur Kill. For example, ETRA had reviewed an April 2001 BEE for the 26-acre West Yard. It described that bunker fuel and No. 6 fuel oil were stored in above ground storage tanks, and that a system of storm sewers, catch basins, and two ditches conducted surface runoff to Spa Spring Creek. The report identifies Copper, Lead, Nickel, and Zinc as contaminants of potential ecological concern. Chevron is responsible to ensure that a similar assessment is reported for the entire site/all "yards" and that appropriate data have been collected in all site contaminant migration pathways and outfalls in water bodies. Chevron also needs to address discharges from the North Field Basins and ground water.

6. General comment - It is apparent that the former Chevron site has contributed free and/or residual product and other contaminants to the Woodbridge Creek, however, the requisite ecological conceptual site model and evaluation of contaminant migrations pathways, needed to determine linkages between contaminants on-site and in surrounding surface water bodies, must be completed (see comment 5). For the Remedial Investigation (RI) to be complete, horizontal and vertical delineation of product and other site-related contaminants (e.g., metals and PAHs) in contaminant migration pathways and ESNRs is required pursuant to N.J.A.C 7:26E-1.16, 3.6, and 4.8. Remediation of free and/or residual product is required, pursuant to N.J.A.C 7:26E- 5.1 (e). As per N.J.A.C.7:26E-4.8, contaminants remaining outside of the remediation footprint for product can either be remediated to the ESC or background concentrations (see comment 3 regarding background levels), or an ecological risk assessment in accordance with USEPA,1997 and the EETG can be conducted to develop site-specific ecological risk-based sediment remediation goals. Pursuant to N.J.A.C. 4.9(a)6.ii. (2), Chevron must determine whether a remedial action is planned or required.

7. (p. 28) 5.0 *Conclusions* - the conclusion in the second bullet states that "Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear complete." This report contains no data or documentation of any kind to support this conclusion, and in fact, the information from the 2001 BEE counters this statement.

Path Forward

The *Supplemental Ecological Evaluation Report* must be revised pursuant to the above comments. Again, pursuant to N.J.A.C. 4.9(a)6.ii.(2) Chevron must determine whether a remedial action is planned or required. Because this is a RCRA 2020 site with technical lead delegated to the Department, Chevron is responsible to ensure that USEPA,1997 is followed.

References

NJDEP. August 9, 2010. *NJDEP Protocol for Addressing Extractable Petroleum Hydrocarbons, Version 5.0Appendix 2 "Residual Saturation Values for No. 2 Fuel Oil, Diesel, and Heavier TPH Products"*

USEPA. June, 1997. *Ecological Risk Assessment Guidance For Superfund, process for designing and conducting ecological risk assessments.* EPA 540-R-97-006. Office of Solid Waste and Emergency Response. Washington, DC.

If you have any questions, please contact me at 609-292-3007.

Sincerely,

Anne Pavelka

Anne Pavelka PG, CHMM
Case Manager
Bureau of Case Management

C: Jill Monroe, BGWPA
John Boyer, BEERA
Nancy Hamill, ETRA
Ricardito Vargas, USEPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

AUG 31 2018

Robert Mancini
Project Manager, Refining Business Unit
Chevron Environmental Management Company
1200 State Street
Perth Amboy, New Jersey 08861

Re: Chevron Waterbody Sediment Sampling
Former Chevron Perth Amboy Facility
Perth Amboy, Middlesex County, New Jersey
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1(a)14; 2.1(d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's *Ecological Evaluation Technical Guidance* (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at vargas.ricardito@epa.gov.

Sincerely,

Ricardito Vargas

Ricardito Vargas
Project Manager
Hazardous Waste Programs Branch

Enclosure

cc: Lynn Vogel, NJDEP (electronic copy only)

Chevron/Buckeye, Perth Amboy, NJ
EPA and NJDEP Recommendations/Comments for 2018 Sediment Sampling
September 2018

General Comments

1. Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.
2. Chevron submitted an updated data sheet to EPA on June 29,2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

Specific Comments

Woodbridge Creek

1. Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and NJDEP are requesting Chevron to use USEPA's ProUCL method, including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.
2. EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SED -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.
3. SED-06 – SED-03
    a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
    b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters
4. EPA is requiring an additional transect to sample for all contaminates (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01. The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show

hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream.

5. SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
6. SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
7. SED -19:
    a. Add additional point (A) along transect and sample for full suite of parameters
    b. Resample transects for all parameters for all points and at consistent depths (surface and subsurface)
8. Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
9. A transect is needed between the former Chevron Refinery Site and DITSED-08. Please explain whether horizontal and vertical delineation is complete in the DITSED-8 area.
10. Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

Spa Spring Creek

1. Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.
2. EPA requires additional sampling at all former transects and points for sub-surface sediment.
3. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
4. Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

Arthur Kill

1. EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.
2. Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.
3. EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

Robert Mancini
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November 15, 2018

Ricardito Vargas
United States Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866

Subject: Response to August 31, 2018 EPA/NJDEP Letter Regarding Former Chevron Perth Amboy Facility Water Body Sediment Sampling
Facility EPA ID#: NJD081982902

Dear Mr. Vargas:

Thank you and the State representatives for meeting with Chevron and our consultants to resolve the remaining HSWA Permit issues relating to the three surface water bodies adjacent to the former Chevron Perth Amboy Facility (Arthur Kill, Spa Spring Creek and Woodbridge Creek). We believe the meeting and site tour were useful in identifying and resolving outstanding issues and provided a roadmap for for inalizing the investigation in accordance with the HSWA Permit conditions. Chevron's investigations conducted to date have provided a significant understanding of sediment quality in the areas of the waterways proximate to the Facility. The Facility's 2013 Hazardous and Solid Waste Amendments Permit Renewal and Permit Modification I requires that the RCRA Facility Investigation (RFI) be completed for the three water bodies (HSWA Permit Module III, Page 25 and 26). During our September 17, 2018 meeting we agreed upon an approach to fill in existing data gaps through the completion of a supplemental sediment sampling effort; the proposed field sampling workplan for this effort is provided as an attachment to this letter (Attachment 1), the Supplemental Field Sampling and Analysis Plan (SFSAP)) and discussed in more detail below. Chevron is committed to performing the final investigatory tasks identified in this letter and the SFSAP to complete the HSWA Permit investigation for the water bodies as soon as possible.

As requested, Chevron is also providing the following response to the August 31, 2018 letter from the Environmental Protection Agency (EPA) (Attachment 2), which contained recommendations and comments from the New Jersey Department of Environmental Protection (NJDEP) concerning the three surface water bodies. The response to this letter and the SFSAP incorporate the comments, agreements and information discussed in the September 17, 2018 meeting between Chevron, EPA and NJDEP, and supersedes the NJDEP's March 24, 2017 letter.

The EPA August 31, 2018 comment letter is separated into two parts. The first part of the letter contains the EPA cover letter and the second part of the letter contains NJDEP recommendations and comments as an attachment. The NJDEP recommendations/comments are separated into General Comments and Specific Comments. The Specific Comments address each of the water bodies; Woodbridge Creek, Spa Spring Creek and the Arthur Kill. The following is the full text of the August 31, 2018 EPA Cover Letter and NJDEP comments, presented in sections that are followed by Chevron's response to comments (RTC).

EPA Cover Letter

Cover Letter Paragraph 1 - The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have drafted comments regarding Chevron's upcoming waterbody sediment sampling. Chevron previously sampled Woodbridge Creek, Spa Spring Creek, and the Arthur Kill for VOCs, SVOCs, EPH, PCB, Metals, and Pesticides in 2002 and 2014. However, based on a review of data collected from the 2 sampling periods, EPA and NJDEP have determined that the three waterbodies sediment, associated with the Former Chevron Perth Amboy Refinery, must be further investigated (i.e., additional sampling must be performed) pursuant to N.J.A.C. 7:26E-2.1 (a)14; 2.1 (d); 3.6, 4.8, 4.9, 5.1 (e), et al., and NJDEP's Ecological Evaluation Technical Guidance (EETG), February 2015. The goal of the additional investigation is to complete a comprehensive RCRA Facility Investigation (RFI) of these waterbodies and thus fulfill the requirements set forth by the 2013 EPA HSWA Permit renewal.

Chevron Response to Cover Letter Paragraph 1 – Chevron will complete the RCRA Facility Investigation (RFI) for the water bodies as specified in the 2013 Hazardous and Solid Waste Amendments (HSWA) permit renewal and Permit Modifications I (Module III, Page 25 and 26). Once agreed upon, this response to comment letter and the attached sediment sampling workplan and support documentation will fulfill the requirement of the 2013 (HSWA) Permit. Please note that the reference to N.J.A.C. 7:26E-5.1(e) appears to be incorrect as it is not part of the investigative regulatory requirements.

Cover Letter Paragraph 2 - Additional sampling is needed to complete delineation of product and other contaminants along all the waterbodies. Enclosed are EPA and NJDEP comments for the upcoming sediment sampling. To meet these sampling objectives, a Field Sampling and Analysis Plan (FSAP) must be designed to characterize and delineate site-related free and residual petroleum product and other site-related contaminants, such that the lateral and vertical extent of contamination are well defined to determine the approximate volume of contamination in these water bodies.

Chevron Response to Paragraph 2 – A Sediment SFSAP is included with this letter as Attachment 1. The Sediment SFSAP incorporates the comments and information discussed, and the agreements reached, in the September 17, 2018 meeting. The objective of the SFSAP is for this to be the last round of sampling and analysis to fulfill the requirements of the 2013 HSWA Permit. As previously

discussed in prior RFI reports and at the September 17, 2018 meeting, these water bodies are located in a historically industrialized/urban area with many other adjacent industrial facilities present in the vicinity in addition to Chevron.

NJDEP General Comments

General Comment 1 - Historic aerial photographs and existing sediment data suggest there are elevated levels of petroleum product and contaminants at historic outfall/discharge areas located near transect 3 (oil/water separator, SMU 40) and transect 2 (former tidal creek) in Woodbridge Creek. Chevron should identify all other historic contaminant migration pathways into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill, including direct or indirect discharge of untreated or treated industrial process waste. The specific contaminants, mass estimates, and timeframe/duration of the discharge should be provided.

Chevron Response to General Comment 1 – During the September 17, 2018 meeting, Chevron noted that known current and historic site conditions including the location of former facility waste water/stormwater outfalls, and the location of proximate waste management units were used as basis for identifying sediment sample locations in Chevron's prior two sediment sampling investigations of the waterbodies. Chevron identified and provided known information on these current and former outfalls and waste management units in the Description of Current Conditions (DOCC), which was originally submitted to the EPA/NJDEP in 1994 pursuant to the original HSWA Permit. The DOCC further identified Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the Facility and their known or suspected discharge mechanisms to the water bodies. The information obtained from the DOCC, a review of historic aerial photographs and subsequent information obtained from completion of the RCRA Facility Investigation for these SWMUS and AOCs formed the basis of selecting sediment samples.

Available information on the history of the New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permits (NJPDES-DSW) permits for the former Chevron Perth Amboy Refinery is summarized in the DOCC (pages 2-31 through 2-34; and is included as Attachment 3). The former Chevron Perth Amboy Refinery held NJPDES-DSW permit No. NJ000021 which permitted the discharge of treated waste waters and storm water to Woodbridge Creek through the Effluent Treatment Plant (DSN 005) and Spa Spring Creek (DSN 004). As provided in the DOCC, the initial NJPDES-DSW permit appears to have been issued in 1974 (then a federal NPDES permit).

Sediment samples from transect SED-05 on Woodbridge Creek was specifically placed at the ETPs outfall DNS 005. Sediment transect SED-04 is downstream of this outfall and is still adjacent to the ETP. Sediment transect SED-03 was placed further downstream of SED-04 to monitor potential discharges from SWMU 40 (the Old Pond), which likely served as an oil/water separator

prior to the construction of the current ETP.

Similarly, other sediment transects sampled during the 2002 and 2014 were purposely located adjacent to former and current waste water treatment/discharge areas as identified in the DOCC and subsequent documents. Sediment sample SED-11 was placed at DSN 004 in Spa Spring Creek to evaluate sediment quality at that location. As discussed in the September 17, 2018 meeting, the investigations of Woodbridge Creek, Spa Spring Creek, and the Arthur Kill included identification of known and potential contaminant sources from the site including all known direct and/or indirect discharges. The results and discussion from this data can be found in both Section 9 of the 2003 RFI report and the November 2016 Supplemental Baseline Ecological Evaluation. Chevron does not have detailed information regarding the specific contaminants, mass estimates and timeframe/durations of process waste discharges. An electronic copy of the DOCC was recently provided to the EPA by Chevron on September 24, 2018. A summary of the history of operations related to the adjacent waterbodies previously provided to the USEPA and NJDEP in the DOCC and subsequent RFI reports will be included in a final report along with the results obtained from implementation of the proposed SFSAP.

General Comment 2 - Chevron submitted an updated data sheet to EPA on June 29, 2018. EPA and NJDEP are requesting that the facility no longer report data as "ND" or Non-Detect. Chevron needs to report the actual results, which can be followed by a "U" in parentheses to indicate that the results are less than the Method Detection Limit (MDL). EPA and NJDEP request an updated data table to reflect this comment.

Chevron Response to General Comment 2 – As noted in the September 17, 2018, Chevron will provide data as requested in all future reports. Please note that in prior reports, data that was listed as ND were accompanied by a number in parentheses that indicated the MDL.

NJDEP Specific Comments - Woodbridge Creek

Woodbridge Creek Comment 1 - Background Samples: EPA and NJDEP do not accept SED-09 as an appropriate background location. This transect contains EPH, among other contaminants, and thus cannot be considered as background. SED-10 does look like an area that can potentially be used as background. Chevron needs to re-sample this transect for all contaminants and product. EPA and NJDEP also believe that 3 sample points along the transect may not be sufficient to determine background concentrations. Thus, EPA and the NJDEP are requesting Chevron use USEPA's ProUCL method including the successive removal of statistical outliers, to determine background using a minimum of 8 samples.

Chevron Response to Woodbridge Creek Comment 1 – Chevron will collect eight (8) additional background samples along Woodbridge Creek, in the vicinity of SED-10, to comply with USEPA's ProUCL method. Locations are discussed in the attached response (See attached SFSAP). Please

note that SED-09 transect represents potential upstream off-site source conditions.

Woodbridge Creek Comment 2 - EPA is requiring an additional transect to sample for all contaminants (VOCs, SVOCs, EPH, PCB, Metals, Organochlorine Pesticides, TOC, and particle grain size) at the midpoint between SEO -09 and SED-06. The transect should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. If results show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot in the upstream and downstream direction.

Chevron Response to Woodbridge Creek Comment 2 - As shown on Figure 2 in Attachment 1 (SFSAP), Chevron will add two additional transects in between SED-06 and SED-09. Samples will be collected from the surface interval and from the subsurface interval exhibiting the greatest potential for contamination, determined by photoionization detector or visual observation. As discussed in the September 17, 2018, samples will be analyzed for extractable petroleum hydrocarbons (EPH), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), priority pollutant Metals (PP Metals), total organic compounds (TOC) and particle grain size\ (but excluding Pesticides). As agreed upon during the September 17, 2018 meeting, Chevron does not need to further delineate hot spots to comply with the requirements of 2013 HSWA Permit.

Woodbridge Creek Comment 3 - SED-06 – SED-03

a. Resample transect for all parameters for all points and at consistent depths (surface and sub-surface)
b. Add 2 additional points (A' and C') to extend the transect to the facility property and the Northfield property/Southern Parcels. These additional points need to be sampled for the full suite of parameters.

Chevron Response to Woodbridge Creek Comment 3

a. These transects were sampled in 2002 for a full suite of analytes. In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously.
b. As discussed, the September 17, 2018 meeting, sediments were characterized with COPECs above Ecological Screening Criteria from bank to bank using extrapolation, therefore, more defined delineation from sample locations A and C to the shoreline is not necessary.

Woodbridge Creek Comment 4 - EPA is requiring an additional transect to sample for all contaminats (VOCs, SVOCs, EPH, PCB, Metals, Pesticides, Herbicides) at the midpoint between SED -03 and SED-02 and midway between SED-02 and SED-01.The transects should contain 3 points (A-C), with C being closest to the facility, B the midpoint, and A located on the opposite side of the facility. Ifresults show hotspots, Chevron must delineate by adding additional transects 200 feet from the hotspot, both upstream and downstream

Chevron Response to Woodbridge Creek Comment 4
Due to underground gas, product and fuel lines, and overhead bridges and railroad trestles, a vibrocore sample transect in between SED-03 and SED-02 is not feasible. During the 2012 sampling event, Williams Pipeline utility locator indicated that it was unsafe to use the vibracore rig in this area. It is possible that a shallow sediment could be collected from this transect using an Ekman Dredge sampler. The feasibility of this transect depends on the approval from the utility owners. At the meeting, Chevron indicated that a transect at a location between SED-01 and SED-02 (See SFSAP) is not on or adjacent to Chevron property. Regardless, Chevron will complete a transect here and analyze for the parameter list discussed above in Woodbridge Creek Comment 2. As agreed upon during the September 17, 2018 meeting, Chevron does not need to further delineate hot spots to comply with the requirements of 2013 HSWA Permit.

Woodbridge Creek Comment 5 - SED-02: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface).

Chevron Response to Woodbridge Creek Comment 5 - These transects were sampled in 2002 for a full suite of analytes (VOCs, SVOCs, PP metals and PCBs). In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron agrees to resample all past locations for EPH analysis where EPH was not analyzed previously.

Woodbridge Creek Comment 6 - SED-01: Resample transect for all parameters for all points and at consistent depths (surface and sub-surface).

Chevron Response to Woodbridge Creek Comment 6 - These transects were sampled in 2002 for a full suite of analytes (VOCs, SVOCs, PP metals and PCBs). In 2014, selected sample locations and intervals were additionally analyzed for EPH. As agreed upon during the September 17, 2018 meeting, Chevron agrees to resample all past locations for EPH analysis where EPH was not analyzed previously.

As specified in the 2016 Supplemental BEE, samples recollected from the subsurface interval were collected at depths with the greatest potential for environmental impact. Sediment depth, unlike a soil horizon, is transient and variable. Considering the 10-year gap between the sampling events, it was determined that returning to the same depth of the original sample would not provide the most representative data. For the SFSAP, Chevron will collect the deeper sediment samples from the depth intervals exhibiting the greatest potential for environmental impact based on field observations, following the prior methodology and as described above.

Woodbridge Creek Comment 7 - SED -19:

a. Add additional point (A) along transect and sample for full suite of parameters
b. Resample transects for all parameters for all points and at consistent depths (surface and

subsurface)

Chevron Response to Woodbridge Creek Comment 7

a. *As discussed during the September 17, 2018 meeting and in the 2016 Supplemental BEE, a sample was not feasible in this location. Riprap stone was installed along the shoreline, on the Motiva side of the creek, where the sample was to be collected. Vibracore sampling techniques do not allow for a sample to be advanced.*

b. *As discussed at the September 17, 2018 meeting, EPH was analyzed in 2014 when this sample was collected. Therefore, additional sampling at this location is not necessary.*

Woodbridge Creek Comment 8 Other transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Woodbridge Creek Comment 8 – As discussed in the September 17, 2018 meeting, Chevron has added an additional 4 transects (12 Sample locations, in addition to 8 natural background samples), to Woodbridge Creek.

Woodbridge Creek Comment 9 - A transect is needed between the former Chevron Refinery Site and DITSWED-08 . Please explain whether horizontal and vertical delineation is complete in the DITSWED-8 area.

Chevron Response to Woodbridge Creek Comment 9 - An additional transect between Chevron and DITSWED-08 is not warranted. Former sediment sample locations SED-06 A, B and C on Transect SED-06 are in line with DITSWED-08, sediment sample DITSED-B08S, and the location of sample SED-06 A is adjacent to DITSWED-08.

Chevron does not own the property where DITSWED-08 is located and is not responsible for the requested work related to it. DITSWED-08 is located on Block 732.A, Lot 1, a 15.5 acre parcel of property owned by North Field Extension, LLC ("NFE, LLC"). NFE, LLC acquired Block 732.A, Lot 1 and a second parcel (the two parcels are collectively referred to as the "Northern Parcels") in September 2013 from Chevron. The conveyance of the Northern Parcels to NFE, LLC was part of a litigation settlement.

Under the settlement, Chevron agreed with NFE, LLC and its principal parties, C.P. Chemicals, Inc., Phibro Animal Health Corporation and Legacy Vulcan Corp. (collectively, the "NFE Parties"), to convey the Northern Parcels to NFE, LLC only if EPA agreed (i) to remove the Northern Parcels from Chevron's HSWA permit and its requirements and (ii) to obligate the NFE Parties to enter into an administrative order on consent with EPA to investigate and remediate the Northern Parcels. EPA was an integral part of the discussions that led to this arrangement and it was given all test data that existed at the time to review and understand the site conditions. As planned, in July 2013, EPA removed the Northern Parcels from the obligations of Chevron's

HSWA permit, and in September 2013 it entered into an Administrative Order on Consent with the NFE Parties requiring them to investigate and remediate the Northern Parcels. Since a central component of this arrangement was to eliminate any Chevron obligation related to contamination at the Northern Parcels, Chevron is not required to perform investigation or remedial work related to DITSWED-08 under the HSWA Permit.

As part of the settlement, Chevron agreed to perform a very specific, limited scope of work—to excavate a small, isolated area of soil. Also, as part of the settlement, the NFE Parties agreed to perform "any required investigation or remediation of any and all contaminants in the Northern Parcels in accordance with the requirements of applicable law". This obligation was "without regard to the source of the contamination". Other than the limited excavation work noted above, the NFE Parties are responsible for any required investigation, delineation and remediation of contamination at the Northern Parcels, including any obligations related to the DITSWED-08 area. A copy of the Settlement Agreement is included as Attachment 4 for your reference. See Paragraphs 4(a) and 4(d) for the pertinent provisions.

Woodbridge Creek Comment 10 - Chevron should clarify if there were any impacts or sediment removal activities implemented as a result of the engineered wetlands between transect 6 and 8 along Woodbridge Creek and Spa Spring Creek.

Chevron Response to Woodbridge Creek Comment 10 - The discharge area was closed during these activities until the engineered wetland was complete. No sediment was excavated from Woodbridge Creek and activities were isolated to the area where the work was completed. There were no impacts to sediment during the construction of the engineered wetlands.

NJDEP Specific Comments - Spa Spring Creek

Spa Spring Creek Comment 1 - Background Sample: Chevron needs to establish an appropriate background location and apply the ProUCL method with a minimum of 8 samples.

Chevron Response to Spa Spring Creek Comment 1 - Chevron will collect four (4) additional background samples along Spa Spring Creek to comply with USEPA's ProUCL method. The location of these additional background samples are included in the SFSAP.

Spa Spring Creek Comment 2 - EPA requires additional sampling at all former transects and points for sub-surface sediment.

Chevron Response to Spa Spring Creek Comment 2 – As discussed during the September 17, 2018 meeting and in Section 4.1.1 of the 2016 Supplemental BEE, the sediment lens at these locations is very thin (approx. 6"), and there is no subsurface sediment to be collected.

Spa Spring Creek Comment 3 - Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Spa Spring Creek Comment 3 - The Spa Spring Creek adjacent to Chevron is relatively short distance, and there are already two transects and a sample collected from the DSN004 outfall location. In addition to the existing and planned background samples in Spa Spring Creek, additional transects will be added above and below the confluence of Spa Spring Creek and Woodbridge Creek. These locations will provide conditions related to Spa Spring Creek.

Spa Spring Creek Comment 4 - Clarify the location of the former NJPDES discharge point on Spa Spring Creek relative to existing sample locations, how long this discharge point was in use, and what are the permit discharge limits.

Chevron Response to Spa Spring Creek Comment 4 - The location of this discharge point is presented in the attached SFSAP, Figure 3. A history of this discharge point and the corresponding NJPDES Permit Number was described in Section 2.4.4 of the 2003 RFI report. A summary of the information is provided as Attachment 3.

NJDEP Specific Comments - Arthur Kill

Arthur Kill Comment 1 - EPA is requiring additional sub-surface sampling along all former sampling points for all parameters.

Chevron Response to Arthur Kill Comment 1 – During the 2002 sampling event, sediment sample cores from the Arthur Kill collected by Chevron did not show evidence of free product (see sediment boring logs, 2003 RFI Report, Appendix B). Additionally, as discussed during our September 17, 2018 meeting the two background samples collected by Chevron in the Arthur Kill in 2002 (SED-16-C and SED-17-C; results discussed in Section 9 of the 2003 RFI Report) showed higher concentrations of contaminants than the samples taken adjacent to Chevron. Additionally, the Chevron Dock area was subject to maintenance dredging, most recently event conducted by Chevron was in 2003 (discussed in Chevron Response to Arthur Kill Comment 3, below). Chevron therefore does not believe additional sampling and analysis in the Arthur Kill is necessary.

Arthur Kill Comment 2 - Additional discrete samples or transects should be added as needed to investigate/delineate discharge areas identified as per General Comment 1 above.

Chevron Response to Arthur Kill Comment 2 –As discussed above, Chevron believes that the existing sediment data from the Arthur Kill, as presented in the 2003 RFI Report, is sufficient and

additional sampling is not warranted.

Arthur Kill Comment 3 - EPA is requesting additional information on the dates/location of dredging in the Arthur Kill.

Chevron Response to Arthur Kill Comment 3 - As discussed at the September 17, 2018 meeting, Chevron's Arthur Kill dock area (Area A [Berths 2, 3 and 4] and Area B (Tanker Berth]) has been subject to prior maintenance dredging by Chevron. Dredging information for this area is provided in Attachment 5, including the 1997 NJDEP Land Use Permit for maintenance dredging and an aerial photograph base map with an outline of the dredged area that includes the location, depths and volumes associated with the dredging activities (Figure A-1). The dredging was completed during November 2003. The dredging material was approved for upland placement by the NJDEP as clean fill and was used as backfill in the former East Yard Basin.

We look forward to your review and approval of the attached sediment investigation workplan. Chevron is committed to completing the final investigatory tasks specified in the HSWA Permit for the water bodies as soon as possible.

If you require additional information regarding this response letter or the attached workplan, please contact me at (732) 738-2023.

Sincerely,

Robert Mancini
Project Manager, Downstream

cc: Lynn E. Vogel – NJDEP

Enclosures (as described)

PREVIOUSLY SUBMITTED ATTACHMENTS TO THE NOVEMBER 15, 2018 LETTER FROM CHEVRON TO USEPA (Ricardito Vargas) ARE NOT INCLUDED WITH THIS LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

MAR 1 - 2019

Robert Mancini
Project Manager, Refining Business Unit
Chevron Environmental Management Company
1200 State Street
Perth Amboy, New Jersey 08861

Re: 1. Supplemental Field Sampling and Analysis Plan, Sediments, November 16, 2018
Former Chevron Perth Amboy Facility
Perth Amboy, Middlesex County, New Jersey
EPA ID #: NJD081982902

Dear Mr. Mancini:

The U.S. Environmental Protection Agency (EPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have completed our review of the Supplemental Field Sampling and Analysis Plan (SFSAP), Sediments, dated November 16, 2018 which was submitted for the Former Chevron Perth Amboy Facility in Perth Amboy, Middlesex County, NJ. The November 2018 RTC and the associated SFSAP were submitted by Chevron (Chevron) Environmental Management Company pursuant to the Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments (HSWA) Permit of 2013, and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E (TRSR).

We have also reviewed the Response to August 31, 2018 EPA/NJDEP Letter, dated November 15, 2018. Comments for this section, including addressing the DITSED-08 area, will be submitted under a separate cover. As agreed upon at the September 17, 2018 meeting, this Supplemental Field Sampling and Analysis Plan serves to fulfill the HSWA 2013 permit requirement to complete a RCRA Facility Investigation (RFI) of the adjacent waterbodies. Any additional investigations and remedial action will be negotiated after the completion of the RFI. Please note, the below comments are organized by the SFSAP Section and Page.

1. **Section 1.0 Introduction, Page 1, 3rd paragraph**: The document states, "The facility has completed several phases of the RFI for the three surface water bodies…" However, the historical data is not included in this document, as such it is unclear if the proposed sampling locations and intervals are sufficient. The document should be revised to include a more detailed discussion of sampling results (text, figure, table) from prior investigations so that we can evaluate if the proposed locations are adequate to sufficiently delineate the nature and extent of contamination in the waterbodies and along the adjacent shorelines.

2. **Section 1.0 Introduction, Page 3: The document states**, "As part of the Supplemental EE, Chevron…further evaluated potential contaminant migration pathways to surface water." However, limited information on this evaluation was included in this document as such we are unable to determine if the proposed sampling program is adequate. The document, as well as Figure 2, should be revised to discuss, at length, any AOCs/SWMUs/PAOCs with the potential to impact these waterbodies, including

but not limited to: SWMUs 1, 2, 3, 7, 8, 24, 26, 31, 35, 36, 40, 41, 45, etc. This figure should also show the former confluence of historic Spa Spring Creek with Woodbridge Creek and areas where non-point source discharges over the site's operation history may have occurred via sheet runoff or groundwater discharges, and/or were associated with overwater fuel transfers, former dock/pier operations, etc. Additionally, this figure should indicate the location of shoreline/perimeter soil borings where light non-aqueous phase liquid (LNAPL) was detected, as referenced below in Comment No. 9. The above information is necessary to determine if the proposed sampling program is adequate.

3. **Section 1.0 Introduction, Page 3: The document states**, "Historically, the Facility has discharged treated storm water and waste waters to outfalls located in Spa Spring Creek and Woodbridge Creek." However, limited additional information on these historic outfalls is included in this document. The document should be revised to include text and accompanying figures detailing the location of known and historic tidal creeks, outfalls, and other current and former discharge (permitted and unpermitted) points into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill; including those referenced in Attachment 3 (DSN 0004A, 004B, 004C, 005, 005A, 006A, etc.). The document should be revised to discuss waste management practices prior to 1974 (date of initial Federal NPDES permit), prior to city sewer connections, and identify historic direct discharges of industrial waste into the three waterbodies. Chevron is directed to a historic document by the Interstate Sanitation Commission Report, entitled Location of City Sewers Adjacent to Industrial Plants Bordering the Arthur Kill in New Jersey, dated January 1965, which discusses the direct discharge of waste material into Woodbridge Creek and the Arthur Kill from the former California Oil Company (electronic pages 13, 14, 62) and other facilities. The document is available at: http://www.iec-nynjct.org/sites/default/files/2018-08/1965%20Sewers%20Locations%20Arthur%20Kill%20NJ%20opt.pdf.

4. **Section 2.1 Sample Collection, Page 5, Table 1 and Figure 2**: The document states, "In summary the proposed sample locations were selected to…revisit previously sample locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed." However, it is unclear if this goal will be achieved since the previous sample locations/intervals were not referenced in the document, in any form, for direct comparison. Further review of the document suggests that few samples will be collected at depth (greater than 0.5 ft. samples) for any contaminant of concern (COC). The document should be revised to include a table comparing past sampling intervals/depths to those proposed herein, so that we can confirm that the sampling program is adequate to sufficiently delineate the impacts to the waterbodies.

5. **Section 2.1 Sample Collection, Additional Background Locations Woodbridge Creek, Page 5:** In response to concerns that SED-09 was not an appropriate background location, Chevron noted that "eight (8) additional background samples along Woodbridge Creek, in the vicinity of existing background location SED-10…" would be collected. While, the 2002 sample results for SED-10 indicated low contamination, a review of Figure 2 suggests that the location is directly beneath a highway overpass which is a potential source of PAHs and inorganics. As referenced in NJDEP's EETG Section 5.3.4, professional judgement should be used regarding the specific locations of the additional background samples such that obvious offsite sources of contamination should be avoided. Chevron also noted in the Response to Comments (Page 5, Woodbridge Creek Comment No. 1) that "SED-09 transects represents potential off-site source conditions." Please note, before we will concur that contamination detected at SED-09 is not site related, Chevron must collect sufficient data to support impacts from off-site sources as referenced in NJDEP TRSR (N.J.A.C. 7:26E-3.10).

6. Section 2.1 Sample Collection, Data Gaps Woodbridge Creek New Locations, Page 5: The document states, "Chevron will attempt to collect shallow sediment samples between existing transects SED-03 and SED-02…This additional transect is SED-25-A,B,C…The feasibility of completing this transect depends on access approval of the utility owners." Since Figure 2 does not reference the location of the pipelines/utilities, it is difficult to evaluate the issues with this location. Figure 2 should be revised to include the location of the pipeline/utilities and any other obstacles to sampling.

7. Section 2.1 Sample Collection, Data Gap Samples EPH Analysis at Existing Boring Locations, Page 6: The document states, "Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not analyzed previously." However, a review of the document suggests the proposed additional EPH analysis is generally limited to the shallow 0 to 0.5 ft. interval where analysis was conducted for other COCs. Further review of the available data suggests that collection of subsurface (at-depth) samples were previously limited in scope, such that the majority of samples were not analyzed for extractable petroleum hydrocarbons (EPH) or other COCs below 0 to 0.5 ft. interval including, but not limited to: SED-01 A/B/C; SED-2C, SED-3A, SED- 4B; SED-05A/B/C, SED-06A/C, SED-07A/B/C; SED-08A/C; SED-09B; SED-10A/B, SED-11C, etc. The document should be revised to included additional at-depth (below 0.5 ft.) sample collection/analysis for EPH at all historic and proposed sample locations/transects. In addition, please specify if/when the samples hit bedrock and the corresponding depth.

8. Section 2.1 Sample Collection, Additional Vertical Samples at Existing Boring Locations, Page 6: Though titled "Additional Vertical Samples" this section only discusses the collection of shallow samples at transect SED-19. As noted above regarding EPH, the document should be revised to include the collection of shallow and at-depth (greater than 0.5 ft. interval) samples for the full suite of parameters at all existing and proposed transects/locations where data does not previously exist.

9. Section 2.1.1 Sediment Sampling, Page 6: The document states, "…sediment cores will be advanced…to refusal, or a total depth of 10 feet below the sediment surface or to the top of underlying parent material…whichever is encountered first." The document later states, "All locations will be advanced to interface of the sediment and parent material or refusal." The document should be revised to be consistent. However, based on boring logs for several adjacent SWMU's, we are not certain that limiting boring depth to 10 feet is adequate for all locations. A quick review of boring logs associated with SWMU 40 suggests the presence of free/residual LNAPL to a depth of 26 ft. bgs in borings (i.e. S40-7/U040-007, MW-33, U040-001, HP-0001-D, S40-7/U040-007, S40-8/U040-008, etc.) along the shoreline of Woodbridge Creek. Since information, such as this, is scattered across numerous documents, we were unable to do a more thorough evaluation of all the waterbodies. The document should be revised include a figure and thorough discussion of all existing soil borings along the shorelines specifically at AOCs/SWMUs where LNAPL has been detected so that we can confirm if the proposed locations adequately evaluates impacts to the waterbodies via seepage or direct discharge. Furthermore, unless Chevron has data to indicate no contaminant migration pathway from these SWMUs where LNAPL was detected to the adjacent waterbodies, we reiterate the need for contingency borings to determine the full extent of petroleum product impacting the waterbodies and the subsurface.

10. Section 3.0 Deliverables, Page 8: The document states, "The report will incorporate the results of soil and groundwater data from adjacent SWMUs and AOCs." As noted above, this information (figure/boring logs, etc.) should be included in the revised SFSAP, for any adjacent AOCs/SWMUs where LNAPL or where highly elevated COCs are present in the soil or groundwater, so that we can confirm if the proposed locations adequately evaluate impacts to the waterbodies. The revised SFSAP should also include historic discharge monitoring data (as referenced in Attachment 3) and any other

information concerning past waste management practices, that will be necessary to evaluate the proposed sampling program.

11. Table 1 Proposed Sediment Sampling: Table 1 should be revised to include why each, sample location and interval is proposed, referencing the specific contaminant migration pathway (i.e., specific AOC, SWMU, outfall, former tidal creek, etc.) that is being evaluated. As noted above the document should also include a summary of historic sample locations, in table form, to confirm that what is proposed is sufficient.

12. Attachment 5 Dredging Documents: Chevron had suggested that due to historic dredging of Arthur Kill no additional sampling was necessary as noted in supporting documentation included in Attachment 5. However, review of Figure 5-1 suggests that dredging of the Arthur Kill was limited to two areas (A and B) adjacent to SWMUs 36 and 45 only. Furthermore, Attachment 5 did not include any analytical data or information regarding contaminant concentrations in the dredged material and only included dredging permit authorization for Area B. Attachment 5 should be revised to include additional information on dredging activities and pre-dredging contaminant concentrations for both Areas A and B. Furthermore, based on the limited information provided, it is unclear if any impacts to Arthur Kill from adjacent SWMU 36 and 45 were noted during dredging activities. The document should clarify if any impacts from these SWMUs were noted during dredging operations. The document should also clarify/discuss if there are other adjacent AOCs, with the potential to impact the Arthur Kill, including but not limited to: PAOC 15, AOC 29 and EY 4a LNAPL areas, AOC 29, and wells MW-155R, etc. The document should be revised to conduct additional sampling in Arthur Kill to confirm no impacts at depth from adjacent AOCs/PAOCs/SWMUs.

Should you have any questions or would like to discuss this matter further, I can be reached at 212-637-3703, or via email at vargas.ricardito@epa.gov.

Sincerely,

Ricardito Vargas

Ricardito Vargas
Project Manager
Hazardous Waste Programs Branch

cc: Lynn Vogel, NJDEP (electronic copy only)

41 Spring Street, Suite 102
New Providence, NJ 07974
T 908.988.1700
TRCcompanies.com

July 2, 2019

United States Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866

Attn: Mr. Ricardito Vargas, Project Manager

Subject: Response to USEPA's March 1, 2019 Comment Letter
Supplemental Field Sampling and Analysis Plan
Arthur Kill, Spa Spring Creek and Woodbridge Creek
Former Chevron Perth Amboy Facility
1200 Maurer Road, Perth Amboy – Middlesex County
Facility EPA ID #: NJD081982902
TRC Project No. 326731/890

Dear Mr. Vargas:

On behalf of Chevron Environmental Management Company (Chevron) TRC Companies, Inc. (TRC) has prepared the enclosed response to the United States Environmental Protection Agency's (USEPA) March 1, 2019 comments regarding the November 19, 2018 Supplemental Field Sampling and Analysis Plan (SFSAP) prepared for the above-referenced Chevron Facility (the Facility). The SFSAP proposed collection and analysis of sediment samples from Spa Spring Creek, Woodbridge Creek, and the Arthur Kill, all adjacent to the Facility. As described further, the attached, revised SFSAP addresses the USEPA's written comments, as well as those discussed and agreed upon during the September 17, 2018 meeting between Chevron, TRC, and representatives of the USEPA and the New Jersey Department of Environmental Protection (NJDEP). The USEPA's March 1, 2019 letter included 12 comments in response to the SFSAP, which was submitted by Chevron along with responses to the USEPA's August 13, 2018 letter concerning the three waterbodies to be sampled in accordance with the SFSAP. Several of the USEPA's comments described the need for additional information and/or provision of historical data, much of which was provided in earlier documents. Therefore, this letter and the attached, revised SFSAP are provided to the USEPA for their information to assist with their review and aid in an expedited approval. It should be noted that the SFSAP and antecedent documents and reports prepared and implemented over the course of the project have been reviewed by the USEPA and NJDEP and modified as needed. The objective of the SFSAP is to complete the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of water bodies as specified in the 2013 Hazardous and Solid Waste Amendment (HSWA) permit renewal and Permit Modifications I.

Contaminants of concern (COCs) exist in the soft sediments overlying the more competent glacial till in the waterways adjacent to the Facility. Based on the existing data and information, the contaminants in the soft sediments have been characterized in the waterbodies around the Facility (Spa Spring Creek, Woodbridge Creek, and Arthur Kill). Delineation is based in part on physical limits of waterbodies and the edge of the scarp forming the end of soft sediments in the channel of the Arthur Kill as determined through a bathymetric survey and bank-to-bank sampling along sediment transects. The sampling, laboratory analysis, and physical/bathymetric survey activities implemented to characterize and delineate the soft sediment was documented in prior reports that were reviewed by both the USEPA and NJDEP. The proposed sediment sampling is intended to address the limited data gaps identified during the September 17, 2018 meeting, and in the March 1, 2019 USEPA comments.

As discussed and agreed upon in prior correspondence and at the September 2018 meeting, and memorialized in the November 2018 response to comments letter to the USEPA; terrestrial areas within 200 feet of the waterways (i.e., the shoreline Solid Waste Management Units [SWMUs], Areas of Concern [AOC]), and areas of Light Non-Aqueous Phase Liquid (LNAPL) were evaluated with respect to potential effects on adjacent waterways by the Baseline Ecological Evaluation (BEE) included in the 2003 RFI Report, and in the November 2016 Supplemental Ecological Evaluation Report (SEER). Historic migration pathways were also evaluated in prior RFI Reports, quarterly progress reports, and the numerous monitoring reports.

Given the above and with respect to the USEPA's current requests, Chevron has provided relevant information to address each of the USEPA's 12 comments from the March 1, 2019 letter. The USEPA's comments are provided below in their entirety, followed by Chevron's responses. The Tables, Attachments, Figures and Appendices referred in this letter are appended to the attached, revised SFSAP unless noted otherwise. Chevron believes that the information provided in this letter and in the revised SFSAP provide the technical information and a historical context to address the USEPA's comments concerning the proposed sediment sampling and enable an expedited approval of the SFSAP. Once approved, Chevron will expeditiously implement the field work and provide a comprehensive report integrating the results of all prior surface water investigations in a complete and final RFI report.

<u>USEPA Comment 1</u>. Section 1.0 Introduction, Page 1, 3rd paragraph: The document states, "The facility has completed several phases of the RCRA Facilities Investigation (RFI) for the three surface water bodies ..." However, the historical data is not included in this document, as such it is unclear if the proposed sampling locations and intervals are sufficient. The document should be revised to include a more detailed discussion of sampling results (text, figure, table) from prior investigations so that we can evaluate if the proposed locations are adequate to sufficiently delineate the nature and extent of contamination in the waterbodies and along the adjacent shorelines.

Response 1: As indicated above, the proposed sediment samples and intervals are based on several rounds of sampling, analysis, report submissions, and review by the NJDEP/USEPA. Therefore, Chevron believes the basis for the proposed sampling is consistent with the objectives of the sampling program as determined and reviewed by the agencies.

Laboratory data associated with previous submissions was provided in prior documents submitted to USEPA and NJDEP. Revised Figure 2 of the SFSAP, and Figure 2a of the SFSAP are attached to show the location of all existing and proposed sediment samples. Figure 2a is a Facility plan showing the relevant SWMUs/AOCs/PAOCs, historical and current extents of LNAPL areas, existing Facility features, and historical and proposed sediment sample locations. Revised Table 1 of the SFSAP is included to describe the relationship between proposed sample locations and the SWMUs and other features of concern. Attachment 1 includes the November 2016 Supplemental Ecological Evaluation Report (SEER), which provides all data and information related to the investigation of the adjacent waterways completed in 2014 (e.g., SEER Figures 3, 4, and 5). Sediment sample locations are shown with respect to the SWMUs and AOCs at the Facility on the drawing titled Sediment Sample Location Plan - 2002 and 2014 Sampling Events with Siting Explanation (Figure 5). This drawing highlights the relationship between SWMUs/AOCs/PAOCs, discharge areas, and sediment sample locations, and includes explanatory notes regarding sample locations. Historical data tables comparing sediment and surface water sample analytical results to the NJDEP's Ecological Screening Criteria (ESCs) for sediments are provided in Section 4 of the SEER.

<u>USEPA Comment 2</u>. Section 1.0 Introduction, Page 3: The document states, "As part of the Supplemental EE, Chevron ...further evaluated potential contaminant migration pathways to surface water." However, limited information on this evaluation was included in this document as such we are unable to determine if the proposed sampling program is adequate. The document, as well as Figure 2, should be revised to discuss, at length, any AOCs/SWMUs/PAOCs with the potential to impact these waterbodies, including but not limited to: SWMUs 1, 2, 3, 7, 8, 24, 26, 31, 35, 36, 40, 41, 45, etc. This figure should also show the former confluence of historic Spa Spring Creek with Woodbridge Creek and areas where non-point source discharges over the Facility's operation history may have occurred via sheet runoff or groundwater discharges, and/or were associated with overwater fuel transfers, former dock/pier operations, etc. Additionally, this figure should indicate the location of shoreline/perimeter soil borings where light non-aqueous phase liquid (LNAPL) was detected, as referenced below in Comment No. 9. The above information is necessary to determine if the proposed sampling program is adequate.

<u>Response 2</u>: As noted in Response 1, Figure 2a of the attached SFSAP is provided to show the former AOCs/SWMUs/PAOCs noted by USEPA in Comment 2, above, and historical features such as docking and product inbounding areas. Information on the management and other activities

conducted in the AOCs/SWMUs/PAOCs was provided to the USEPA in the Description of Current Conditions Report prepared by Environmental Science and Engineering, Inc. August 24, 1994 (DOCC). The text of the DOCC through Section 3 is included as Attachment 2 and provides information on historic practices in these areas. The basis for the proposed sediment sample locations is provided on revised Table 1, and on Figure 3. Relevant portions of the DOCC are summarized in Section 1.1.3 of the attached revised SFSAP. The summary includes the location of know historic discharge location and wastewater management areas.

Sediment samples were collected in the 2002 and 2014 investigations of adjacent waterways to evaluate Contaminants of Potential Ecological Concern (COPECs) in sediments that may have been related to the historical operations at the Facility (waste storage, product transfer, etc.). Chevron believes that the historical and proposed sample quantity and locations are adequate with respect to characterizing sediment near these former operational areas. In addition, the frequency of historic and proposed sampling is sufficient to assess potential effects of non-point source discharges, e.g., runoff and groundwater flow to surface water bodies. For reference, the extent of LNAPL areas in terrestrial SWMUs/AOCs proximal to the shoreline is presented on Figure 2a. The LNAPL areas were previously defined, are currently undergoing remediation, and as stated in the 2003 BEE, "Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear to be complete." Tables comparing analytical data from creek sediments with data for terrestrial soils of the SWMUs/AOCs and respective ESCs indicate that there are no data gaps regarding analytical parameters (Section 4 of the SEER [Attachment 1]). Historical information on Facility conditions, LNAPL monitoring and attenuation, Sections 7 and 9 of the 2003 RFI (LNAPL and BEE sections), and historical aerial photographs (1978) are included in Appendix B; this information is being re-submitted to expedite USEPA's review.

<u>USEPA Comment 3</u>. Section 1.0 Introduction, Page 3: The document states, "Historically, the Facility has discharged treated storm water and waste waters to outfalls located in Spa Spring Creek and Woodbridge Creek." However, limited additional information on these historic outfalls is included in this document. The document should be revised to include text and accompanying figures detailing the location of known and historic tidal creeks, outfalls, and other current and former discharge (permitted and unpermitted) points into Woodbridge Creek, Spa Spring Creek, and the Arthur Kill; including those referenced in Attachment 3 (DSN 0004A, 004B, 004C, 005, 005A, 006A, etc.). The document should be revised to discuss waste management practices prior to 1974 (date of initial Federal NPDES permit), prior to city sewer connections, and identify historic direct discharges of industrial waste into the three waterbodies. Chevron is directed to a historic document by the Interstate Sanitation Commission Report, entitled Location of City Sewers Adjacent to Industrial Plants Bordering the Arthur Kill in New Jersey, dated January 1965, which discusses the direct discharge of waste material into Woodbridge Creek and the Arthur Kill from the

former California Oil Company (electronic pages 13, 14, 62) and other facilities. The document is available at:

http://www.iec-nynjct.org/sites/default/files/2018-08/965%20Sewers%20Locations%20Arthur%20Kill%20NJ%20opt.pdf.

Response 3: Figure 2a is included to show the current/former NJPDES outfalls, historical waterway locations, and known points of discharges from the Facility. Information on waste management practices prior to the mid-1970s, while requested by the USEPA, is limited. However, Chevron previously provided the USEPA with a copy of the DOCC which was prepared in accordance with the 2013 RCRA HSWA permit issued by the USEPA. As noted above in Response 2, relevant sections of the DOCC describing SWMUs and AOCs are included as Attachment 2. Section 2 of the DOCC contains information on historic discharges, which are summarized below. Section 1 of the revised SFSAP provides a narrative historical summary of wastewater, stormwater, and process waste management practices, and a brief summary is presented below.

From 1950 to 1976 and before the construction of the Effluent Treatment Plant (ETP), East Yard stormwater and wastewater discharges were to the Arthur Kill via an oil/water separator (identified as SWMU 36). No information is available for pre-1950 wastewater discharge practices or conditions. Other discharges described in the DOCC for the Central Yard, West Yard, Main Yard, and North Field were routed to an Oily Water Sewer System (AOC 16) to several oil/water separators in the North Field, where oil was recovered, and suspended solids settled out prior to discharge. The North Field oil/water separators were used to recover oils and for the collection of settled solids later disposed in SWMU 43 (Mud Flats). These units included:

- Old Pond (SWMU 40) – operated 1940s-1970s
- No. 4 Separator (SWMU 35) – 1950-1977
- Surge Pond (SWMU 2) – 1950-1960; capped and closed 2016
- North Field Basin (SWMU 1) – 1960-2006 (area remedied and restored as a tidal wetland)
- No. 2 and No. 3 Separators – associated with the Surge Pond, included in the ETP (SWMU 31).

The locations of these features are shown on Figure 2a and Figure 3. Figure 3 is a copy of a drawing titled AOC, SWMU, and PAOC Location Map, prepared from a figure of the same name by Parsons that provides the locations and descriptions of AOCs and SWMUs at the Facility, and the extent of LNAPL (also provided with detailed information on LNAPL monitoring in Appendix B-4).

All stormwater and wastewater from 1976 to 1987 was directed to the ETP, with the exception of a small stormwater discharge area draining to Spa Spring Creek. The Old Pond Separator, No. 4 Separator, and Oil/Water Separator for the East Yard were taken out of service after the ETP became operational. The East Yard Basin (SWMU 3) was completed in 1976 and replaced the Oil Water Separator Near East Yard Basin, which include a pumping station to divert oily water to the ETP. The ETP included oil water separation and advance biological treatment and discharged to Woodbridge Creek. Stormwater overloads were held in the North Field Basin from 1960-1976.

Further changes occurred after 1987, including the cessation of stormwater discharges to the North Field Basin and East Yard Basin, as well as cessation of waste sludge placement in the Surge Pond. Stormwater was held in multiple tanks prior to treatment at the ETP.

Chevron believes the historical and proposed samples in the three waterways are sufficient to assess sediment conditions related to historic point and non-point source discharges from plant operations. As noted in the SFSAP and in prior correspondence with the EPA (November 2016 SEER, November 2018 RTC/SFSAP), the historical and recent industrial uses of and contaminant contribution to the Arthur Kill and Woodbridge Creek by multiple entities cannot be understated.

Appendix B-1 is a drawing prepared in January 1993 that identifies the stormwater collection system and connections to the former treatment plant for process and bulk storage tank areas, as well as permitted discharge locations (e.g., DSN004) for non -contact cooling water from the former power plant. The drawing shows that only small and largely undeveloped areas of the Facility contributed runoff to the adjacent waterways.

Chevron reviewed the historic document titled Interstate Sanitation Commission Report (ISCR) via the internet link provided by the USEPA. The ISCR does not provide any further information beyond that in the DOCC and already known and described herein. The ICSR notes that the formerly operational API separators discharged to Woodbridge Creek ("API Separators 1 and 2 and the settling basin lagoon", i.e., the No. 2 and 3 separators and surge pond, now closed) with the East Yard Tank Farm Separator discharging to the Arthur Kill. The ISCR notes that all sanitary wastes were discharged to the 12-inch diameter public sewer on State Street. Maps included in the ISCR do not provide any detail for the Facility. Chevron previously reviewed this ISCR report in 1994 as part of the DOCC Report and discussed its findings previously with the NJDEP and USEPA case team at that time.

<u>USEPA Comment 4</u>. Section 2.1 Sample Collection, Page 5, Table 1 and Figure 2: The document states, "In summary the proposed sample locations were selected to ...revisit previously sampled locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed." However, it is unclear if this goal will be achieved since the previous sample locations/intervals were not referenced in the document, in any form, for direct comparison. Further review of the document suggests

that few samples will be collected at depth (greater than 0.5 ft. samples) for any contaminant of concern (COC). The document should be revised to include a table comparing past sampling intervals/depths to those proposed herein, so that we can confirm that the sampling program is adequate to sufficiently delineate the impacts to the waterbodies.

Response 4: The Revised Table 1 provides a comparative summary and the location of proposed and historical samples, depths, and analytical parameters. Regarding the depth of proposed sampling, it should be noted that the biologically active zone, or benthic zone is defined by the NJDEP as 0-0.5 feet and would be of primary concern with respect to sediment impacts. It was also agreed at the September 17, 2018 meeting and in the subsequent November 2018 responses to the USEPA's August 2018 comment letter that further sampling (i.e., of "hotspots") is not necessary to meet the requirements of the 2013 HSWA permit, and that the existing and proposed samples adequately characterize and delineate contaminants in sediment. Further, petroleum constituent analysis (i.e., Volatile Organic Compounds [VOCs]; Base Neutral Compounds [BNs]) has been completed throughout the waterways to various depths in and below the benthic zone. The horizontal, downstream and bank-to-bank physical limit of contaminated sediments in Woodbridge Creek was determined by completing a bathymetric survey and bottom profile analysis. The bathymetric survey revealed a steep submarine escarpment at the Woodbridge Creek/Arthur Kill confluence (Figure 6 of Attachment 1), indicating the terminus of soft sediments at the contact with the Arthur Kill. Therefore, further sampling to define the vertical/horizontal extent of EPH or other contaminants beyond that proposed in the SFSAP is not warranted.

USEPA Comment 5. Section 2.1 Sample Collection, Additional Background Locations Woodbridge Creek, Page 5: In response to concerns that SED-09 was not an appropriate background location, Chevron noted that "eight (8) additional background samples along Woodbridge Creek, in the vicinity of existing background location SED-10 ..." would be collected. While, the 2002 sample results for SED-10 indicated low contamination, a review of Figure 2 suggests that the location is directly beneath a highway overpass which is a potential source of PAHs and inorganics. As referenced in NJDEP's EETG Section 5.3.4, professional judgement should be used regarding the specific locations of the additional background samples such that obvious sources of contamination unrelated to the Facility should be avoided. Chevron also noted in the Response to Comments (Page 5, Woodbridge Creek Comment No. 1) that "SED-09 transects represents potential off-Facility source conditions." Please note, before we will concur that contamination detected at SED-09 is not Facility related, Chevron must collect sufficient data to support impacts from off-Facility sources as referenced in NJDEP TRSR (N.J.A.C. 7:26E-3.10).

Response 5: The USEPA's suggestion that proposed background samples at SED-10 are inappropriate due to potential roadway runoff contributing PAHs and inorganics does not take into consideration the nature of the surrounding, highly urbanized drainage basin. Urban runoff from the surrounding region is not limited to roadways, and as observed on aerial imagery

(Appendix B-6) multiple industrial, commercial, and residential areas are located directly along or in proximity to the subject waterways upstream of the Facility, including the various urban and industrial land use types identified in the regions based on the NJDEP's GeoWEB database map included in the SFSAP (see Attachment 3-1). Therefore, the presence of COPECs in Woodbridge Creek from regional point and non-point sources represents the background condition of the creek.

The proposed samples at SED-10 are not adjacent to "obvious offsite sources of contamination", such as an industrial outfall or known contaminated area. Further, the SED-10 location was discussed during the September 17, 2018 meeting, and deemed by USEPA as "an area that can potentially be used as background "in their August 31, 2018 comment letter. Sufficient data is available suggesting that the COPECs detected in samples around SED-9 are not Facility-related. Specifically, as shown on Figures 9-7 in Attachment 1, the concentration of COPECs detected in downstream samples at SED-6 are an order of magnitude lower than those at SED-9 (i.e., total PAHS at SED-9-C are 69.85 mg/kg versus those at SED-6-B (0.71 mg/kg). Similarly, low concentrations in Spa Spring Creek indicate that Chevron operations were not a contaminant source in that waterway. This trend from higher to lower concentrations would be reversed were the COPECs at SED-9 related to a Facility discharge. The laboratory analyses for the SED-6, SED-7, and SED-10 samples are consistent with information recorded on their boring logs (Attachment 6) which note the absence of visual or olfactory indication of contamination versus what was described on SED-9 boring logs. Regardless, as noted in the SFSAP and in the November 2018 RTCs, Chevron will add two additional sediment transects between SED-9 and SED-6, each having three sample locations (identified on Figures 2 and 2a in the revised SFSAP as SED-23 A, B, and C; SED-24 A, B, and C). Each sediment sample will be analyzed for the full suite of parameters listed on revised Table 1; a list of proposed sediment samples is also provided on each of these figures.

<u>USEPA Comment 6</u>. Section 2.1 Sample Collection, Data Gaps Woodbridge Creek New Locations, Page 5: The document states, "Chevron will attempt to collect shallow sediment samples between existing transects SED-03 and SED-02. This additional transect is SED-25-A, B, C. The feasibility of completing this transect depends on access approval of the utility owners." Since Figure 2 does not reference the location of the pipelines/utilities, it is difficult to evaluate the issues with this location. Figure 2 should be revised to include the location of the pipeline/utilities and any other obstacles to sampling.

<u>Response 6</u>: Figures 2 and 2a show the location of pipelines/utilities that may obstruct sampling at SED-25. As noted, shallower samples may be collected in these areas using a Ponar dredge or similar low-impact sampler.

<u>USEPA Comment 7</u>. Section 2.1 Sample Collection, Data Gap Samples EPH Analysis at Existing Boring Locations, Page 6: The document states, "Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not

analyzed previously." However, a review of the document suggests the proposed additional EPH analysis is generally limited to the shallow 0 to 0.5 ft. interval where analysis was conducted for other COCs. Further review of the available data suggests that collection of subsurface (at-depth) samples were previously limited in scope, such that the majority of samples were not analyzed for extractable petroleum hydrocarbons (EPH) or other COCs below 0 to 0.5 ft. interval including, but not limited to: SED-01 A/B/C; SED-2C, SED-3A, SED- 4B; SED-05A/B/C, SED-06A/C, SED-07A/B/C; SED-08A/C; SED-09B; SED-l OA/B, SED-1 l C, etc. The document should be revised to include additional at-depth (below 0.5 ft.) sample collection/analysis for EPH at all historic and proposed sample locations/transects. In addition, please specify if/when the samples hit bedrock and the corresponding depth.

Response 7: Please refer to Response 4. It was agreed at the September 17, 2018 meeting and in the November 2018 RTC that "Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously." The proposed additional sample depths are provided in revised Table 1. No other additional sampling is proposed. The USEPA's request for information on depth to bedrock appears to be a misunderstanding, since bedrock was not encountered during sampling, whereas refusal was encountered. The vertical limit of soft sediment in Woodbridge Creek coincides with the top of the underlying glacial till, which is sufficiently competent and refused the Vibracore drilling stem. As reported in Section 2 of the SEER (Attachment 1), bedrock was encountered in terrestrial borings from 65-85 feet below grade, well below the bed of Woodbridge Creek.

USEPA Comment 8. Section 2.1 Sample Collection, Additional Vertical Samples at Existing Boring Locations, Page 6: Though titled "Additional Vertical Samples" this section only discusses the collection of shallow samples at transect SED-19. As noted above regarding EPH, the document should be revised to include the collection of shallow and at-depth (greater than 0.5 ft. interval) samples for the full suite of parameters at all existing and proposed transects/locations where data does not previously exist.

*Response 8: The commenter misinterprets the quoted text. Section 2.1 of the SFSAP states that "…**only deeper samples were taken** at boring locations SED-19-B and SED-19-C (Emphasis added). Shallow samples to fill this gap will be taken at SED-19-B and SED-19-C." Figure 4 from the SEER (Attachment 1) provides the EPH data from SED-19 B and SED-19-C at 6-6.5 feet (16,000 mg/kg) and 7.5-8 feet (8,170 mg/kg) below the sediment surface. The shallow (0-0.5 feet) interval is the data gap to be filled by the proposed samples, as noted on revised Figure 2, and on Figure 2a and Table 1.*

USEPA Comment 9. Section 2.1.1 Sediment Sampling, Page 6: The document states, "...sediment cores will be advanced ...to refusal, or a total depth of 10 feet below the sediment surface or to the top of underlying parent material, whichever is encountered first." The document later states, "All locations will be advanced to interface of the sediment and parent

material or refusal." The document should be revised to be consistent. However, based on boring logs for several adjacent SWMU's, we are not certain that limiting boring depth to 10 feet is adequate for all locations. A quick review of boring logs associated with SWMU 40 suggests the presence of free/residual LNAPL to a depth of 26 ft. bgs in borings (i.e. S40-7/U040-007, MW-33, U040-001, HP-0001-D, S40-7/U040-007, S40-8/U040-008, etc.) along the shoreline of Woodbridge Creek. Since information, such as this, is scattered across numerous documents, we were unable to do a more thorough evaluation of all the waterbodies. The document should be revised include a figure and thorough discussion of all existing soil borings along the shorelines specifically at AOCs/SWMUs where LNAPL has been detected so that we can confirm if the proposed locations adequately evaluates impacts to the waterbodies via seepage or direct discharge. Furthermore, unless Chevron has data to indicate no contaminant migration pathway from these SWMUs where LNAPL was detected to the adjacent waterbodies, we reiterate the need for contingency borings to determine the full extent of petroleum product impacting the waterbodies and the subsurface.

Response 9: The text regarding the depth of termination for proposed borings has been revised for consistency, and where possible, sediment coring will proceed to greater depths, up to 20 feet.. Chevron disagrees with the comment regarding uncertainty of the proposed 10-foot boring limit and the concern over LNAPL found at greater depths in SWMU 40. As noted above, the 2003 BEE indicated that there are no current migration pathways (including evaluation of LNAPL areas) between SWMUs along the shoreline and the adjacent waterways. In addition, LNAPL monitoring reports indicate limited and declining LNAPL extents (Appendices B-2, B-4, B-5). LNAPL monitoring is accomplished at the Facility by gauging liquid product thicknesses (or its absence) in groundwater monitoring wells, and does not rely on historical soil boring logs, including the cited ones that are from 1995-1997 (Attachment 4). While LNAPL was noted in several borings, it was generally limited to the interval above the water table, generally within 8-12 feet, and above an organic layer comprised of peat and organic silt/clay. Fill was encountered in the entire profile at Boring U040-007, completed to 26 feet. It contained approximately 20 feet of petroleum catalyst beads, with LNAPL from 12-26 feet. Given the presence of the catalyst beads in the fill documented in the log for U040-007, the presence of LNAPL is not surprising. However, LNAPL appears less prevalent in flanking borings U040-001 and U040-008, and in the log for MW-33 (0033), suggesting that the LNAPL extent is limited (Attachment 6). The SEER concluded that "there is no indication of ongoing discharges of hazardous substances from the site based on the soil and groundwater sample analysis, and light, non—aqueous phase liquid (LNAPL) investigation."

Section 7 of the 2003 RFI (Appendix B-2) provides a comprehensive description of LNAPL areas at that time, and similarly concluded that the LNAPL was generally immobile. Subsequent monitoring reports provided annually to the USEPA have indicated no impacts to the adjacent waterways and noted the on-going reduction/elimination of LNAPL overall. The LNAPL detected in the SWMUs has been demonstrated to be virtually immobile and therefore does not represent a source of the contaminants detected in creek sediments. The existing and proposed sediment

sample locations are positioned in a manner where potential LNAPL or related contaminants would be detected.

USEPA Comment 10. Section 3.0 Deliverables, Page 8: The document states, "The report will incorporate the results of soil and groundwater data from adjacent SWMUs and AOCs." As noted above, this information (figure/boring logs, etc.) should be included in the revised SFSAP, for any adjacent AOCs/SWMUs where LNAPL or where highly elevated COCs are present in the soil or groundwater, so that we can confirm if the proposed locations adequately evaluate impacts to the waterbodies. The revised SFSAP should also include historic discharge monitoring data (as referenced in Attachment 3) and any other information concerning past waste management practices, that will be necessary to evaluate the proposed sampling program.

Response 10: Inclusion of analytical results from the 2002 and 2014 investigation of adjacent SWMUs and AOCs into the Supplemental RFI Report (SRFI) is proposed for a comprehensive review of the soil and groundwater conditions along the adjacent waterways. For informational purposes, data from the 2014 sampling event is included in Tables I-IX of the SEER (Attachment 1) and the 2002 sediment data associated with the BEE is included in Appendix B-3. This data was previously provided, and its incorporation is not intended to evaluate the representativeness of the proposed sample locations, or to identify analytical data gaps, as soil, groundwater, and sediment have been analyzed for the same broad suite of parameters (i.e., VOCs, BNs, metals, TOC, grain size, as applicable based on the sample matrix). Please refer to Response 3 and referenced attachments, appendices, and figures regarding the inclusion of historic discharge monitoring data and waste practices.

USEPA Comment 11. Table 1 Proposed Sediment Sampling: Table 1 should be revised to include why each, sample location and interval is proposed, referencing the specific contaminant migration pathway (i.e., specific AOC, SWMU, outfall, former tidal creek, etc.) that is being evaluated. As noted above the document should also include a summary of historic sample locations, in table form, to confirm that what is proposed is sufficient.

Response 11: Table 1 has been revised and is included in the Revised SFSAP. The sample locations are listed on the table and correlated with information concerning historic/current discharge outfalls, SWMUs, and AOCs on the adjacent shorelines. However, it cannot be overstated that the objective of the proposed investigation is to comply with the HSWA permit provisions, and not completion of an exhaustive study linking sediment the broadly-contaminated sediments with specific historical Facility operational areas.

USEPA Comment 12. Attachment 5 Dredging Documents: Chevron had suggested that due to historic dredging of Arthur Kill no additional sampling was necessary as noted in supporting documentation included in Attachment 5. However, review of Figure 5-1 suggests that dredging of the Arthur Kill was limited to two areas (A and B) adjacent to SWMUs 36 and 45 only.

Furthermore, Attachment 5 did not include any analytical data or information regarding contaminant concentrations in the dredged material and only included dredging permit authorization for Area B. Attachment 5 should be revised to include additional information on dredging activities and pre-dredging contaminant concentrations for both Areas A and B. Furthermore, based on the limited information provided, it is unclear if any impacts to Arthur Kill from adjacent SWMU 36 and 45 were noted during dredging activities. The document should clarify if any impacts from these SWMUs were noted during dredging operations. The document should also clarify/discuss if there are other adjacent AOCs, with the potential to impact the Arthur Kill, including but not limited to: PAOC 15, AOC 29 and EY 4a LNAPL areas, AOC 29, and wells MW-155R, etc. The document should be revised to conduct additional sampling in Arthur Kill to confirm no impacts at depth from adjacent AOCs/PAOCs/SWMUs.

Response: Information regarding areas of the Arthur Kill waterfront (Areas A and B) that were dredged in in November 2003 was provided as requested by the USEPA during the September 17, 2018 meeting. Please note that the dredging was conducted to maintain the tanker berths and not for sediment remediation purposes, therefore, information on adjacent AOCs and sediment sampling and analysis to determine pre-dredging conditions was not required for dredging permit authorization. No impacts from the adjacent AOCs/PAOCs/SWMUs are known to have occurred during dredging and filling operations. Subsequent sampling at SED-13C, -14C, -15C, and -18C provides sufficient data to characterize sediment conditions in the in this area. Further, the benthic zone (0-0.5 feet) was removed from the berthing areas as a result of the most recent maintenance dredging, and likely prior dredging, which prevents establishment of a normal benthic community regardless of potential Facility-related discharges. Further sediment evaluation in the berthing areas is therefore not warranted.

We trust that this letter and attachments address the USEPA's questions and concerns raised in the March 1, 2019 comment letter. Please note that an expeditious review is needed in order to complete the RFI for surface waters and meet the RCRA 2020 goal. While we believe that this letter and the associated SFSAP meets the USEPA's requirements, Chevron requests the opportunity to discuss the SFSAP with appropriate representatives of the USEPA, the NJDEP, and TRC at a meeting to be scheduled at the earliest possible convenience. The purpose of the meeting is to present the SFSAP, discuss any of the concerns on the part of the agencies, and to expedite final approval and implementation without further submissions. Please contact the undersigned if you have any questions and to discuss the timing and location for the proposed meeting.

Sincerely,

William S. Cordasco, Sr. Scientist

Kenneth Siet, Vice President

Cc: Lynn Vogel, NJDEP
Robert Mancini, Chevron
Todd Frantz, Parsons

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August 21, 2019

United States Environmental Protection Agency-Region 2
290 Broadway
New York, New York 10007-1866

Attn: Mr. Ricardito Vargas, Project Manager

Subject: August 7, 2019 Meeting and Presentation of the Revised Supplemental Field Sampling and Analysis Plan-Arthur Kill, Spa Spring Creek, and Woodbridge Creek
Former Chevron Perth Amboy Facility
1200 Maurer Road, Perth Amboy – Middlesex County
Facility EPA ID #: NJD081982902
TRC Project No. 326731/890

Dear Mr. Vargas:

On behalf of Chevron Environmental Management Company (Chevron) TRC Companies, Inc. (TRC) has prepared this letter and attachments to provide additional information and clarifications regarding specific comments made by the United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP) on the revised Supplemental Field Sampling and Analysis Plan (SFSAP, July 2019) prepared for the above-referenced Chevron Facility (the Facility).

Chevron and TRC presented the revised SFSAP at a meeting attended by representatives of Chevron, the USEPA, NJDEP, and Buckeye Pipeline Company on August 7, 2019. The objective of the meeting was to resolve any issues of concern to the USEPA and the NJDEP regarding the SFSAP and expedite its review and approval. The SFSAP proposes collection and analysis of sediment samples from Spa Spring Creek and Woodbridge Creek which are the waterbodies adjacent to the Facility. The July 2019 SFSAP was revised from the original submission in November 2018 to address the agencies' concerns as noted in their joint comment letter to Chevron of March 1, 2019. In addition to presenting the revised SFSAP, the meeting included a presentation of the Facility's operational and remedial history and the industrial history and character of the surrounding region, and specifically the Woodbridge Creek watershed. The USEPA and NJDEP raised additional questions and concerns during the meeting, several of which concerned Chevron's responses to earlier comments by USEPA/NJDEP that were discussed in the July 2, 2019 Response to Comments (RTC) letter prepared by TRC (submitted with the SFSAP as a companion document). Other than the specific concerns raised during the meeting and discussed further herein, it is our understanding that the SFSAP is acceptable to the agencies without further comment.

Issues Addressed During August 7, 2019 Meeting

The USEPA and the NJDEP identified several specific issues regarding the SFSAP that were further discussed at the August 7, 2019 meeting, including:

- Sediment sampling protocol details regarding sample interval selection in the field
- Potential data gaps (sample intervals, analytical parameters and related spreadsheet)
- Contaminated sediment delineation
- Light, Non-Aqueous Phase Liquid (LNAPL) areas proximal to the waterways
- Chevron's responses (July 2, 2019) to USEPA Comments 4 and 7 (March 1, 2019 comment letter)
- NJDEP's meeting comments regarding sample data (SED-06, SED-09)

The specific issues are further discussed below with the associated responses, as agreed upon at the meeting. In addition to the specific items listed above and discussed at the meeting, TRC identified typographic errors in the notes to SFSAP Figure 2A (attached), which were corrected on the revised, attached Figure 2A.

<u>Sediment Sampling Protocol</u>
The USEPA and NJDEP had several concerns with the sampling proposed in the SFSAP, e.g., apparent data gaps in proposed sampling intervals and laboratory analysis. At the meeting the USEPA noted that some of these concerns were previously presented by the USEPA on a spreadsheet summarizing sediment analytical results/depths and describing potential data gaps. Further discussion regarding the review of data gaps is described below in the following section under "Sediment Sample Data Gaps".

A summary of the sample interval selection criteria proposed sampling is presented below. As described and discussed during the meeting, sample depth interval selection will be based on a combination of pre-determined intervals and field indicators of contamination (e.g., odors, elevated volatile vapors, staining, etc.) if observed in sediment cores. Sediment intervals exhibiting similar indicators in new and proposed borings will be sampled and analyzed as discussed at the meeting, and described as follows:

Determination of Sample Intervals for Selected Prior Sediment Boring Locations Sampled in 2002/2014

- Advance each boring to refusal or to 20 feet, whichever is first encountered;
- Record observations of sediment lithology, possible contamination, and other physical characteristics for the entire core;
- Screen the entire core for field indicators of contamination (detectable indicators of contamination: e.g., odors, elevated VOCs detected with field instruments, staining, etc.);
- Collect sediment from each 0-0.5-foot interval for analysis of EPH, and if needed, any

parameters missing from among the established analytical suite (i.e., TCL VOCs/BNs, EPH, TAL Metals).
- Collect sediment from 2-2.5 feet or from the discrete interval exhibiting the worst-case conditions based on field screening and analyze for the parameters noted above.

Determination of Sample Intervals for New Sample Locations

- Advance each boring to refusal or to 20 feet, whichever is first encountered;
- Record observations of sediment lithology, possible contamination, and other physical characteristics for the entire core;
- Screen the entire core for field indicators of contamination (detectable indicators of contamination: e.g., odors, elevated VOC vapors detected with field instruments, staining, etc.);
- Collect sediment from each 0-0.5-foot interval for analysis of the established analytical suite (i.e., TCL VOCs/BNs, EPH, TAL Metals)
- Collect sediment from the 2-2.5-foot interval or from the discrete interval exhibiting the worst-case conditions based on field screening and analyze for the parameters noted above.

The physical parameters including pH, TOC, and grain size determination will also be analyzed as shown on the Spreadsheet and revised Table 1 (see discussion below). It was determined that the sediment in previously-sampled areas is adequately characterized with respect to these parameters (i.e., pH, TOC, and grain size). However, samples will be collected for analysis of these parameters from selected depth intervals in the new sediment borings, i.e., borings along transects SED-22 through SED 25, from SED-WCBG-1 to WCBG-8, and where possible from borings in Spa Spring Creek.

<u>Sediment Sample Data Gaps</u>

As a result of the meeting, TRC conducted an evaluation of the existing data and objectives of the proposed sampling based on the discussion at the meeting and agency comments. The USEPA raised a question about the potential for using a spreadsheet that was previously sent to Chevron and TRC as an example of summarizing sediment data for data gap review. TRC reviewed the last version of the spreadsheet, which was incomplete, and evaluated other options for use of a spreadsheet to evaluate sediment sampling plan data gaps. The attached Sediment Data Gap Analysis Spreadsheet ("the Spreadsheet"; Attachment 1) was developed by TRC to aid data gap identification and indicate how the proposed sampling will fill data gaps. The Spreadsheet lists each sediment sampling location and related information including:

- Sample number/depth interval;
- Historical analytical parameters completed at <u>prior</u> sediment sample locations/intervals, and proposed analysis for selected sampling intervals to address data gaps; and,
- Proposed analysis at <u>new</u> sediment sample locations/intervals.

TRC discussed and demonstrated the use of the Spreadsheet with Mr. Ricky Vargas of the USEPA during a Skype teleconference on August 14, 2019. Mr. Vargas indicated that the Spreadsheet

would be useful for identifying potential data gaps; an electronic version of the Spreadsheet (in Excel) is being forwarded via email. An electronic copy of the Spreadsheet is also included with this submission in Attachment 1 on CDROM.

In addition to the Spreadsheet (Attachment 1), Table 1 from the SFSAP has been revised to reflect the sampling changes noted in this letter (see Attachment 2). Figures 2, and 2A of the SFSAP have also been revised and are attached. The attached, revised versions of the Figures and Tables were updated to be consistent with the data gaps and proposed sampling to fill those gaps indicated per the Spreadsheet.

Physical Delineation

As noted at the meeting, the focus of the waterway investigation is to characterize and delineate the contaminated soft sediment in Spa Spring Creek and Woodbridge Creek that exists above the strata underlying the creek beds (i.e., above the underlying till/alluvium), as supported by the following:

- The extent of soft sediment is defined horizontally by the banks of each waterway and vertically by refusal on the underlying till/alluvium;
- The bathymetric survey and lithologic profile for the mouth of Woodbridge Creek, as presented on the Bathymetric Survey and lithologic profile included in the (November 2016 Supplemental Ecological Evaluation Report [SEER], indicates that soft sediment does not extend into the Arthur Kill; and,
- The absence of soft sediment in the Arthur Kill is attributable to tidal scouring, periodic dredging/channel deepening, and large vessel propeller effects.

The laboratory sample analytical results provide a basis for characterization of the soft sediments within the limits of the waterways. However, except for in the upstream direction, the delineation of waterway soft sediment is a function of the physical waterway limits (e.g., banks) and the extent of the downstream limit of the soft sediment (i.e., based on presence/absence and bathymetry, per the SEER). These details and supporting data will be included in a final sediment investigation report ("the final sediment report").

Light, Non-Aqueous Phase Liquid (LNAPL)

The LNAPL areas proximal to the waterways were presented at the meeting on Facility maps and discussed with respect to their current status. It was noted that the LNAPL areas have been significantly reduced in mass and extent, that LNAPL is immobile, and that the reduced LNAPL areas are not current sources of sediment contamination to adjacent waterways. The following was stated in the July 2, 2019 RTC letter:

The LNAPL areas were previously defined, are currently undergoing remediation, and as stated in the 2003 BEE, "Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear to be complete."

It should be noted that the above text refers to the then current LNAPL conditions, which have further improved (reduced) over the intervening 16 years. However, the text was not intended to dismiss the possible historical LNAPL mobility or related potential discharges no longer evident today. This will be clarified in a final sediment report that will include the results of the sediment sampling obtained from implementation of the SFSAP.

Cross Sections

As discussed with the NJDEP at the meeting, lithologic cross-sections will be prepared for selected areas of the Facility and included in the final sediment report.

Specific Responses to March 1, 2019 Comments by USEPA/NJDEP

The NJDEP noted that clarification was needed regarding Chevron's responses to Comment Nos. 4 and 7 in the Response to Comments (RTC) letter submitted with the revised SFSAP on July 2, 2019. For convenience, the USEPA's Comments 4 and 7 and Chevron's responses are re-stated, below followed by supplemental discussion.

USEPA Comment 4. Section 2.1 Sample Collection, Page 5, Table 1 and Figure 2: The document states, "In summary the proposed sample locations were selected to ...revisit previously sampled locations to supplement analysis with shallow and/or deeper samples as well as EPH where it had not previously been analyzed." However, it is unclear if this goal will be achieved since the previous sample locations/intervals were not referenced in the document, in any form, for direct comparison. Further review of the document suggests that few samples will be collected at depth (greater than 0.5 ft. samples) for any contaminant of concern (COC). The document should be revised to include a table comparing past sampling intervals/depths to those proposed herein, so that we can confirm that the sampling program is adequate to sufficiently delineate the impacts to the waterbodies.

RTC-Response 4: The Revised Table 1 provides a comparative summary and the location of proposed and historical samples, depths, and analytical parameters. Regarding the depth of proposed sampling, it should be noted that the biologically active zone, or benthic zone is defined by the NJDEP as 0-0.5 feet and would be of primary concern with respect to sediment impacts. It was also agreed at the September 17, 2018 meeting and in the subsequent November 2018 responses to the USEPA's August 2018 comment letter that further sampling (i.e., of "hotspots") is not necessary to meet the requirements of the 2013 HSWA permit, and that the existing and proposed samples adequately characterize and delineate contaminants in sediment. Further, petroleum constituent analysis (i.e., Volatile Organic Compounds [VOCs]; Base Neutral Compounds [BNs]) has been completed throughout the waterways to various depths in and below

the benthic zone. The horizontal, downstream and bank-to-bank physical limit of contaminated sediments in Woodbridge Creek was determined by completing a bathymetric survey and bottom profile analysis. The bathymetric survey revealed a steep submarine escarpment at the Woodbridge Creek/Arthur Kill confluence (Figure 6 of Attachment 1), indicating the terminus of soft sediments at the contact with the Arthur Kill. Therefore, further sampling to define the vertical/horizontal extent of EPH or other contaminants beyond that proposed in the SFSAP is not warranted.

Comment 4 Discussion: It is our understanding that the USEPA's request for clarification pertains to the data gap concerns noted above. We believe that these data gaps are addressed by the enclosed Spreadsheet, and the revised tables and figures included with this letter. The Spreadsheet identifies additional depth intervals where re-sampling of sediment is warranted for specific parameters. Therefore, additional sampling and analysis will be performed as appropriate, and laboratory sample analytical results will be provided in the final sediment report.

<u>USEPA Comment 7</u>. Section 2.1 Sample Collection, Data Gap Samples EPH Analysis at Existing Boring Locations, Page 6: The document states, "Chevron will resample all past locations on Woodbridge Creek and Spa Spring Creek for EPH analysis where EPH was not analyzed previously." However, a review of the document suggests the proposed additional EPH analysis is generally limited to the shallow 0 to 0.5 ft. interval where analysis was conducted for other COCs. Further review of the available data suggests that collection of subsurface (at-depth) samples were previously limited in scope, such that the majority of samples were not analyzed for extractable petroleum hydrocarbons (EPH) or other COCs below 0 to 0.5 ft. interval including, but not limited to: SED-01 A/B/C; SED-2C, SED-3A, SED- 4B; SED-05A/B/C, SED-06A/C, SED-07A/B/C; SED-08A/C; SED-09B; SED-lOA/B, SED-11C, etc. The document should be revised to include additional at-depth (below 0.5 ft.) sample collection/analysis for EPH at all historic and proposed sample locations/transects. In addition, please specify if/when the samples hit bedrock and the corresponding depth.

<u>RTC-Response 7</u>: Please refer to Response 4. It was agreed at the September 17, 2018 meeting and in the November 2018 RTC that "Chevron will resample all past locations for EPH analysis where EPH was not analyzed previously." The proposed additional sample depths are provided in revised Table 1. No other additional sampling is proposed. The USEPA's request for information on depth to bedrock appears to be a misunderstanding, since bedrock was not encountered during sampling, whereas refusal was encountered. The vertical limit of soft sediment in Woodbridge Creek coincides with the top of the underlying glacial till, which is sufficiently competent and refused the Vibracore drilling stem. As reported in Section 2 of the SEER (Attachment 1), bedrock was encountered in terrestrial borings from 65-85 feet below grade, well below the bed of Woodbridge Creek.

Comment 7 Discussion: The USEPA's concerns noted in Comment 7 are similar to those mentioned in Comment 4 regarding data gaps, and the response is similar. The existing data were reviewed for all sediment samples, including the specific samples noted by the USEPA in this comment. As noted under the Comment 4 discussion, additional depth intervals were identified where additional sampling and analysis will be performed, and all related data will be provided in the final sediment report. Regarding the USEPA's request on specifying the depth to bedrock, it was agreed at the meeting that Chevron would provide the depth to refusal, where encountered, whether on bedrock or other competent material. Complete boring logs and stratigraphic cross-sections will be provided with the final sediment report.

Analytical Results (Refer to USEPA Comment5/RTC Response 5)

During the meeting, the NJDEP noted an apparent discrepancy regarding the total concentrations of polycyclic aromatic hydrocarbons (PAHs) reported for samples SED-06-B and SED-09-C in the above-referenced response. The total PAHs reported for sediment samples SED-06-B and SED-09-C in the RTC were 0.71 mg/kg and 69.85 mg/kg, respectively, whereas the actual total PAH concentrations for these samples were 2.15 mg/kg and 140 mg/kg, respectively. The higher upstream concentrations of PAHs at the SED-09 transect, and the associated EPH concentration of 27,000 mg/kg versus those detected at SED-06 suggest a source of contamination other than the Facility. The laboratory sample analytical results for PAHs in sediments are summarized in Table 9-8 of the 2003 BEE included in Attachment 3 and on Figure 4.

As a result of our review of this issue, TRC identified several minor discrepancies regarding the data presentation in Tables 9-8, and on Figure 4 and Table IV of the 2016 SEER, though none that would change the sediment characterization. Specifically, analytical results for benzo(a)anthracene and benzo(a)pyrene were incorrectly shown on Figure 4, as they appear to have been switched in the data boxes, but they were correctly shown on Table IV of the SEER. The PAHs shown on Figure 4 for sample SED-01-C were below the Effects Range Low (ER-L) and Effects Range Moderate (ER-M) ESC but shown incorrectly as above these criteria (bolded/highlighted text). These inconsistencies have been corrected in the revised Table IV and Table 9-8, and the revised Figure 4, which are included in Attachments 3 and 4, respectively.

We trust that this letter and attachments address the USEPA's questions and concerns raised during the August 7, 2019 meeting. As noted at the meeting, Chevron respectfully requests an expedited review and approval by the end of August, which is necessary in order to complete the RFI for the surface water bodies and meet the RCRA 2020 goal.

Please contact the undersigned if you have any questions or if you require any additional information.

Sincerely,

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Robert Mancini, Chevron
Todd Frantz, Parsons

Chevron_PA_RFI_SedWP_Rev_Aug_21_2019

ATTACHMENT 1:

SEDIMENT DATA GAP ANALYSIS SPREADSHEET
(PAPER COPY AND CDROM)

Sediment Data Gap Analysis Spreadsheet
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-01-A	SED-01-A/0-6	3967881	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Woodbridge Creek	SED-01-A	SED-01-A/6-12	3967880	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Woodbridge Creek	SED-01-A	SED-01-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-01-B	SED-01-B/0-6	3967883	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Woodbridge Creek	SED-01-B	SED-01-B/6-12	3967882	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Woodbridge Creek	SED-01-B	SED-01-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-01-C	SED-01-C/0-6	3967905	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		
Woodbridge Creek	SED-01-C	SED-01-C/6-12	3967904	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Woodbridge Creek	SED-01-C	SED-01-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-02-A	SED-02-A/0-6	3967892	SEDIMENT	0.0	0.5	12/20/2002	Existing	X		X		X
Woodbridge Creek	SED-02-A	SED-02-A/6-12	3967891	SEDIMENT	0.5	1.0	12/20/2002	Existing				X	
Woodbridge Creek	SED-02-A(R)	SED-02-A(R)/0-6		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-02-A(R)	SED-02-A(R)/6-12		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-02-A(R)	SED-02-A(R)	JB62621-2	SEDIMENT	6.0	6.5	3/21/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-02-B	SED-02-B/0-6	3967889	SEDIMENT	0.0	0.5	12/20/2002	Existing	X		X		X
Woodbridge Creek	SED-02-B	SED-02-B/6-12	3967887	SEDIMENT	0.5	1.0	12/20/2002	Existing				X	
Woodbridge Creek	SED-02-B(R)	SED-02-B(R)/0-6		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-02-B(R)	SED-02-B(R)/6-12		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-02-B(R)	SED-02-B(R)	JB62621-1	SEDIMENT	3.5	4.0	3/21/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-02-C	SED-02-C/0-6	3967894	SEDIMENT	0.0	0.5	12/20/2002	Existing	X		X		X
Woodbridge Creek	SED-02-C	SED-02-C/6-12	3967893	SEDIMENT	0.5	1.0	12/20/2002	Existing				X	
Woodbridge Creek	SED-02-C(R)	SED-02-C(R)/0-6		SEDIMENT	0.0	0.5		Proposed	X		X		X
Woodbridge Creek	SED-02-C(R)	SED-02-C(R)/6-12		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-02-C(R)	SED-02-C(R)/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X-FD	X-FD	X-FD	X-FD	
Woodbridge Creek	SED-03-A	SED-03-A/0-6	3967919	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-03-A	SED-03-A/6-12	3967918	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-03-A	SED-03-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-03-B	SED-03-B/0-6	3967857	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-03-B	SED-03-B/6-12	3967856	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-03-B	SED-03-B(R)	JB62513-7	SEDIMENT	1.5	2.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-B	SED-03-B(R)	JB62513-8	SEDIMENT	4.5	5.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C/0-6	3967921	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-03-C	SED-03-C/6-12	3967920	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-03-C	SED-03-C/12-18	3967922	SEDIMENT	1.0	1.5	12/19/2002	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C(R)	JB62513-5	SEDIMENT	1.5	2.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C/30-36	3967923	SEDIMENT	2.5	3.0	12/19/2002	Existing	X	X	X	X	X
Woodbridge Creek	SED-03-C	SED-03-C(R)	JB62513-6	SEDIMENT	6.0	6.5	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-04-A	SED-04-A/0-6	3967911	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-04-A	SED-04-A/6-12	3967910	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-04-A	SED-04-A/39-45	3967912	SEDIMENT	3.3	3.8	12/19/2002	Existing	X	X	X	X	X[1]
Woodbridge Creek	SED-04-B	SED-04-B/0-6	3967915	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-04-B	SED-04-B/6-12	3967914	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-04-B	SED-04-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	

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Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-04-C	SED-04-C/0-6	3967917	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-04-C	SED-04-C/6-12	3967916	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-04-C	SED-04-C(R)	JB62513-4	SEDIMENT	1.5	2.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-04-C	SED-04-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-05-A	SED-05-A/0-6	3967907	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-05-A	SED-05-A/6-12	3967906	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-05-A	SED-05-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-05-B	SED-05-B/0-6	3967909	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-05-B	SED-05-B/6-12	3967908	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-05-B	SED-05-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-05-C	SED-05-C/0-6	3967855	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-05-C	SED-05-C/6-12	3967854	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-05-C	SED-05-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-06-A	SED-06-A/0-6	3967875	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-06-A	SED-06-A/6-12	3967874	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-06-A	SED-06-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-06-B	SED-06-B/0-6	3967879	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-06-B	SED-06-B/6-12	3967878	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-06-B	SED-06-B(R)	JB62513-3	SEDIMENT	4.0	4.5	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-06-C	SED-06-C/0-6	3967867	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-06-C	SED-06-C/6-12	3967866	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-06-C	SED-06-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-09-A	SED-09-A/0-6	3967877	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-09-A	SED-09-A/6-12	3967876	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-09-A	SED-09-A(R)	JB62513-1	SEDIMENT	3.0	3.5	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-09-B	SED-09-B/0-6	3967869	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-09-B	SED-09-B/6-12	3967868	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-09-B	SED-09-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-09-C	SED-09-C/0-6	3967864	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-09-C	SED-09-C/6-12	3967863	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-09-C	SED-09-C/33-39	3967865	SEDIMENT	2.8	3.3	12/19/2002	Existing	X	X	X	X	X
Woodbridge Creek	SED-09-C	SED-09-C(R)	JB62513-2	SEDIMENT	4.5	5.0	3/20/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-10-A	SED-10-A/0-6	3967871	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-10-A	SED-10-A/6-12	3967870	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-10-A	SED-10-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-10-B	SED-10-B/0-6	3967873	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-10-B	SED-10-B/6-12	3967872	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-10-B	SED-10-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-10-C	SED-10-C/0-6	3967862	SEDIMENT	0.0	0.5	12/19/2002	Existing	X	X	X		X
Woodbridge Creek	SED-10-C	SED-10-C/6-12	3967861	SEDIMENT	0.5	1.0	12/19/2002	Existing		X		X	
Woodbridge Creek	SED-10-C	SED-10-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Woodbridge Creek	SED-19-B	SED-19-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-19-B	SED-19-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-19-B	SED-19-B	JB62621-3	SEDIMENT	6.0	6.5	3/21/2014	Existing	X	X	X	X	X

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Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-19-C	SED-19-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		
Woodbridge Creek	SED-19-C	SED-19-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-19-C	SED-19-C	JB62621-4	SEDIMENT	7.5	8.0	3/21/2014	Existing	X	X	X	X	X
Woodbridge Creek	SED-22-A	SED-22-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-22-A	SED-22-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-22-A	SED-22-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-22-B	SED-22-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-22-B	SED-22-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-22-B	SED-22-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-22-C	SED-22-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-22-C	SED-22-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-22-C	SED-22-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-23-A	SED-23-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-23-A	SED-23-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-23-A	SED-23-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-23-B	SED-23-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-23-B	SED-23-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-23-B	SED-23-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-23-C	SED-23-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-23-C	SED-23-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-23-C	SED-23-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-24-A	SED-24-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-24-A	SED-24-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-24-A	SED-24-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-24-B	SED-24-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-24-B	SED-24-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-24-B	SED-24-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-24-C	SED-24-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-24-C	SED-24-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-24-C	SED-24-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-25-A	SED-25-A/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-25-A	SED-25-A/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-25-A	SED-25-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-25-B	SED-25-B/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-25-B	SED-25-B/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-25-B	SED-25-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-25-C	SED-25-C/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-25-C	SED-25-C/0.5-1.0		SEDIMENT	0.5	1.0		Proposed				X	
Woodbridge Creek	SED-25-C	SED-25-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-1	SED-WCBG-1/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-1	SED-WCBG-1/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	X
Woodbridge Creek	SED-WCBG-1	SED-WCBG-1/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-2	SED-WCBG-2/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-2	SED-WCBG-2/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	

Sediment Data Gap Analysis Spreadsheet
Former Perth Amboy Chevron Facility
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Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Woodbridge Creek	SED-WCBG-2	SED-WCBG-2/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-3	SED-WCBG-3/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-3	SED-WCBG-3/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-3	SED-WCBG-3/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-4	SED-WCBG-4/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-4	SED-WCBG-4/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-4	SED-WCBG-4/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-5	SED-WCBG-5/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-5	SED-WCBG-5/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-5	SED-WCBG-5/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-6	SED-WCBG-6/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-6	SED-WCBG-6/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-6	SED-WCBG-6/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-7	SED-WCBG-7/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-7	SED-WCBG-7/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-7	SED-WCBG-7/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Woodbridge Creek	SED-WCBG-8	SED-WCBG-8/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Woodbridge Creek	SED-WCBG-8	SED-WCBG-8/0.5-1.0		SEDIMENT	0.5	1.0		Proposed		X		X	
Woodbridge Creek	SED-WCBG-8	SED-WCBG-8/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-07-A	SED-07-A/0-6	3967897	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-07-A	SED-07-A/6-12	3967896	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-07-A	SED-07-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-07-B	SED-07-B/0-6	3967859	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-07-B	SED-07-B/6-12	3967858	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-07-B	SED-07-B/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-07-C	SED-07-C/0-6	3967901	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-07-C	SED-07-C/6-12	3967900	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-07-C	SED-07-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-08-A	SED-08-A/0-6	3967903	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-08-A	SED-08-A/6-12	3967902	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-08-A	SED-08-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-08-C	SED-08-C/0-6	3967885	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-08-C	SED-08-C/6-12	3967884	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-08-C	SED-08-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-11-C	SED-11-C/0-6	3967899	SEDIMENT	0.0	0.5	12/20/2002	Existing	X	X	X		X
Spa Spring Creek	SED-11-C	SED-11-C/6-12	3967898	SEDIMENT	0.5	1.0	12/20/2002	Existing		X		X	
Spa Spring Creek	SED-11-C	SED-11-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-20-A	SED-20-A	JB60857-1	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X
Spa Spring Creek	SED-20-A	SED-20-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-20-C	SED-20-C	JB60857-2	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X
Spa Spring Creek	SED-20-C	SED-20-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-21-A	SED-21-A	JB60857-4	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X
Spa Spring Creek	SED-21-A	SED-21-A/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-21-C	SED-21-C	JB60857-3	SEDIMENT	0.0	0.5	2/28/2014	Existing	X	X	X	X	X

Sediment Data Gap Analysis Spreadsheet
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Waterbody	Location ID	Field ID	Lab ID	Matrix	Sample Top	Sample Botm	Sample Date	Existing /Proposed	BN	EPH	Metals	VOC	pH/TOC/Grain Size
Spa Spring Creek	SED-21-C	SED-21-C/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	
Spa Spring Creek	SED-SSBG-1	SED-SSBG-1/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-1	SED-SSBG-1/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-SSBG-2	SED-SSBG-2/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-2	SED-SSBG-2/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-SSBG-3	SED-SSBG-3/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-3	SED-SSBG-3/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD
Spa Spring Creek	SED-SSBG-4	SED-SSBG-4/0.0-0.5		SEDIMENT	0.0	0.5		Proposed	X	X	X		X
Spa Spring Creek	SED-SSBG-4	SED-SSBG-4/2.0-2.5		SEDIMENT	2.0	2.5		Proposed	X - FD	X - FD	X - FD	X - FD	X - FD

X	= previously analyzed
[1]	= previously analyzed for Grain Size only
X	= Proposed sample analysis
X - FD	= Proposed sample analysis with interval determined by field screening

Total Proposed # of Samples:	BN	EPH	Metals	VOC	pH/TOC/Grain Size
	86	150	87	82	49

ATTACHMENT 2:

REVISED SUPPLEMENTAL FIELD SAMPLING and ANALYSIS PLAN
TABLE 1

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-WCBG-1[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-2[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	2.0-2.5	EPH, VOCs, SVOCs, Metals					
SED-WCBG-3[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-4[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-5[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-6[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-7[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-WCBG-8[2]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			Background Sample
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-01-A	0.0-0.5	EPH	Woodbridge Creek	SED-01-A	0.0-0.5	Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was originally collected to address downstream impacts from offsite sources. The transect is adjacent to the former Hess and Shell Facilities and is not bordered by Chevron on either side.
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-01-B	0.0-0.5	EPH	Woodbridge Creek	SED-01-B	0.0-0.5	Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-01-C	0.0-0.5	EPH	Woodbridge Creek	SED-01-C	0.0-0.5	Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-02-A(R)	0.0-0.5	EPH	Woodbridge Creek	SED-02-A (see explanation)	0.0-0.5	BN and Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was originally collected to address downstream impacts from onsite sources. This includes a former discharge trench which sewerage from the two former administrations buildings and runoff from AOC 50 (Bulk Station) discharged into. These samples are offset from their original locations due to underground utilities.The transect is adjacent to the former Hess and Shell Facilities and is not bordered by Chevron on either side. See utilities shown in the inset on Figure 2A.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	6.0-6.5	BNs, Metals, VOCs			6.0-6.5	Grain Size, TOC, pH, EPH	
SED-02-B(R)	0.0-0.5	EPH	Woodbridge Creek	SED-02-B (see explanation)	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	3.5-4.0	BNs, Metals, VOCs			3.5-4.0	Grain Size, TOC, pH, EPH	
SED-02-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-02-C (see explanation)	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-03-A	0.0-0.5	EPH	Woodbridge Creek	SED-03-A	0.0-0.5	BN and Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was located downstream from SWMU 7, 16, 17, 18 (TEL Burials Areas), 24 (TEL Weathering Area), 31 (Effluent Treatment Plant), 41 (Drying Area) and PAOC 21 (Colonial Pipeline). It is adjacent to SWMU 40 (Old Pond). Aerial photos indicate that the No.1 Separator, which is described as API Separator #1 in the January 1965 Interstate Sanitation Commission Report titled Location of City Sewers Adjacent to Industrial Plants Bordering the Arthur Kill in New Jersey (ISC Sewer Report), was connected to SWMU 40 and discharged directly adjacent to this location. This area also addresses impacts from the SWMU 40 LNAPL Areas.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-03-B(R)	0.0-0.5	EPH	Woodbridge Creek	SED-03-B	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	1.5-2.0	BNs, Metals, VOCs			1.5-2.0	Grain Size, TOC, pH EPH	
	4.5-5.0	BNs, Metals, VOCs			4.5-5.0	Grain Size, TOC, pH EPH	
SED-03-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-03-C	0.0-0.5	BN and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	1.0-1.5	EPH			1.0-1.5	Grain Size, TOC, pH, EPH	
	1.5-2.0	BNs, Metals, VOCs			1.5-2.0	VOCs	
	2.5-3.0	EPH			2.5-3.0	VOCs, BNs, Metals	
	6.0-6.5	BNs, Metals, VOCs			6.0-6.5	Grain Size, TOC, pH, EPH	
SED-04-A	0.0-0.5	EPH	Woodbridge Creek	SED-04-A	0.0-0.5	BN and Metals	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is adjacent to SWMU 24 (TEL Weathering Area), SWMU 31 (Effluent Treatment Plant), and SWMU 41 and downgradient of discharge point discussed in SED-05 Transect.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	3.25-3.75	EPH, Metals			3.25-3.75	VOCs, BNs	
SED-04-B	0.0-0.5	EPH	Woodbridge Creek	SED-04-B	0.0-0.5	BNs and Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-04-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-04-C	0.0-0.5	Metals	
	0.5-1.0	EPH			0.5-1.0	VOCs and BNs	
	1.5-2.0	BNs, Metals, VOCs			1.5-2.0	Grain Size, TOC, pH, EPH	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-05-A	0.0-0.5	EPH	Woodbridge Creek	SED-05-A	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is adjacent to SWMU 31 (Effluent Treatment Plant) and SWMU 41 (Drying Area). In addition, this location is in line with the current discharge from the Effluent plant, as well as the location of the historic discharge point of SWMU 35 (No. 4 separator - Settling Basin in ISC Sewer Report). SWMU 1 (North Field Basin) and SWMU 2 (Surge Pond) also historically discharged at this point through Separator No.2 (API Separator #2 in ISC Sewer Report) and Separator No. 3. This location also addresses the Former SWMU 41 LNAPL area and the Former NF4 LNAPL Area.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-05-B	0.0-0.5	EPH	Woodbridge Creek	SED-05-B	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	Grain Size, TOC, pH EPH	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-05-C	0.0-0.5	EPH	Woodbridge Creek	SED-05-C	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-06-A	0.0-0.5	EPH	Woodbridge Creek	SED-06-A	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is adjacent to SWMU 1 (North Field Basin and SWMU 2 (Surge Pond). In addition, this location is in line with the historic confluence point of Spa Spring Creek and Woodbridge Creek and the overflow point of SWMU 1. This transect is also adjacent to the DITSWED-8 area.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-06-B(R)	0.0-0.5	EPH	Woodbridge Creek	SED-06-B	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	4.0-4.5	EPH, BNs, Metals, VOCs			4.0-4.5	Grain Size, TOC, pH, EPH	
SED-06-C	0.0-0.5	EPH	Woodbridge Creek	SED-06-C	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-07-A	0.0-0.5	EPH	Spa Spring Creek	SED-07-A	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is upgradient of the new confluence of Spa Spring Creek and Woodbridge Creek. In addition, this transect is adjacent to SWMU 1 (North Field Basin).
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-07-B	0.0-0.5	EPH	Spa Spring Creek	SED-07-B	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-07-C	0.0-0.5	EPH	Spa Spring Creek	SED-07-C	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-08-A	0.0-0.5	EPH	Spa Spring Creek	SED-08-A	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect was selected as it was adjacent to SWMU 27 (TEL Weathering Area), SWMU 29 (Fines Transfer Area), and SWMU 39 (Unnamed North Field Pond).
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-08-C	0.0-0.5	EPH	Spa Spring Creek	SED-08-C	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-09-A(R)	0.0-0.5	EPH	Woodbridge Creek	SED-09-A and SED-09-A(R)	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). This transect is upgradient of the new confluence of Spa Spring Creek and Woodbridge Creek. This transect is also in line with the former American Cyanmid site and downstream of former discharge points from offsite properties along Woodbridge creek.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	3.0-3.5	EPH, BNs, Metals, VOCs			3.0-3.5	Grain Size, TOC, pH EPH	
SED-09-B	0.0-0.5	EPH	Woodbridge Creek	SED-09-B	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-09-C(R)	0.0-0.5	EPH	Woodbridge Creek	SED-09-C and SED-09-C(R)	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	2.75-3.25	EPH			2.75-3.25	Metals and BNs	
	4.5-5.0	BNs, Metals, VOCs			3.3-3.8	VOCs	
					4.5-5.0	Grain Size, TOC, pH, EPH	
SED-10-A	0.0-0.5	EPH	Woodbridge Creek	SED-10-A	0.0-0.5	Metals and BNs	As requested in EPA's August 31, 2018 Letter, these sample locations will be revisited to analyze for additional parameters (EPH, TOC, pH and grain size). These samples were collected as background samples.
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-10-B	0.0-0.5	EPH	Woodbridge Creek	SED-10-B	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-10-C	0.0-0.5	EPH	Woodbridge Creek	SED-10-C	0.0-0.5	Metals and BNs	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					
SED-11-C	0.0-0.5	EPH	Woodbridge Creek	SED-11-C	0.0-0.5	Metals, BNs, pH, TOC, Grain Size	
	0.5-1.0	EPH			0.5-1.0	VOCs	
	TBD[1]	EPH, BNs, Metals, VOCs					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-19-B	0.0-0.5	EPH, BNs, and Metals	Woodbridge Creek	SED-19-B	4.0-4.5	VOCs, BNs and Metals	Samples were collected from the mouth of Woodbridge Creek. Sample locations are adjacent to both the Former Hess and Former Shell Sites and are situated next to Discharge 002 of the Former Hess Facility.
	0.5-1.0	EPH and VOCs			6.0-6.5	BNs, EPH, pH, Grain Size and TOC	
SED-19-C	0.0-0.5	EPH, BNs, and Metals	Woodbridge Creek	SED-19-C	7.5-8.0	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
	0.5-1.0	EPH and VOCs				VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-20-A	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-20-A	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-20-C	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-20-C	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-21-A	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-21-A	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-21-C	TBD[1]	BNs, Metals, and VOCs	Spa Spring Creek	SED-21-C	0.0-0.5	VOCs, BNs, Metals, EPH, pH, Grain Size and TOC	
SED-22-A	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located inbetween transects SED-01 and SED-02. This location is adjacent to the Former Hess and Former Shell Facilities and also coincides with the Hess Facilities Outfall 003.
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-22-B	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-22-C	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-23-A	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located inbetween transects SED-06 and SED-09. This location is adjacent to SWMU 1 (North Field Basin) and is in between SED-06 Transect and the confluence of Woodbridge Creek and Spa Spring Creek.
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-23-B	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-23-C	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					

Table 1 (Revised August 2019)
Proposed Sediment Sampling
Former Perth Amboy Chevron Facility
Perth Amboy, New Jersey

Proposed Sample Name	Sample Depth	Analysis	Location	Correlated Historic Samples	Historic Sample Depth	Historic Analysis	Explanation
SED-24-A	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located in between transects SED-06 and SED-09. This location is upstream of the Site and alos upstream of the confluence of Woodbridge Creek and Spa Spring Creek.
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-24-B	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-24-C	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-25-A[3]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			As requested in EPA's August 31, 2018 Letter, this transect will be located inbetween transects SED-02 and SED-03. This location is adjacent to the former Motiva/Shell Facilities, where a large petroleum spill occurred in the 1990s. In addition, this transect is directly adjacent to the Former AOC 8 (Oily Tarry Material at B27 and B23) NF6 LNAPL Area and downgradient of the SWMU 40 (Old Pond) LNAPL Area.
	0.5-1.0	VOCs					
SED-25-B[3]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
SED-25-C[3]	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Woodbridge Creek	No historic sample.			
	0.5-1.0	VOCs					
	TBD[1]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-1	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[2]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-2	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[2]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-3	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[2]	EPH, VOCs, SVOCs, Metals					
SED-SSBG-4	0.0-0.5	EPH, SVOCs, Metals, TOC, pH and grain size	Spa Spring Creek	No historic sample.			Background Sample
	TBD[1]	EPH, VOCs, SVOCs, Metals					

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.

[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field.

[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler.

ATTACHMENT 3:

ANALYTICAL DATA SUMMARY SHEETS:
1 - TABLE 9-8 OF THE 2003 BASLINE ECOLOGICAL EVALUATION SHOWING SEMI-VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN SEDIMENT
2 – REVISED TABLE IV OF THE 2016 SUPPLEMENTAL ECOLOGICAL EVALUATION REPORT

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-11-C/0-6		SED-08-A/0-6		SED-08-C/0-6		SED-07-A/0-6		SED-07-B/0-6		SED-07-C/0-6		SED-10-A/0-6		SED-10-B/0-6		SED-10-C/0-6	
			Date Sampled:	12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967899		3967903		3967885		3967897		3967859		3967901		3967871		3967873		3967862	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Flow Direction**		⇨		**Spa Spring Creek**		⇨				⇨		**Woodbridge Creek**				⇨	
Naphthalene	Naphthalene	*0.16*	*2.1*	0.012	U	0.013	J	0.024	U	0.053		0.034	U	0.031	U	0.0018	J	**0.22**		0.003	J
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	0.0049	U	0.0071	J	0.015	J	0.057		0.014	U	0.013	U	0.0009	J	**0.22**		0.0031	
Acenaphthylene	ACPL	*0.044*	*0.64*	0.0049	U	0.0024	U	0.015	J	**0.083**		0.014	U	0.013	U	0.021		0.027		0.0049	
Acenaphthene	ACP	*0.016*	*0.5*	0.0049	U	0.005	J	0.011	J	**0.017**	J	0.014	U	0.013	U	0.0008	J	**0.052**		**0.017**	
Fluorene	Fluorene	*0.019*	*0.54*	0.0059	J	0.0062	J	0.016	J	**0.031**		0.014	U	0.013	U	0.0012	J	**0.074**		0.019	
Phenanthrene	PhA	*0.24*	*1.5*	0.011	J	0.032		0.17		**0.31**		0.018	J	0.025	J	0.011		**0.77**		0.24	
Anthracene	ANT	*0.085*	*1.1*	0.0049	U	0.0071	J	0.043		**0.13**		0.014	U	0.013	U	0.017		**0.19**		0.051	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	0.022		0.056		0.39		0.5		0.034	J	0.028	J	0.12		**1.1**		0.4	
Pyrene	Pyrene	*0.665*	*2.6*	0.022		0.1		0.35		0.61		0.039	J	0.031	J	0.24		**1.4**		0.47	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	0.0097	J	0.018		0.16		**0.29**		0.014	U	0.013	U	0.14		**0.63**		0.21	
Chrysene	Chrysene	*0.384*	*2.8*	0.011	J	0.036		0.24		**0.39**		0.02	J	0.017	J	0.14		**1**		0.24	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.012	J	0.042		0.33		0.53		0.025	J	0.02	J	0.21		1.1		0.33	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	0.0049	U	0.015	J	0.12		0.18		0.014	U	0.013	U	0.087		**0.34**		0.1	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	0.0061	J	0.018		0.22		**0.45**		0.014	J	0.013	U	0.19		**0.65**		0.22	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	0.0058	J	0.019		0.18		**0.37**		0.014	U	0.014	J	0.095		**0.22**		0.14	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	0.0049	U	0.0067	J	0.05		**0.15**		0.014	U	0.013	U	0.026		**0.073**		0.036	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	0.0049	U	0.025		**0.23**		**0.74**		0.016	J	0.013	U	0.095		**0.21**		0.17	
Phenol	Phenol	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2-Chlorophenol	2-CP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
2-Nitrophenol	2-NP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachloroethane	HCE	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Isophorone	IP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Dimethylphthalate	DMP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
2-Methylphenol	2-MP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Methylphenol	4-MP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
4-Chloroaniline	4-CLA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2-Nitroaniline	2-NA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Atrazine	Atrazine	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Caprolactam	Caprolactam	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Benzaldehyde	Benzald	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Nitrophenol	4-NP	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Pentachlorophenol	PCP	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	3.2	U	16	U	6.2	U	2	U	14	U	4.2	U	0.82	U	3.4	U	0.82	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-11-C/0-6		SED-08-A/0-6		SED-08-C/0-6		SED-07-A/0-6		SED-07-B/0-6		SED-07-C/0-6		SED-10-A/0-6		SED-10-B/0-6		SED-10-C/0-6	
			Date Sampled:	12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967899		3967903		3967885		3967897		3967859		3967901		3967871		3967873		3967862	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Flow Direction**		⇨		**Spa Spring Creek**		⇨				⇨		**Woodbridge Creek**				⇨	
Diethylphthalate	DEP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.062	J	0.17	U	0.04	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Di-n-butylphthalate	DBP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Butylbenzylphthalate	BBP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	0.32	U	1.6	U	0.86	J	0.5	J	1.4	U	0.42	U	0.46		1	J	5.2	
Di-n-octylphthalate	DOP	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
3-Nitroaniline	3-NA	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Dibenzofuran	DBF	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.61	J	0.04	U
4-Nitroaniline	4-NA	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Carbazole	Carbazole	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.88	J	0.04	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Acetophenone	Acetophen	(--)	(--)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Total Targeted SVOCs		(--)	(--)	0.1055		0.4061		3.4		5.391		0.166		0.135		1.9187		10.766		7.854	
Total TICs		(--)	(--)	119.8		1155.2		134.3		107.2		494.3		154.7		17.84		52		20.67	
Total PAHs		*4*	*45*	0.1055		0.4061		2.54		**4.891**		0.166		0.135		1.3967		**8.276**		2.654	
Total SVOCs		(--)	(--)	119.9055		1155.6061		137.7		112.591		494.466		154.835		19.7587		62.766		28.524	

U = The compound was not detected at the indicated concentration.
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(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-09-A/0-6		SED-09-B/0-6		SED-09-C/0-6		SED-09-C/33-39		SED-06-A/0-6		SED-06-B/0-6		SED-06-C/0-6		SED-05-A/0-6		SED-05-B/0-6	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967877		3967869		3967864		3967865		3967875		3967879		3967867		3967907		3967909	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Naphthalene	Naphthalene	*0.16*	*2.1*	0.024	J	0.068		0.049		**5.9**		0.01	U	0.012	J	0.029	J	0.092	J	0.0062	U
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	0.017		0.067		0.032		**21**		0.004	U	0.011		0.024		0.049	J	0.0059	J
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.053**		**0.052**		**0.083**		**0.97**		0.008	J	0.019		**0.05**		**0.088**		0.0071	J
Acenaphthene	ACP	*0.016*	*0.5*	**0.032**		**0.2**		**0.099**		**1.9**		0.004	U	0.0052	J	**0.056**		**0.045**	J	0.0025	U
Fluorene	Fluorene	*0.019*	*0.54*	**0.028**		**0.22**		**0.085**		**3.8**		0.0061	J	0.0064	J	**0.059**		**0.072**		0.003	J
Phenanthrene	PhA	*0.24*	*1.5*	0.11		**2**		**0.95**		**18**		0.018		0.038		**0.72**		**0.7**		0.025	
Anthracene	ANT	*0.085*	*1.1*	**0.29**		**0.67**		**0.31**		**3.1**		0.011	J	0.033		**0.2**		**0.19**		0.011	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**0.71**		**2.3**		**2.1**		**5.5**		0.041		0.13		**1.2**		**1.1**		0.076	
Pyrene	Pyrene	*0.665*	*2.6*	**1.9**		**4.6**		**2.9**		**13**		0.11		**0.71**		**1.7**		**2.3**		0.2	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.69**		**1.9**		**1.2**		**6.5**		0.034		0.15		**0.8**		**0.83**		0.066	
Chrysene	Chrysene	*0.384*	*2.8*	**1.1**		**2.1**		**1.7**		**11**		0.052		0.27		**1.1**		**1.1**		0.083	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.68		2.1		2.3		9.6		0.071		0.28		1.4		1.2		0.19	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	0.21		**0.95**		**0.71**		**1.2**		0.022		0.077		**0.46**		**0.43**		0.044	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	**0.55**		**1.7**		**1.5**		**13**		0.044		0.21		**0.94**		**1.3**		0.2	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	0.17		**0.99**		**0.8**		**4.1**		0.028		0.07		**0.44**		**0.64**		0.1	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	**0.07**		**0.28**		**0.23**		**4**		0.011	J	0.031		**0.14**		**0.28**		**0.064**	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.24**		**1**		**1**		**18**		0.049		0.1		**0.54**		**1.2**		**0.27**	
Phenol	Phenol	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2-Chlorophenol	2-CP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
2-Nitrophenol	2-NP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachloroethane	HCE	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Isophorone	IP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.69	U	0.44	U	1.7	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Dimethylphthalate	DMP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
2-Methylphenol	2-MP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Methylphenol	4-MP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
4-Chloroaniline	4-CLA	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2-Nitroaniline	2-NA	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Atrazine	Atrazine	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Caprolactam	Caprolactam	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Benzaldehyde	Benzald	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Nitrophenol	4-NP	(--)	(--)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Pentachlorophenol	PCP	(--)	(--)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	2.7	U	1.7	U	7	U	15	U	3.4	U	1.7	U	5.6	U	4.6	U	0.83	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
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ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-09-A/0-6		SED-09-B/0-6		SED-09-C/0-6		SED-09-C/33-39		SED-06-A/0-6		SED-06-B/0-6		SED-06-C/0-6		SED-05-A/0-6		SED-05-B/0-6	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967877		3967869		3967864		3967865		3967875		3967879		3967867		3967907		3967909	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Diethylphthalate	DEP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Di-n-butylphthalate	DBP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Butylbenzylphthalate	BBP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	4.2		1.4		7		37		0.69	J	0.71	J	3.1		2.1	J	0.51	
Di-n-octylphthalate	DOP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
3-Nitroaniline	3-NA	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Dibenzofuran	DBF	(--)	(--)	0.14	U	0.09	U	0.3	U	1.9	J	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Nitroaniline	4-NA	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Carbazole	Carbazole	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Acetophenone	Acetophen	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Total Targeted SVOCs		(--)	(--)	11.074		22.597		23.048		179.47		1.1951		2.8626		12.958		13.716		1.855	
Total TICs		(--)	(--)	66.3		29.2		190.3		1181		123.89		29.38		65.5		75.6		25.49	
Total PAHs		*4*	*45*	**6.874**		**21.197**		**16.048**		**140.57**		0.5051		2.1526		**9.858**		**11.616**		1.345	
Total SVOCs		(--)	(--)	77.374		51.797		213.348		1360.47		125.0851		32.2426		78.458		89.316		27.345	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-05-C/0-6		SED-04-A/0-6		SED-04-A/39-45		SED-04-B/0-6		SED-04-C/0-6		SED-03-A/0-6		SED-03-B/0-6		SED-03-C/0-6		SED-03-C/12-18	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967855		3967911		3967912		3967915		3967917		3967919		3967857		3967921		3967922	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Naphthalene	Naphthalene	*0.16*	*2.1*	0.13		0.04	U	**0.42**		0.036		0.0041	J	0.065	J	0.086	J	**3.4**		**10**	
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	**0.13**		0.027	J	**1.4**		0.031		0.0034	J	0.042	J	**0.093**		**7.5**		**39**	
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.11**		**0.063**	J	**0.29**		0.025		0.0012	J	**0.15**		**0.13**		**0.8**		**1.2**	
Acenaphthene	ACP	*0.016*	*0.5*	**0.068**		**0.036**	J	**0.64**		**0.092**		0.0015	J	**0.086**	J	**0.26**		**1.9**		**2.8**	
Fluorene	Fluorene	*0.019*	*0.54*	**0.065**		**0.052**	J	**1.1**		**0.092**		0.003	J	0.019	U	**0.25**		**3.7**		**5.8**	
Phenanthrene	PhA	*0.24*	*1.5*	0.17		**0.6**		**4.5**		**1**		0.011		**0.25**		**2.5**		**11**		**10**	
Anthracene	ANT	*0.085*	*1.1*	**0.18**		**0.2**		**0.97**		**0.28**		0.003	J	**0.36**		**0.95**		**1.9**		**1.4**	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**1.1**		**1.2**		**2.5**		**1.1**		0.021		**2**		**4.8**		**4.2**		**3.7**	
Pyrene	Pyrene	*0.665*	*2.6*	**1.4**		**1.8**		**6.1**		**1.4**		0.027		**5.2**		**6**		**8.6**		**5.1**	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.54**		**0.72**		**2**		**0.51**		0.0081		**1.3**		**2.9**		**3.9**		**1.4**	
Chrysene	Chrysene	*0.384*	*2.8*	**0.96**		**1**		**2.8**		**0.68**		0.011		**2.3**		**3.6**		**7.5**		**2.5**	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.98		1.3		1.6		0.69		0.017		1.6		3.8		5.9		1.4	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	**0.32**		**0.44**		**0.46**		0.24		0.0056		**0.44**		**1.3**		**1.1**		**0.46**	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	**0.71**		**1.1**		**2**		**0.6**		0.01		**1.1**		**3.3**		**8.5**		**1.1**	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	**0.54**		**0.76**		**0.86**		**0.41**		0.0076		**0.72**		**1.9**		**3.6**		**0.69**	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	**0.17**		**0.2**		**0.48**		**0.11**		0.0018	J	**0.35**		**0.59**		**3.1**		**0.22**	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.68**		**1**		**2.4**		**0.5**		0.011		**1.6**		**2.1**		**14**		**0.94**	
Phenol	Phenol	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2-Chlorophenol	2-CP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
2-Nitrophenol	2-NP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachloroethane	HCE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Nitrobenzene	Nitrobenzene	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Isophorone	IP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachlorobutadiene	HCBD	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2-Chloronaphthalene	2-CNP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Dimethylphthalate	DMP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
2-Methylphenol	2-MP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Methylphenol	4-MP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
4-Chloroaniline	4-CLA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2-Nitroaniline	2-NA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Atrazine	Atrazine	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Caprolactam	Caprolactam	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Benzaldehyde	Benzald	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Nitrophenol	4-NP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Pentachlorophenol	PCP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	26	U	1.1	U	11	U	0.85	U	1.6	U	7.8	U	2.4	U	16	U	16	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-05-C/0-6		SED-04-A/0-6		SED-04-A/39-45		SED-04-B/0-6		SED-04-C/0-6		SED-03-A/0-6		SED-03-B/0-6		SED-03-C/0-6		SED-03-C/12-18	
			Date Sampled:	12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02		12/19/02	
			Lab Sample No.:	3967855		3967911		3967912		3967915		3967917		3967919		3967857		3967921		3967922	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				⇨	
Diethylphthalate	DEP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachlorobenzene	HCB	*0.02*	*24*	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Di-n-butylphthalate	DBP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Butylbenzylphthalate	BBP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	18		2.3		5.2	J	0.85		0.17	J	50		1.7		12		8	J
Di-n-octylphthalate	DOP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
3-Nitroaniline	3-NA	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Dibenzofuran	DBF	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	1.9	J	3.9	J
4-Nitroaniline	4-NA	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Carbazole	Carbazole	(--)	(--)	1.3	U	0.087	J	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Acetophenone	Acetophen	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Total Targeted SVOCs		(--)	(--)	26.253		12.885		35.72		8.646		0.3173		67.563		36.259		104.5		99.61	
Total TICs		(--)	(--)	184.2		52.5		586		33.14		56.17		485		67.6		1403		2204	
Total PAHs		*4*	*45*	**8.253**		**10.498**		**30.52**		**7.796**		0.1473		**17.563**		**34.559**		**90.6**		**87.71**	
Total SVOCs		(--)	(--)	210.453		65.385		621.72		41.786		56.4873		552.563		103.859		1507.5		2303.61	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-03-C/30-36		SED-02-A/0-6		SED-02-B/0-6		SED-02-B/0-6D		SED-02-C/0-6		SED-01-A/0-6		SED-01-B/0-6		SED-01-C/0-6		SED-16-C/0-6	
			Date Sampled:	12/19/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/17/02	
			Lab Sample No.:	3967923		3967892		3967889		3967890		3967894		3967881		3967883		3967905		3964485	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				**Arthur Kill**	
Naphthalene	Naphthalene	*0.16*	*2.1*	**3.4**		0.1	J	**0.19**		0.036	U	0.071	J	0.039	J	0.042		0.089		0.11	
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	**8.9**		0.069	J	**0.15**		0.032	J	0.056	J	0.029		0.039		0.05		0.065	
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.33**		**0.11**		**0.046**	J	**0.057**	J	**0.11**		**0.062**		**0.059**		**0.17**		**0.15**	
Acenaphthene	ACP	*0.016*	*0.5*	**0.46**		**0.034**	J	**0.45**		**0.068**		**0.037**	J	0.012	J	**0.077**		**0.084**		**0.027**	
Fluorene	Fluorene	*0.019*	*0.54*	**0.99**		**0.049**	J	**0.5**		**0.14**		**0.037**	J	**0.022**		**0.069**		**0.1**		**0.05**	
Phenanthrene	PhA	*0.24*	*1.5*	**2.8**		**0.33**		**4.9**		**1.7**		0.2		0.13		**0.61**		**0.29**		0.2	
Anthracene	ANT	*0.085*	*1.1*	**0.32**		**0.24**		**1.3**		**0.47**		**0.22**		**0.086**		**0.2**		**0.5**		**0.25**	
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**1**		**1.3**		**4.8**		**2.2**		**0.94**		**0.64**		**1**		**1.3**		**1**	
Pyrene	Pyrene	*0.665*	*2.6*	**1.8**		**1.6**		**5.1**		**2.3**		**3.3**		**0.72**		**1.3**		**2.6**		**1.3**	
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.4**		**0.55**		**2.1**		**1**		**0.65**		**0.31**		**0.61**		**0.59**		**0.44**	
Chrysene	Chrysene	*0.384*	*2.8*	**0.53**		**0.83**		**2.3**		**1.4**		**1.4**		0.23		**0.91**		**1.2**		**0.7**	
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.39		1.2		2.6		1.3		1.5		0.55		1		0.7		0.9	
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	0.11		**0.4**		**0.99**		**0.48**		**0.48**		0.2		**0.36**		0.19		**0.33**	
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	0.29		**0.78**		**2.2**		**0.97**		**1.4**		0.39		**0.86**		0.42		**0.65**	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	0.16		**0.58**		**1.4**		**0.55**		**0.75**		**0.36**		**0.64**		0.16		**0.36**	
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	0.058	J	**0.17**		**0.34**		**0.17**		**0.37**		**0.096**		**0.21**		0.059		**0.094**	
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.25**		**0.76**		**1.6**		**0.64**		**1.5**		**0.42**		**0.87**		**0.2**		**0.33**	
Phenol	Phenol	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2-Chlorophenol	2-CP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
2-Nitrophenol	2-NP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachloroethane	HCE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Isophorone	IP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Dimethylphthalate	DMP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
2-Methylphenol	2-MP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Methylphenol	4-MP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
4-Chloroaniline	4-CLA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.27	J
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2-Nitroaniline	2-NA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Atrazine	Atrazine	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Caprolactam	Caprolactam	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Benzaldehyde	Benzald	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.13	J
4-Nitrophenol	4-NP	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Pentachlorophenol	PCP	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	8	U	1.5	U	1	U	1	U	13	U	3.6	U	2.2	U	7.4	U	2.1	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-03-C/30-36		SED-02-A/0-6		SED-02-B/0-6		SED-02-B/0-6D		SED-02-C/0-6		SED-01-A/0-6		SED-01-B/0-6		SED-01-C/0-6		SED-16-C/0-6	
			Date Sampled:	12/19/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/20/02		12/17/02	
			Lab Sample No.:	3967923		3967892		3967889		3967890		3967894		3967881		3967883		3967905		3964485	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Woodbridge Creek**				⇨				⇨				⇨				**Arthur Kill**	
Diethylphthalate	DEP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Di-n-butylphthalate	DBP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Butylbenzylphthalate	BBP	(--)	(--)	0.8	U	0.25	J	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	0.8	U	4.3		2.1		1		20		6.5		3.2		0.74	U	21	
Di-n-octylphthalate	DOP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
3-Nitroaniline	3-NA	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Dibenzofuran	DBF	(--)	(--)	0.79	J	0.075	U	0.07	J	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Nitroaniline	4-NA	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Carbazole	Carbazole	(--)	(--)	0.41	U	0.075	U	0.13	J	0.047	U	0.66	U	0.18	U	0.2	J	0.38	U	0.1	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Acetophenone	Acetophen	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Total Targeted SVOCs		(--)	(--)	22.978		13.652		33.266		14.477		33.021		10.796		12.256		8.702		28.356	
Total TICs		(--)	(--)	476		107.8		43.12		37.84		157		80.1		65.4		101.7		107.7	
Total PAHs		*4*	*45*	**22.188**		**9.102**		**30.966**		**13.477**		**13.021**		**4.296**		**8.856**		**8.702**		**6.956**	
Total SVOCs		(--)	(--)	498.978		121.452		76.386		52.317		190.021		90.896		77.656		110.402		136.056	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-13-C/0-6		SED-13-C/0-6D		SED-14-C/0-6		SED-18-C/0-6		SED-15-C/0-6		SED-17-C/0-6		FB121902		FB122002	
			Date Sampled:	12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/19/02		12/202/02	
			Lab Sample No.:	3964479&80		3964481&82		3964483&84		3964488		3964477&78		3964486		3967924		3967895	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Arthur Kill**		⇨				⇨				⇨		**Field Blanks (ppb)**			
Naphthalene	Naphthalene	*0.16*	*2.1*	0.1		0.11		0.15		0.094		0.1		**0.8**		1	U	1	U
2-Methylnaphthalene	2-MNap	*0.07*	*0.67*	0.069		0.07		**0.085**		0.069		0.064		**0.67**		1	U	1	U
Acenaphthylene	ACPL	*0.044*	*0.64*	**0.14**		**0.14**		**0.15**		**0.12**		**0.15**		**0.59**		1	U	1	U
Acenaphthene	ACP	*0.016*	*0.5*	**0.077**		**0.067**		**0.46**		**0.065**		**0.04**		**3.9**		1	U	1	U
Fluorene	Fluorene	*0.019*	*0.54*	**0.085**		**0.077**		**0.21**		**0.069**		**0.053**		**1.2**		1	U	1	U
Phenanthrene	PhA	*0.24*	*1.5*	**0.3**		**0.3**		**0.28**		**0.34**		**0.36**		**2.2**		1	U	1	U
Anthracene	ANT	*0.085*	*1.1*	**0.29**		**0.26**		**0.31**		**0.27**		**0.3**		**2.4**		1	U	1	U
Fluoranthene	Fluoranthene	*0.6*	*5.1*	**1.2**		**1.1**		**1.3**		**0.92**		**1.1**		**6.4**		1	U	1	U
Pyrene	Pyrene	*0.665*	*2.6*	**1.3**		**1.3**		**1.6**		**1.2**		**1.4**		**7.3**		1	U	1	U
Benzo(a)anthracene	B(a)A	*0.261*	*1.6*	**0.56**		**0.52**		**0.61**		**0.52**		**0.65**		**3.7**		1	U	1	U
Chrysene	Chrysene	*0.384*	*2.8*	**0.68**		**0.59**		**0.62**		**0.67**		**0.94**		**3.8**		1	U	1	U
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.94		0.9		0.91		0.21		1.3		3.7		1	U	1	U
Benzo(k)fluoranthene	B(k)F	*0.24*	*1340*	**0.37**		**0.26**		**0.34**		**0.33**		**0.44**		**1.2**		1	U	1	U
Benzo(a)pyrene	B(a)P	*0.43*	*1.6*	**0.66**		**0.6**		**0.65**		**0.61**		**0.85**		**3.2**		1	U	1	U
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	*0.2*	*320*	**0.38**		**0.35**		**0.35**		**0.3**		**0.64**		**1.6**		1	U	1	U
Dibenz(a,h)anthracene	DB(a,h)a	*0.063*	*0.26*	**0.1**		**0.097**		**0.092**		**0.084**		**0.15**		**0.47**		1	U	1	U
Benzo(g,h,i)perylene	B(g,h,i)P	*0.17*	*320*	**0.37**		**0.35**		**0.32**		**0.26**		**0.63**		**1.7**		1	U	1	U
Phenol	Phenol	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2-Chlorophenol	2-CP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
2-Nitrophenol	2-NP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachloroethane	HCE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Nitrobenzene	Nitrobenzene	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Isophorone	IP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachlorobutadiene	HCBD	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	U	0.35	U	5	U	5	U
2-Chloronaphthalene	2-CNP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Dimethylphthalate	DMP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
2-Methylphenol	2-MP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
4-Methylphenol	4-MP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
4-Chloroaniline	4-CLA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.12	J	0.11	U	0.068	U	1	U	1	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
2-Nitroaniline	2-NA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Atrazine	Atrazine	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Caprolactam	Caprolactam	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	5	U	5	U
Benzaldehyde	Benzald	(--)	(--)	0.1	J	0.11	J	0.13	J	0.15	J	0.11	U	0.09	J	1	U	1	U
4-Nitrophenol	4-NP	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	J	0.35	U	10	U	10	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Pentachlorophenol	PCP	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	U	0.35	U	3	U	3	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	2	U	1.8	U	2.1	U	1.9	U	2.3	U	1.4	U	19	U	20	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.51	U	0.46	U	0.52	U	0.48	U	0.59	U	0.35	U	5	U	5	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

Revised Table 9-8 (August 2019)
Semi-Volatile Organic Compounds in Sediment Samples
Chevron Perth Amboy, New Jersey

			TRC Sample No./Depth Sampled (in):	SED-13-C/0-6		SED-13-C/0-6D		SED-14-C/0-6		SED-18-C/0-6		SED-15-C/0-6		SED-17-C/0-6		FB121902		FB122002	
			Date Sampled:	12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/17/02		12/19/02		12/202/02	
			Lab Sample No.:	3964479&80		3964481&82		3964483&84		3964488		3964477&78		3964486		3967924		3967895	
			Laboratory:	Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster		Lancaster	
SVOCs (cont'd) (ppm)	**Abbrev.**	**ER-L[1]**	**ER-M[1]**	**Arthur Kill**		⇨				⇨				⇨		**Field Blanks (ppb)**			
Diethylphthalate	DEP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	2	U	2	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachlorobenzene	HCB	*0.02*	*24*	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Di-n-butylphthalate	DBP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
Butylbenzylphthalate	BBP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	4.5		4.8		3.7		4.7		3.9		0.14	U	2	U	4	J
Di-n-octylphthalate	DOP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
3-Nitroaniline	3-NA	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Dibenzofuran	DBF	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.48	J	1	U	1	U
4-Nitroaniline	4-NA	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Carbazole	Carbazole	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.12	J	1	U	1	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.16	J	1	U	1	U
Acetophenone	Acetophen	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	1	U
Total Targeted SVOCs		(--)	(--)	12.221		12.001		12.267		11.101		13.657		45.68		ND		4	
Total TICs		(--)	(--)	470.8		89.7		85.4		98.3		138.6		101.5		ND		140	
Total PAHs		*4*	*45*	**7.621**		**7.091**		**8.437**		**6.131**		**9.167**		**44.83**		ND		ND	
Total SVOCs		(--)	(--)	483.021		101.701		97.667		109.401		152.257		147.18		ND		144	

U = The compound was not detected at the indicated concentration.
J = Estimated value; ND = not detected.
[1] New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.
Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.
ppm = parts per million.

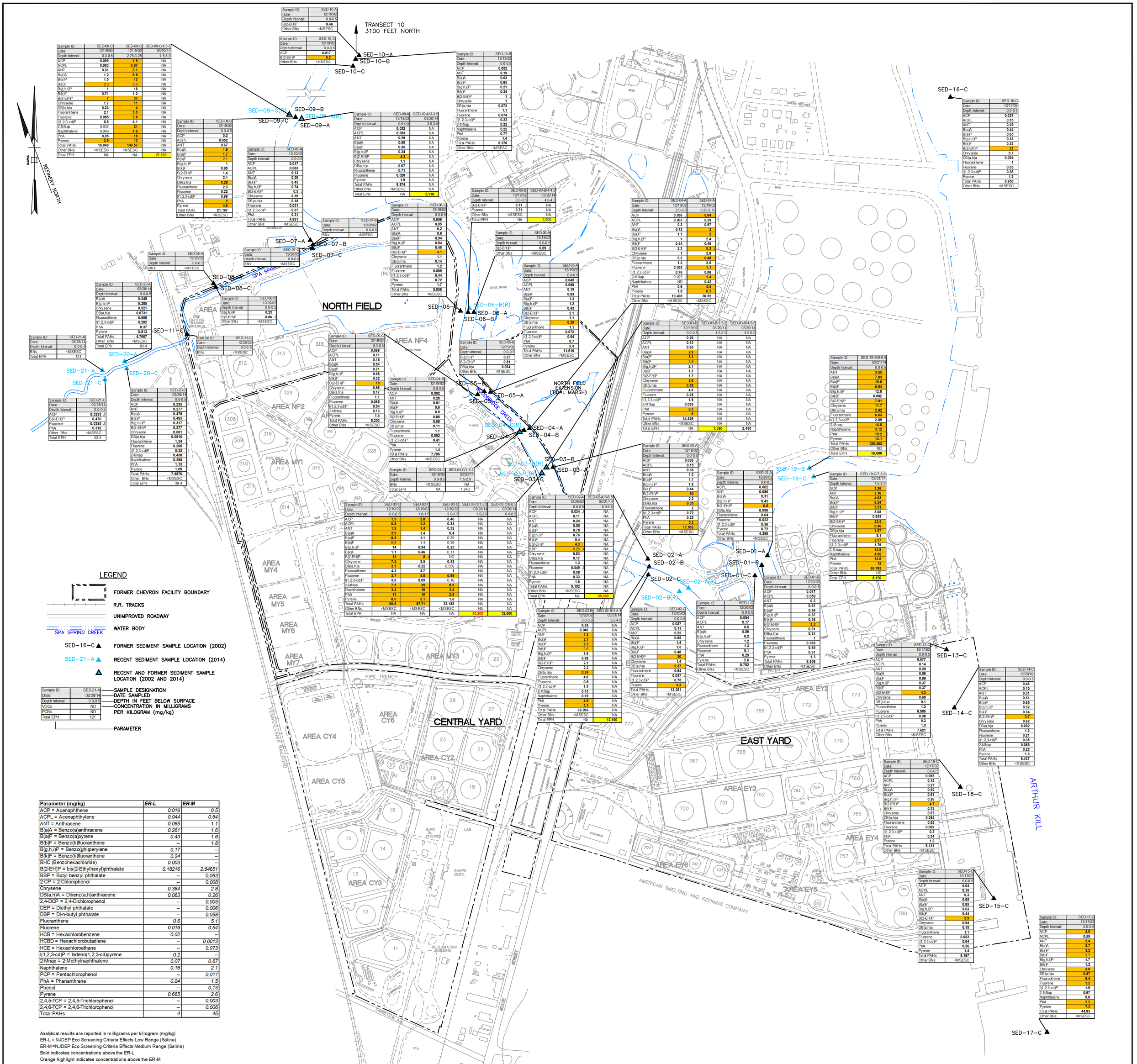
Table IV
Summary of Semi-Volatile Organic Compounds (SVOCs) in Sediment
Former Chevron Facility - Perth Amboy, New Jersey

		Sample No.:	SED-19-B/6-6.5	SED-19-C/7.5-8	SED-20-A	SED-20-C	SED-21-A	SED-21-C
		Date Sampled:	03/21/14	03/21/14	02/28/14	02/28/14	02/28/14	02/28/14
		Depth (ft):	6.0-6.5	7.5-8.0	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5
		LAB Sample ID:	JB62621-3	JB62621-4	JB60857-1	JB60857-2	JB60857-4	JB60857-3
		LAB:	Accutest, NJ	Accutest, NJ	Accutest, NJ	Accutest, NJ	Accutest, NJ	Accutest, NJ
Parameter (mg/kg)	***ER-L***	***ER-M***						
Acenaphthene	*0.016*	*0.5*	ND (0.076)	**1.26**	ND (0.011)	**0.235**	ND (0.0098)	**0.0235** J
Acenaphthylene	*0.044*	*0.64*	ND (0.084)	ND (0.11)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.013)
Acetophenone	--	--	ND (0.046)	ND (0.060)	ND (0.0065)	ND (0.0073)	ND (0.0060)	ND (0.0071)
Anthracene	*0.085*	*1.1*	**3.55**	**3.16**	0.0521	**0.277**	0.0268 J	0.0748
Atrazine	--	--	ND (0.052)	ND (0.067)	ND (0.0072)	ND (0.0082)	ND (0.0067)	ND (0.0079)
Benzaldehyde	--	--	ND (0.060)	ND (0.078)	ND (0.0084)	ND (0.0096)	ND (0.0078)	ND (0.0093)
Benzo(a)pyrene	*0.43*	*1.6*	**10.6**	**6.24**	0.376	**0.465**	0.199	0.166
Benzo(a)anthracene	*0.261*	*1.6*	**7.03**	**4.63**	**0.345**	**0.475**	0.17	0.151
Benzo(b)fluoranthene	--	*1.8*	**6.94**	**3.91**	0.541	0.608	0.245	0.217
Benzo(ghi)perylene	*0.17*	--	**12.8**	**5.08**	**0.285**	**0.317**	0.155	0.136
Benzo(k)fluoranthene	*0.24*	--	**0.882**	**0.853**	0.185	0.214	0.0922	0.0681
BHC (Benzohexachloride)	*0.003*	--	NA	NA	NA	NA	NA	NA
1,1-Biphenyl	*Product Limit*	--	ND (0.030)	ND (0.039)	ND (0.0043)	0.0959	ND (0.0039)	ND (0.0047)
bis(2-Chloroethoxy)methane	--	--	ND (0.11)	ND (0.14)	ND (0.015)	ND (0.017)	ND (0.014)	ND (0.016)
bis(2-Chloroethyl)ether	--	--	ND (0.079)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.012)
bis(2-Chloroisopropyl)ether	--	--	ND (0.078)	ND (0.10)	ND (0.011)	ND (0.012)	ND (0.010)	ND (0.012)
bis(2-Ethylhexyl)phthalate	*0.18216*	*2.64651*	**7.01**	**23.5**	0.158	**0.277**	0.115	**0.476**
4-Bromophenyl-phenylether	--	--	ND (0.095)	ND (0.12)	ND (0.013)	ND (0.015)	ND (0.012)	ND (0.015)
Butyl benzyl phthalate	--	*0.063*	ND (0.15)	ND (0.20)	ND (0.021)	ND (0.024)	ND (0.020)	ND (0.023)
Caprolactam	--	--	ND (0.083)	ND (0.11)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.013)
Carbazole	--	--	ND (0.12)	ND (0.16)	0.0641 J	0.207	0.0247 J	0.0355 J
4-Chloroaniline	--	--	ND (0.084)	ND (0.11)	ND (0.012)	ND (0.013)	ND (0.011)	ND (0.013)
4-Chloro-3-methyl phenol	--	--	ND (0.26)	ND (0.34)	ND (0.037)	ND (0.042)	ND (0.034)	ND (0.040)
2-Chloronaphthalene	--	--	ND (0.081)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.011)	ND (0.012)
2-Chlorophenol	--	*0.008*	ND (0.26)	ND (0.34)	ND (0.037)	ND (0.042)	ND (0.034)	ND (0.040)
4-Chlorophenyl-phenylether	--	--	ND (0.079)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.012)
Chrysene	*0.384*	*2.8*	**11.7**	**6.96**	**0.521**	**0.601**	0.25	0.21
Dibenz(a,h)anthracene	*0.063*	*0.26*	**2.92**	**1.67**	**0.0731**	**0.0816**	0.0382	0.0298 J
Dibenzofuran	--	--	ND (0.078)	ND (0.10)	ND (0.011)	0.22	ND (0.010)	0.0164 J
3,3'-Dichlorobenzidine	--	--	ND (0.067)	ND (0.086)	ND (0.0093)	ND (0.011)	ND (0.0086)	ND (0.010)
2,4-Dichlorophenol	--	*0.005*	ND (0.42)	ND (0.55)	ND (0.059)	ND (0.067)	ND (0.055)	ND (0.065)
Diethyl phthalate	--	*0.006*	ND (0.089)	ND (0.12)	ND (0.013)	ND (0.014)	ND (0.012)	ND (0.014)
2,4-Dimethyl phenol	--	--	ND (0.44)	ND (0.57)	ND (0.062)	ND (0.070)	ND (0.057)	ND (0.068)
Dimethyl phthalate	--	--	ND (0.092)	ND (0.12)	ND (0.013)	ND (0.015)	ND (0.012)	ND (0.014)
Di-n-butyl phthalate	--	*0.058*	ND (0.058)	ND (0.075)	ND (0.0081)	ND (0.0092)	ND (0.0075)	ND (0.0089)
4,6-Dinitro-o-cresol	--	--	ND (0.32)	ND (0.41)	ND (0.045)	ND (0.051)	ND (0.041)	ND (0.049)
4,6-Dinitro-2-methylphenol	--	--	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	--	--	ND (0.32)	ND (0.41)	ND (0.045)	ND (0.051)	ND (0.041)	ND (0.049)
Dinitrotoluene (2,4-2,6- mixture)	--	--	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	--	--	ND (0.11)	ND (0.15)	ND (0.016)	ND (0.018)	ND (0.015)	ND (0.018)
2,6-Dinitrotoluene	--	--	ND (0.10)	ND (0.13)	ND (0.014)	ND (0.016)	ND (0.013)	ND (0.015)
Di-n-octyl phthalate	--	--	ND (0.13)	ND (0.16)	ND (0.018)	ND (0.020)	ND (0.017)	ND (0.020)
1,4-Dioxane	--	--	ND (0.17)	ND (0.22)	ND (0.024)	ND (0.027)	ND (0.022)	ND (0.026)
Fluoranthene	*0.6*	*5.1*	**6.63**	**5.1**	**0.909**	**1.24**	0.365	0.368
Fluorene	*0.019*	*0.54*	ND (0.086)	**2.57**	0.0145 J	**0.208**	ND (0.011)	**0.0285** J
Hexachlorobenzene	*0.02*	--	ND (0.085)	ND (0.11)	ND (0.012)	ND (0.014)	ND (0.011)	ND (0.013)
Hexachlorobutadiene	--	*0.0013*	ND (0.073)	ND (0.094)	ND (0.010)	ND (0.012)	ND (0.0094)	ND (0.011)
Hexachlorocyclopentadiene	--	--	ND (0.27)	ND (0.35)	ND (0.037)	ND (0.042)	ND (0.035)	ND (0.041)
Hexachloroethane	--	*0.073*	ND (0.073)	ND (0.094)	ND (0.010)	ND (0.012)	ND (0.0094)	ND (0.011)
Indeno(1,2,3-cd)pyrene	*0.2*	--	**2.89**	**1.79**	**0.282**	**0.32**	0.143	0.101
Isophorone	--	--	ND (0.070)	ND (0.091)	ND (0.0099)	ND (0.011)	ND (0.0091)	ND (0.011)
2-Methylnaphthalene	*0.07*	*0.67*	**14.5**	**14.9**	ND (0.020)	**0.438**	ND (0.019)	ND (0.022)
2-Methylphenol	--	--	ND (0.30)	ND (0.39)	ND (0.042)	ND (0.047)	ND (0.039)	ND (0.046)
3&4-Methylphenol	--	--	ND (0.33)	ND (0.43)	ND (0.047)	ND (0.053)	ND (0.043)	ND (0.051)
Naphthalene	*0.16*	*2.1*	**3.12**	**4.06**	ND (0.010)	**0.268**	ND (0.0093)	ND (0.011)
2-Nitroaniline	--	--	ND (0.12)	ND (0.15)	ND (0.016)	ND (0.018)	ND (0.015)	ND (0.018)
3-Nitroaniline	--	--	ND (0.10)	ND (0.14)	ND (0.015)	ND (0.017)	ND (0.014)	ND (0.016)
4-Nitroaniline	--	--	ND (0.10)	ND (0.13)	ND (0.014)	ND (0.016)	ND (0.013)	ND (0.016)
Nitrobenzene	--	--	ND (0.076)	ND (0.098)	ND (0.011)	ND (0.012)	ND (0.0098)	ND (0.012)
2-Nitrophenol	--	--	ND (0.28)	ND (0.36)	ND (0.039)	ND (0.044)	ND (0.036)	ND (0.043)
4-Nitrophenol	--	--	ND (0.44)	ND (0.57)	ND (0.062)	ND (0.070)	ND (0.057)	ND (0.068)
n-Nitrosodi-n-propylamine	--	--	ND (0.064)	ND (0.083)	ND (0.0089)	ND (0.010)	ND (0.0083)	ND (0.0098)
n-Nitrosodiphenylamine	--	--	ND (0.16)	ND (0.20)	ND (0.022)	ND (0.025)	ND (0.020)	ND (0.024)
p-Chloroaniline	--	--	NA	NA	NA	NA	NA	NA
p-Chloro-m-cresol	--	--	NA	NA	NA	NA	NA	NA
Pentachlorophenol	--	*0.017*	ND (0.45)	ND (0.58)	ND (0.063)	ND (0.071)	ND (0.058)	ND (0.069)
Phenanthrene	*0.24*	*1.5*	**19.2**	**12.6**	**0.37**	**1.15**	0.13	**0.316**
Phenol	--	*0.13*	ND (0.28)	ND (0.36)	ND (0.038)	ND (0.044)	ND (0.036)	ND (0.042)
Pyrene	*0.665*	*2.6*	**13.1**	**12**	**0.813**	**1.09**	0.346	0.408
1,2,4,5-Tetrachlorobenzene	--	--	ND (0.080)	ND (0.10)	ND (0.011)	ND (0.013)	ND (0.010)	ND (0.012)
2,3,4,6-Tetrachlorophenol	--	--	ND (0.27)	ND (0.35)	ND (0.038)	ND (0.043)	ND (0.035)	ND (0.042)
2,4,5-Trichlorophenol	--	*0.003*	ND (0.30)	ND (0.39)	ND (0.043)	ND (0.048)	ND (0.039)	ND (0.047)
2,4,6-Trichlorophenol	--	*0.006*	ND (0.25)	ND (0.32)	ND (0.034)	ND (0.039)	ND (0.032)	ND (0.038)
Low Molecular Weight PAHs	--	--	40.37	38.55	0.4366	2.576	0.1568	0.4428
High Molecular Weight PAHs	--	--	86.092	48.233	4.3301	5.4116	2.0034	1.8549
Total PAHs	*4*	*45*	**126.462**	**86.783**	**4.7667**	**7.9876**	2.1602	2.2977
Total SVOC TIC	--	--	336 J	221 J	3.06 J	2.95 J	4.91 J	1.27 J
Total VOC and SVOC TICs	--	--	533 J	493 J	3.06 J	2.95 J	4.91 J	1.27 J

ER-L = NJDEP Eco Screening Criteria Effects Low Range (Saline)
ER-M =NJDEP Eco Screening Criteria Effects Medium Range (Saline)
Bold indicates concentrations above the ER-L
Bold and Underlined indicates concentrations above the ER-M
ND = Not Detected
NA = Not Analyzed
J = Estimated value below sample reporting limit

ATTACHMENT 4:

REVISED FIGURE 4 of the 2014 SUPPLEMENTAL ECOLOGICAL EVALUATION REPORT



Sample ID:	SED-09-C	SED-09-C	SED-09-C/4.5-5
Date:	12/19/02	12/19/02	03/20/14
Depth Interval:	0.0-0.5	2.75-3.25	4.5-5.0
ACP	**0.099**	**1.9**	NA
ACPL	**0.083**	**0.97**	NA
ANT	**0.31**	**3.1**	NA
B(a)A	**1.2**	**6.5**	NA
B(a)P	**1.5**	**13**	NA
B(b)F	2.3	9.6	NA
B(g,h,i)P	**1**	**18**	NA
B(k)F	**0.71**	**1.2**	NA
B(2-EH)P	**7**	**37**	NA
Chrysene	**1.7**	**11**	NA
DB(a,h)a	**0.23**	**4**	NA
Fluoranthene	**2.1**	**5.5**	NA
Fluorene	**0.085**	**3.8**	NA
I(1,2,3-cd)P	**0.8**	**4.1**	NA
2-MNap	0.032	**21**	NA
Naphthalene	0.049	**5.9**	NA
PhA	**0.95**	**18**	NA
Pyrene	**2.9**	**13**	NA
Total PAHs	**16.048**	**140.57**	NA
Other BNs	<MSESC	<MSESC	NA
Total EPH	NA	NA	**27,700**

Sample ID:	SED-10-A
Date:	12/19/02
Depth Interval:	0.0-0.5
B(2-EH)P	**0.46**
Other BNs	<MSESC

Sample ID:	SED-10-C
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.017**
B(2-EH)P	**5.2**
Other BNs	<MSESC

Sample ID:	SED-10-B
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.052**
ANT	**0.19**
B(a)A	**0.63**
B(a)P	**0.65**
B(g,h,i)P	**0.21**
B(k)F	**0.34**
B(2-EH)P	**1** J
Chrysene	**1**
DB(a,h)a	**0.073**
Fluoranthene	**1.1**
Fluorene	**0.074**
I(1,2,3-cd)P	**0.22**
2-MNap	**0.22**
Naphthalene	**0.22**
PhA	**0.77**
Pyrene	**1.4**
Total PAHs	**8.276**
Other BNs	<MSESC

Sample ID:	SED-09-B
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.2**
ACPL	**0.052**
ANT	**0.57**
B(a)A	**1.9**
B(a)P	**1.7**
B(b)F	2.1
B(g,h,i)P	**1**
B(k)F	**0.95**
B(2-EH)P	**1.4**
Chrysene	**2.1**
DB(a,h)a	**0.28**
Fluoranthene	**2.3**
Fluorene	**0.22**
I(1,2,3-cd)P	**0.99**
PhA	**2**
Pyrene	**4.6**
Total PAHs	**21.197**
Other BNs	<MSESC

Sample ID:	SED-09-A	SED-09-A/3-3.5
Date:	12/19/02	03/20/14
Depth Interval:	0.0-0.5	3.0-3.5
ACP	**0.032**	NA
ACPL	**0.053**	NA
ANT	**0.29**	NA
B(a)A	**0.69**	NA
B(a)P	**0.55**	NA
B(g,h,i)P	**0.24**	NA
B(2-EH)P	**4.2**	NA
Chrysene	**1.1**	NA
DB(a,h)a	**0.07**	NA
Fluoranthene	**0.71**	NA
Fluorene	**0.028**	NA
Pyrene	**1.9**	NA
Total PAHs	**6.874**	NA
Other BNs	<MSESC	NA
Total EPH	NA	**5,110**

Sample ID:	SED-07-A
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.017** J
ACPL	**0.083**
ANT	**0.13**
B(a)A	**0.29**
B(a)P	**0.45**
B(g,h,i)P	**0.74**
B(2-EH)P	**0.5** J
Chrysene	**0.39**
DB(a,h)a	**0.15**
Fluorene	**0.031**
I(1,2,3-cd)P	**0.37**
PhA	**0.31**
Total PAHs	**4.891**
Other BNs	<MSESC

Sample ID:	SED-07-B
Date:	12/20/02
Depth Interval:	0.0-0.5
BNs	<MSESC

Sample ID:	SED-07-C
Date:	12/20/02
Depth Interval:	0.0-0.5
BNs	<MSESC

Sample ID:	SED-08-A
Date:	12/20/02
Depth Interval:	0.0-0.5
BNs	<MSESC

Sample ID:	SED-08-C
Date:	12/20/02
Depth Interval:	0.0-0.5
B(g,h,i)P	**0.23**
B(2-EH)P	**0.86** J
Other BNs	<MSESC

Sample ID:	SED-06-C
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.056**
ACPL	**0.05**
ANT	**0.2**
B(a)A	**0.8**
B(a)P	**0.94**
B(g,h,i)P	**0.54**
B(k)F	**0.46**
B(2-EH)P	**3.1**
Chrysene	**1.1**
DB(a,h)a	**0.14**
Fluoranthene	**1.2**
Fluorene	**0.059**
I(1,2,3-cd)P	**0.44**
PhA	**0.72**
Pyrene	**1.7**
Total PAHs	**9.858**
Other BNs	<MSESC

Sample ID:	SED-06-B	SED-06-B/4-4.5
Date:	12/19/02	03/20/14
Depth Interval:	0.0-0.5	4.0-4.5
B(2-EH)P	**0.71** J	NA
Pyrene	**0.71**	NA
Other BNs	<MSESC	NA
Total EPH	NA	3,200

Sample ID:	SED-06-A
Date:	12/19/02
Depth Interval:	0.0-0.5
B(2-EH)P	**0.69**
Other BNs	<MSESC

Sample ID:	SED-05-A
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.045**
ACPL	**0.088**
ANT	**0.19**
B(a)A	**0.83**
B(a)P	**1.3**
B(g,h,i)P	**1.2**
B(k)F	**0.43**
B(2-EH)P	**2.1** J
Chrysene	**1.1**
DB(a,h)a	**0.28**
Fluoranthene	**1.1**
Fluorene	**0.072**
I(1,2,3-cd)P	**0.64**
PhA	**0.7**
Pyrene	**2.3**
Total PAHs	**11.616**
Other BNs	<MSESC

Sample ID:	SED-05-B
Date:	12/19/02
Depth Interval:	0.0-0.5
B(g,h,i)P	**0.27**
B(2-EH)P	**0.51**
DB(a,h)a	**0.064**
Other BNs	<MSESC

Sample ID:	SED-05-C
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.068**
ACPL	**0.11**
ANT	**0.18**
B(a)A	**0.54**
B(a)P	**0.71**
B(g,h,i)P	**0.68**
B(k)F	**0.32**
B(2-EH)P	**18**
Chrysene	**0.96**
DB(a,h)a	**0.17**
Fluoranthene	**1.1**
Fluorene	**0.065**
I(1,2,3-cd)P	**0.54**
2-MNap	**0.13**
Pyrene	**1.4**
Total PAHs	**8.253**
Other BNs	<MSESC

Sample ID:	SED-04-B
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.092**
ANT	**0.28**
B(a)A	**0.51**
B(a)P	**0.6**
B(g,h,i)P	**0.5**
B(2-EH)P	**0.85**
Chrysene	**0.68**
DB(a,h)a	**0.11**
Fluoranthene	**1.1**
Fluorene	**0.092**
I(1,2,3-cd)P	**0.41**
PhA	**1**
Pyrene	**1.4**
Total PAHs	**7.796**
Other BNs	<MSESC

Sample ID:	SED-04-C	SED-04-C/1.5-2
Date:	12/19/02	03/20/14
Depth Interval:	0.0-0.5	1.5-2.0
BNs	<MSESC	NA
Total EPH	NA	1,640

Sample ID:	SED-04-A
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.036**
ACPL	**0.063** J
ANT	**0.2**
B(a)A	**0.72**
B(a)P	**1.1**
B(g,h,i)P	**1**
B(k)F	**0.44**
B(2-EH)P	**2.3**
Chrysene	**1**
DB(a,h)a	**0.2**
Fluoranthene	**1.2**
Fluorene	**0.052**
I(1,2,3-cd)P	**0.76**
2-MNap	0.027 J
Naphthalene	ND
PhA	**0.6**
Pyrene	**1.8**
Total PAHs	**10.498**
Other BNs	<MSESC

Sample ID:	SED-03-B	SED-03-B/1.5-2	SED-03-B/4.5-5
Date:	12/19/02	03/20/14	03/20/14
Depth Interval:	0.0-0.5	1.5-2.0	4.5-5.0
ACP	**0.26**	NA	NA
ACPL	**0.13**	NA	NA
ANT	**0.95**	NA	NA
B(a)A	**2.9**	NA	NA
B(a)P	**3.3**	NA	NA
B(b)F	3.8	NA	NA
B(g,h,i)P	**2.1**	NA	NA
B(k)F	**1.3**	NA	NA
B(2-EH)P	**1.7**	NA	NA
Chrysene	**3.6**	NA	NA
DB(a,h)a	**0.59**	NA	NA
Fluoranthene	**4.8**	NA	NA
Fluorene	**0.25**	NA	NA
I(1,2,3-cd)P	**1.9**	NA	NA
2-MNap	**0.093**	NA	NA
PhA	**2.5**	NA	NA
Pyrene	**6**	NA	NA
Total PAHs	**34.559**	NA	NA
Other BNs	<MSESC	NA	NA
Total EPH	NA	**7,390**	**2,430**

Sample ID:	SED-03-A
Date:	12/19/02
Depth Interval:	0.0-0.5
ACP	**0.086**
ACPL	**0.15**
ANT	**0.36**
B(a)A	**1.3**
B(a)P	**1.1**
B(g,h,i)P	**1.6**
B(k)F	**0.44**
B(2-EH)P	**50**
Chrysene	**2.3**
DB(a,h)a	**0.35**
Fluoranthene	**2**
I(1,2,3-cd)P	**0.72**
PhA	**0.25**
Pyrene	**5.2**
Total PAHs	**17.563**
Other BNs	<MSESC

Sample ID:	SED-01-A
Date:	12/20/02
Depth Interval:	0.0-0.5
ACPL	**0.062**
ANT	**0.086**
B(a)A	**0.31**
B(g,h,i)P	**0.42**
B(2-EH)P	**6.5**
DB(a,h)a	**0.090**
Fluoranthene	**0.64**
Fluorene	**0.022**
I(1,2,3-cd)P	**0.36**
Pyrene	**0.72**
Total PAHs	**4.296**
Other BNs	<MSESC

Sample ID:	SED-01-B
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.077**
ACPL	**0.059**
ANT	**0.2**
B(a)A	**0.61**
B(a)P	**0.86**
B(g,h,i)P	**0.87**
B(k)F	**0.36**
B(2-EH)P	**3.2**
Chrysene	**0.91**
DB(a,h)a	**0.21**
Fluoranthene	**1**
Fluorene	**0.069**
I(1,2,3-cd)P	**0.64**
PhA	**0.61**
Pyrene	**1.3**
Total PAHs	**8.856**
Other BNs	<MSESC

Sample ID:	SED-01-C
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.084**
ACPL	**0.17**
ANT	**0.5**
B(a)A	**0.59**
B(g,h,i)P	**0.2**
Chrysene	**1.2**
Fluoranthene	**1.3**
Fluorene	**0.1**
PhA	**0.29**
Pyrene	**2.6**
Total PAHs	**8.702**
Other BNs	<MSESC

Sample ID:	SED-02-A	SED-02-A/6-6.5
Date:	12/20/02	03/21/14
Depth Interval:	0.0-0.5	6.0-6.5
ACP	**0.034** J	NA
ACPL	**0.11**	NA
ANT	**0.24**	NA
B(a)A	**0.55**	NA
B(a)P	**0.78**	NA
B(g,h,i)P	**0.76**	NA
B(k)F	**0.4**	NA
B(2-EH)P	**4.3**	NA
BBP	0.25 J	NA
Chrysene	**0.83**	NA
DB(a,h)a	**0.17**	NA
Fluoranthene	**1.3**	NA
Fluorene	**0.049**	NA
I(1,2,3-cd)P	**0.58**	NA
PhA	**0.33**	NA
Pyrene	**1.6**	NA
Total PAHs	**9.102**	NA
Other BNs	<MSESC	NA
Total EPH	NA	**59,300**

Sample ID:	SED-02-B	SED-02-B/3.5-4
Date:	12/20/02	03/21/14
Depth Interval:	0.0-0.5	3.5-4.0
ACP	**0.45**	NA
ACPL	**0.046** J	NA
ANT	**1.3**	NA
B(a)A	**2.1**	NA
B(a)P	**2.2**	NA
B(b)F	2.6	NA
B(g,h,i)P	**1.6**	NA
B(k)F	**0.99**	NA
B(2-EH)P	**2.1**	NA
Chrysene	**2.3**	NA
DB(a,h)a	**0.34**	NA
Fluoranthene	**4.8**	NA
Fluorene	**0.5**	NA
I(1,2,3-cd)P	**1.4**	NA
2-MNap	**0.15**	NA
Naphthalene	**0.19**	NA
PhA	**4.9**	NA
Pyrene	**5.1**	NA
Total PAHs	**30.966**	NA
Other BNs	<MSESC	NA
Total EPH	NA	**12,100**

Sample ID:	SED-02-C
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.037** J
ACPL	**0.11**
ANT	**0.22**
B(a)A	**0.65**
B(a)P	**1.4**
B(g,h,i)P	**1.5**
B(k)F	**0.48**
B(2-EH)P	**20**
Chrysene	**1.4**
DB(a,h)a	**0.37**
Fluoranthene	**0.94**
Fluorene	**0.037** J
I(1,2,3-cd)P	**0.75**
Pyrene	**3.3**
Total PAHs	**13.021**
Other BNs	<MSESC

Sample ID:	SED-19-B/6-6.5
Date:	03/21/14
Depth Interval:	6.0-6.5
ANT	**3.55**
B(a)A	**7.03**
B(a)P	**10.6**
B(b)F	**6.94**
B(g,h,i)P	**12.8**
B(k)F	**0.882**
B(2-EH)P	**7.01**
Chrysene	**11.7**
DB(a,h)a	**2.92**
Fluoranthene	**6.63**
I(1,2,3-cd)P	**2.89**
2-MNap	**14.5**
Naphthalene	**3.12**
PhA	**19.2**
Pyrene	**13.1**
Total PAHs	**126.462**
Other BNs	ND
Total EPH	**16,000**

Sample ID:	SED-19-C/7.5-8
Date:	03/21/14
Depth Interval:	7.5-8.0
ACP	**1.26**
ANT	**3.16**
B(a)A	**4.63**
B(a)P	**6.24**
B(b)F	**3.91**
B(g,h,i)P	**5.08**
B(k)F	**0.853**
B(2-EH)P	**23.5**
Chrysene	**6.96**
DB(a,h)a	**1.67**
Fluoranthene	**5.1**
Fluorene	**2.57**
I(1,2,3-cd)P	**1.79**
2-MNap	**14.9**
Naphthalene	**4.06**
PhA	**12.6**
Pyrene	**12**
Total PAHS	**86.783**
Other BNs	ND
Total EPH	**8,170**

Sample ID:	SED-16-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.027**
ACPL	**0.15**
ANT	**0.25**
B(a)A	**0.44**
B(a)P	**0.65**
B(g,h,i)P	**0.33**
B(k)F	**0.33**
B(2-EH)P	**21**
Chrysene	**0.7**
DB(a,h)a	**0.094**
Fluoranthene	**1**
Fluorene	**0.05**
I(1,2,3-cd)P	**0.36**
Pyrene	**1.3**
Total PAHs	**6.956**
Other BNs	<MSESC

Sample ID:	SED-13-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.077**
ACPL	**0.14**
ANT	**0.29**
B(a)A	**0.56**
B(a)P	**0.66**
B(g,h,i)P	**0.37**
B(k)F	**0.37**
B(2-EH)P	**4.5**
Chrysene	**0.68**
DB(a,h)a	**0.1**
Fluoranthene	**1.2**
Fluorene	**0.085**
I(1,2,3-cd)P	**0.38**
PhA	**0.3**
Pyrene	**1.3**
Total PAHs	**7.621**
Other BNs	<MSESC

Sample ID:	SED-14-C
Date:	12/20/02
Depth Interval:	0.0-0.5
ACP	**0.46**
ACPL	**0.15**
ANT	**0.31**
B(a)A	**0.61**
B(a)P	**0.65**
B(g,h,i)P	**0.32**
B(k)F	**0.34**
B(2-EH)P	**3.7**
Chrysene	**0.62**
DB(a,h)a	**0.092**
Fluoranthene	**1.3**
Fluorene	**0.21**
I(1,2,3-cd)P	**0.35**
2-MNap	**0.085**
PhA	**0.28**
Pyrene	**1.6**
Total PAHs	**8.437**
Other BNs	<MSESC

Sample ID:	SED-18-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.065**
ACPL	**0.12**
ANT	**0.27**
B(a)A	**0.52**
B(a)P	**0.61**
B(g,h,i)P	**0.28**
B(2-EH)P	**4.7**
B(k)F	**0.33**
Chrysene	**0.67**
DB(a,h)a	**0.084**
Fluoranthene	**0.92**
Fluorene	**0.069**
I(1,2,3-cd)P	**0.3**
PhA	**0.34**
Pyrene	**1.2**
Total PAHs	**6.131**
Other BNs	<MSESC

Sample ID:	SED-15-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**0.04**
ACPL	**0.15**
ANT	**0.3**
B(a)A	**0.65**
B(a)P	**0.85**
B(g,h,i)P	**0.63**
B(k)F	**0.44**
B(2-EH)P	**3.9**
Chrysene	**0.94**
DB(a,h)a	**0.15**
Fluoranthene	**1.1**
Fluorene	**0.053**
I(1,2,3-cd)P	**0.54**
PhA	**0.36**
Pyrene	**1.4**
Total PAHs	**9.167**
Other BNs	<MSESC

Sample ID:	SED-17-C
Date:	12/17/02
Depth Interval:	0.0-0.5
ACP	**3.9**
ACPL	**0.59**
ANT	**2.4**
B(a)A	**3.7**
B(a)P	**3.2**
B(b)F	3.7
B(g,h,i)P	**1.7**
B(k)F	**1.2**
Chrysene	**3.8**
DB(a,h)a	**0.47**
Fluoranthene	**6.4**
Fluorene	**1.2**
I(1,2,3-cd)P	**1.6**
2-MNap	**0.67**
Naphthalene	**0.8**
PhA	**2.2**
Pyrene	**7.3**
Total PAHs	**44.83**
Other BNs	<MSESC

Parameter (mg/kg)	ER-L	ER-M
ACP = Acenaphthene	0.016	0.5
ACPL = Acenaphthylene	0.044	0.64
ANT = Anthracene	0.085	1.1
B(a)A = Benzo(a)anthracene	0.261	1.6
B(a)P = Benzo(a)pyrene	0.43	1.6
B(b)F = Benzo(b)fluoranthene	–	1.8
B(g,h,i)P = Benzo(ghi)perylene	0.17	–
B(k)F = Benzo(k)fluoranthene	0.24	–
BHC (Benzohexachloride)	0.003	–
B(2-EH)P = bis(2-Ethylhexyl)phthalate	0.18216	2.64651
BBP = Butyl benzyl phthalate	–	0.063
2-CP = 2-Chlorophenol	–	0.008
Chrysene	0.384	2.8
DB(a,h)A = Dibenz(a,h)anthracene	0.063	0.26
2,4-DCP = 2,4-Dichlorophenol	–	0.005
DEP = Diethyl phthalate	–	0.006
DBP = Di-n-butyl phthalate	–	0.058
Fluoranthene	0.6	5.1
Fluorene	0.019	0.54
HCB = Hexachlorobenzene	0.02	–
HCBD = Hexachlorobutadiene	–	0.0013
HCE = Hexachloroethane	–	0.073
I(1,2,3-cd)P = Indeno(1,2,3-cd)pyrene	0.2	–
2-Mnap = 2-Methylnaphthalene	0.07	0.67
Naphthalene	0.16	2.1
PCP = Pentachlorophenol	–	0.017
PhA = Phenanthrene	0.24	1.5
Phenol	–	0.13
Pyrene	0.665	2.6
2,4,5-TCP = 2,4,5-Trichlorophenol	–	0.003
2,4,6-TCP = 2,4,6-Trichlorophenol	–	0.006
Total PAHs	4	45

Analytical results are reported in milligrams per killogram (mg/kg)
ER-L = NJDEP Eco Screening Criteria Effects Low Range (Saline)
ER-M =NJDEP Eco Screening Criteria Effects Medium Range (Saline)
Bold indicates concentrations above the ER-L
Orange highlight indicates concentrations above the ER-M
Orange highlight and Bold indicates concentrations above the ER-L and ER-M
<MSESC = Value is less than Most Stringent Ecological Screening Criteria
J = estimated value below sample reporting limit
ND = Not Detected
All samples were not analyzed for BHC (Benzohexachloride)

Petroleum Hydrocarbon Analytes (EPH/TPHC):
Yellow Highlight = Greater than 1,700 ppm but below 4,000 ppm (Lower Terrestrial Ecological Screening Criteria)
Yellow Highlight (Bold) = Greater than 4,000 ppm but below 17,000 ppm (Upper Terrestrial Ecological Screening Criteria)
Yellow Highlight (Bold/Red) = Greater than 17,000 ppm (Residual/free product threshold for petroleum hydrocarbon mixtures other than No. 2 fuel oil and diesel)
EPH Product Determination = NJDEP's residual/free product limit for Category-2 discharge
EPH Trigger Level = NJDEP's trigger for development of sample-specific human health-based criterion for Category-2 discharge

NO.	DESCRIPTION	BY	DATE
0	REVISIONS OF FIGURE BOXES PER SUPPLEMENTAL REVIEW (SED-01-C, SED-19-B, SED-19-C, SED-20-A, SED-20-C)	EO/PW	08/19/19

TRC ENVIRONMENTAL CORP.
41 Spring Street
New Providence, New Jersey 07974

SEDIMENT ANALYTICAL RESULTS
SVOCs AND EPH

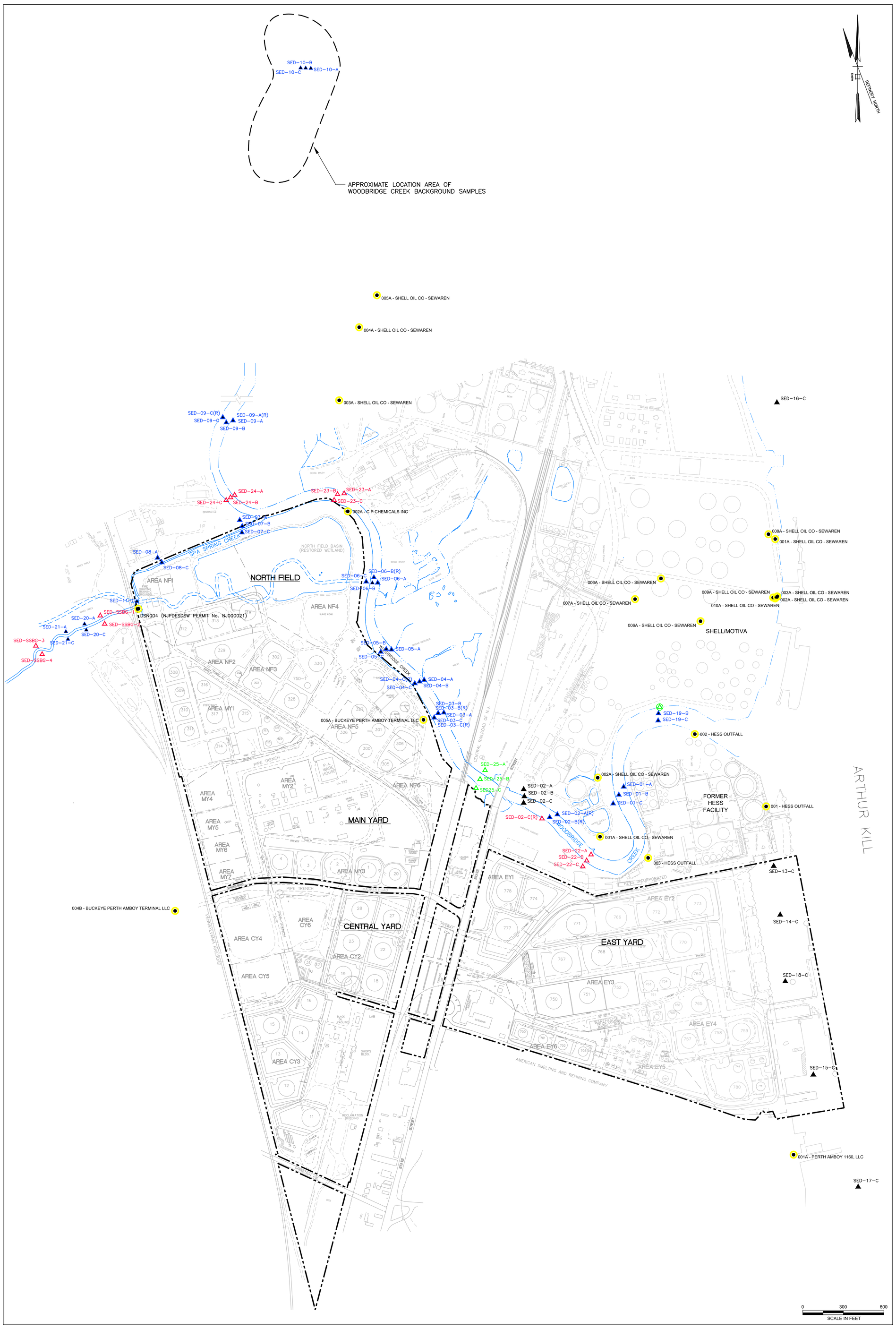
CHEVRON FACILITY - PERTH AMBOY, NJ

JOB NO. 890 - 194098

TR/ODL | DATE: OCTOBER 2014 | FIGURE: 4

FILE: M:\CAD FILES\VISION PROJECTS\194098\PHASE 000003\FIGURE 4 – SEDIMENT BNS AND EPH_081919_EO EDIT.DWG, DATE: 08/20/2019 11:21:27AM

FIGURES



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

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.
[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field.
[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler.

LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- SEDIMENT SAMPLE LOCATION (2002 AND 2014)
- PROPOSED SEDIMENT SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE LOCATION TO BE REVISITED
- PROPOSED SEDIMENT LOCATION LIMITED TO MANUAL SURFACE SAMPLING (0 - 0.5 FEET) DUE TO BURIED UTILITIES. LOCATION SUBJECT FOR APPROVAL FROM RESPECTIVE PIPELINE COMPANIES
- REQUESTED SEDIMENT LOCATION NOT ACCESSIBLE
- NJPDES DISCHARGE POINT

NOTES:

1. ALL SAMPLING LOCATIONS SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND ACCESSIBILITY.
2. ALL LOCATIONS ARE UNDERSTOOD TO BE WITHIN LIMITS OF WATERWAYS - MORE PRECISE LOCATION INFORMATION WILL BE DETAILED IN SUPPLEMENTAL REPORT.

NO.	BY	DATE	REVISION	APP'D
2	KAL	8/21/19	UPDATED BASED ON AUSGUST 7, 2019 USEPA MEETING	RL
1	MG	6/26/19	UPDATED BASED ON USEPA'S MARCH 1, 2019 COMMENTS TO NOVEMBER 2018 SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN, INCLUDING 5 ADDITIONAL SAMPLE POINTS	WC

PROJECT:
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:
PROPOSED SEDIMENT SAMPLE LOCATIONS

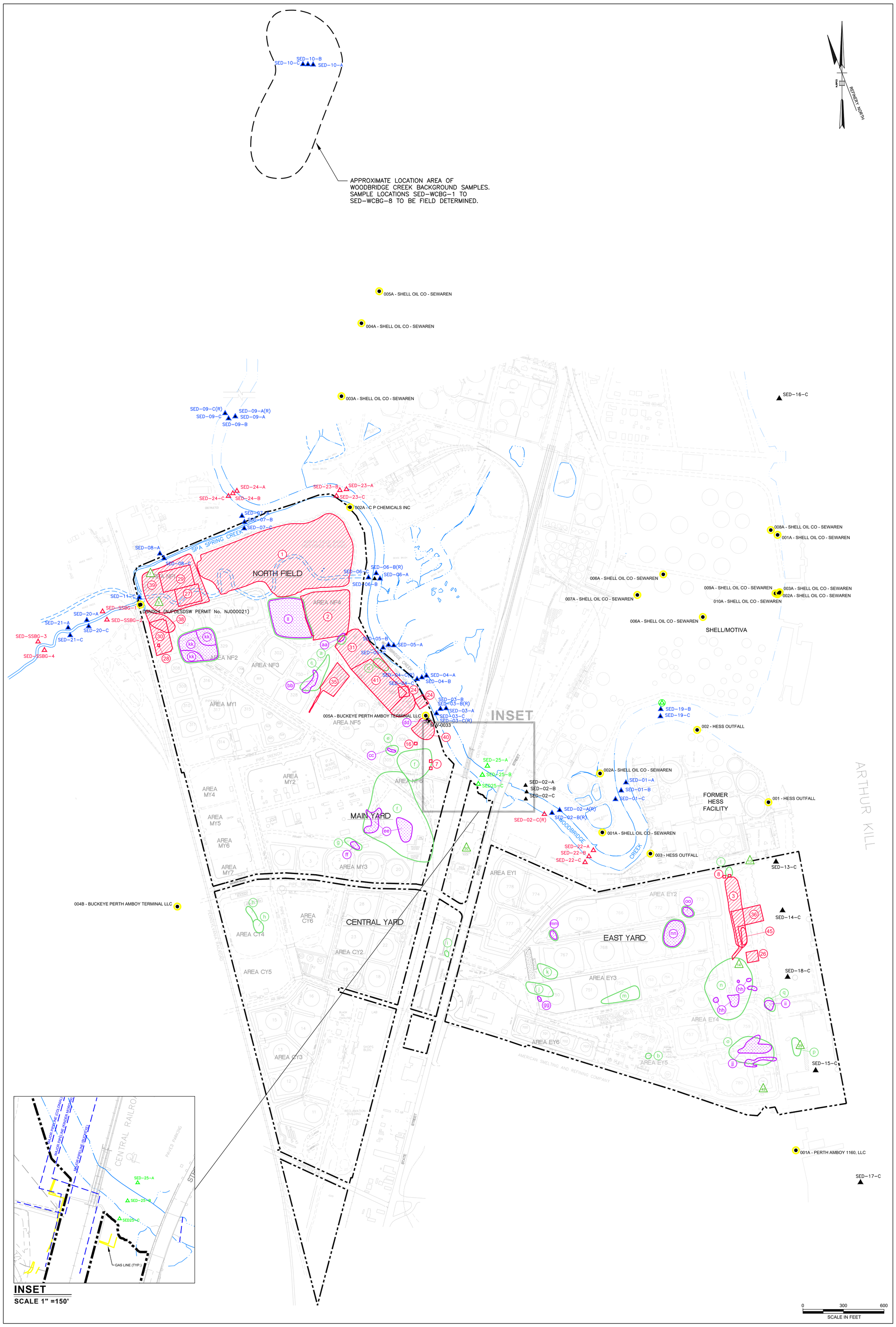
DRAWN BY:	M. GIAMBATTISTA	PROJ. NO.:	------
CHECKED BY:	K. LOCKARD		
APPROVED BY:	W. CORDASCO		
DATE:	JUNE 2019		

FIGURE 2

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

FILE NO.: FIGURE 2_082119.dwg

30x42 --- USER: PWanfried --- ATTACHED XREF'S: --- ATTACHED IMAGES: J8A13; J8A14; J8A15; J8C1; J8C2; J8C3; J8C5; J8C6; J8C7;
DRAWING NAME: M:\Cad Files\WORK\890\2019\RTC FSAP\ FIGURE 2A_082119.dwg --- PLOT DATE: August 21, 2019 - 5:44PM --- LAYOUT: FIGURE 2A



INSET
SCALE 1" =150'

LEGEND

- FORMER CHEVRON PERTH AMBOY FACILITY BOUNDARY
- PIPELINE CROSSING LOCATIONS
- FORMER SEDIMENT SAMPLE LOCATION (2002 AND 2014)
- PROPOSED SEDIMENT SAMPLE LOCATION
- FORMER (2002 AND 2014) SEDIMENT SAMPLE LOCATION TO BE REVISITED
- PROPOSED SEDIMENT LOCATION LIMITED TO MANUAL SURFACE SAMPLING (0 - 0.5 FEET) DUE TO BURIED UTILITIES. LOCATION SUBJECT FOR APPROVAL FROM RESPECTIVE PIPELINE COMPANIES
- REQUESTED SEDIMENT LOCATION NOT ACCESSIBLE
- NJPDES SURFACE WATER DISCHARGE POINT
- CURRENT EXTENT OF LNAPL
- FORMER EXTENT OF LNAPL

NOTES:

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

SOLID WASTE MANAGEMENT UNITS (SWMUs)*

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

AREAS OF CONCERN (AOCs)*

- 5 PETROLEUM SUBSTANCE NEAR UGST E3
- 7 TARRY MATERIAL AT MW-13
- 13 B-11 OILY FILL AREA
- 14 GWQAP OIL FILL AREA III
- 25 5 BERTH COAL TAR
- 45 TANK BASIN 748
- 26 BULK STATION

FORMER LNAPL AREAS

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

CURRENT LNAPL AREAS

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

PROPOSED SEDIMENT SAMPLES

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

[1] - TBD indicates the 6-inch sample interval To Be Determined based on field detectable evidence of contamination, or if no evidence, from 2-2.5 feet below the sediment surface or from 0.5-foot interval above parent material, whichever is first encountered.
[2] - Samples will be collected in the vicinity of the SED-10 transect, exact locations will be determined in the field.
[3] - Pending utility approval, TRC will collect a shallow sediment sample using a Ponar Sampler.

NO.	BY	DATE	REVISION	APP'D
2	KAL	8/21/19	UPDATED BASED ON AUSGUST 7, 2019 USEPA MEETING	
1	MG	6/26/19	UPDATED BASED ON USEPA'S MARCH 1, 2019 COMMENTS TO NOVEMBER 2018 SUPPLEMENTAL FIELD SAMPLING AND ANALYSIS PLAN, INCLUDING 5 ADDITIONAL SAMPLE POINTS	WC

PROJECT:
CHEVRON FACILITY
PERTH AMBOY, NEW JERSEY

TITLE:
PROPOSED SEDIMENT SAMPLE LOCATIONS AND SUPPLEMENTAL INFORMATION

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

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

FILE NO.: FIGURE 2A_082119.dwg