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Date: September 18, 2019

To: Rob Ede
Hahn and Associates Inc.

From: Jeanne Peterson
Project Manager, AQA

Subject: Data Validation
Gasco Mult 802 Decommissioning
Apex Laboratories, LLC Work Order A9E0677

SUMMARY

Level II (i.e., EPA Stage 2A) data validation was performed on the data for one solid sample prepared and analyzed using approved procedures for methods SW846 8260C (VOCs), SW846 8270D (SVOCs), NWTPH-Gx (gasoline range organics [GRO]), NWTPH-Dx (diesel and oil), SW846 6020A (metals by ICPMS), and D7511-12 (total cyanide). Data were reported for all requested analytes.

The analytical data were evaluated in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (October 1999) and the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (February 1994) (NFG, collectively), and the applicable methods.

In general, the data are valid as reported. No data were rejected. Other qualifiers were applied to the data as specified in the Data Qualifiers section below.

See attached data validation spreadsheets for supporting documentation on the data review and validation.

SAMPLES

The sample included in this validation is listed below.

Sample ID	APEX Sample ID	Analysis	Matrix
2708-190520-006	A9E0677-01	VOCs, SVOCs, GRO, DRO, Total Metals, Total CN	Solid

DATA QUALIFIERS (see following sections for detailed explanations)

Sample ID	Method	Analyte	Qualifier	Qualifier Code	Reason for Qualification
2708-190520-006	8260C	Methylene chloride	UJ	10	Low laboratory control sample recovery
	6020A	Barium	J	8, 9	Low matrix spike recovery and poor duplicate precision
		Iron Zinc	J	8	Low matrix spike recovery
		Nickel	UJ	9	Poor duplicate precision
	D7511-12	Total cyanide	J	8	High and low matrix spike recovery

DISCUSSION

Sample Shipping/Receiving

All COC, analysis request, and sample receipt documentation was complete and correct with the following exception.

The sample receipt section of the COCs was not completed; the information was documented on the Cooler Receipt Form.

Holding Times and Preservation

The sample was properly preserved and analyzed within the prescribed holding times.

Blanks

No target analytes were detected in the method blanks. Field blanks were not collected with the sample in this work order.

Surrogates

All surrogate recoveries were within laboratory QC acceptance criteria with the following exceptions.

Method 8270D

The surrogates were diluted out of samples 2708-190520-006 (10000X) and 2708-190520-006 DUP (10000X). No sample results were qualified.

Method NWTPH-Dx

The surrogates were diluted out of sample 2708-190520-006 (100X). No sample results were qualified.

Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

The LCS/LCSD analyses met laboratory QC acceptance criteria with the following exceptions.

Method 8260C

The LCS recoveries were > the upper acceptance limit for bromoform; carbon tetrachloride; dichlorofluoromethane; and 2,2-dichloropropane. The associated sample results were non-detects and not affected by the high bias and, therefore, were not qualified based on professional judgment.

The LCS recovery was < the lower acceptance limit but ≥30% for methylene chloride. The associated sample result was a non-detect and, therefore, was **qualified UJ**.

Method 8270D

The LCS recoveries were > the upper acceptance limit for 2,4-dinitrophenol; 4,6-dinitro-2-methylphenol; and 3,3'-dichlorobenzidine. The associated sample results were non-detects and not affected by the high bias and, therefore, were not qualified based on professional judgment.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met laboratory QC acceptance criteria with the following exceptions.

Method 8260C

It should be noted that the MS analysis was performed on a non-project sample.

Methods 8270D, NWTPH-Gx, and NWTPH-Dx

An MS analysis was not performed with the sample in this work order; therefore, matrix-specific accuracy data were not available.

Method 6020A

The MS recoveries were < the lower acceptance limit but ≥10% for barium, iron, and zinc. The associated sample results were detects and, therefore, were **qualified J**.

The MS recovery was outside of the acceptance limits for manganese. The parent sample concentration was >4X the spike amount; therefore, no sample results were qualified based on professional judgment.

It should be noted that the MS analysis was performed on a non-project sample.

Method D7511-12

The MS recovery was < the lower acceptance limit but ≥10% and the MSD recovery was > the upper acceptance limit for total cyanide. The associated sample result was a detect and, therefore, was **qualified J**.

Laboratory Duplicate

The laboratory duplicate analyses (LCS/LCSD, MS/MSD, and/or sample/duplicate) were within laboratory QC acceptance criteria with the following exceptions.

Method 6020A

The duplicate sample relative percent differences (RPDs) were >the acceptance limit for barium and nickel. The barium result for sample 2708-190520-006 was a detect and therefore, was **qualified J**. The nickel result for sample 2708-190520-006 was a non-detect and, therefore, was **qualified UJ**.

It should be noted that the laboratory duplicate analysis was performed on a non-project sample.

Methods 8260C and NWTPH-Dx

It should be noted that the laboratory duplicate analysis was performed on a non-project sample.

Method NWTPH-Gx

It should be noted that the laboratory duplicate analyses were performed on non-project samples.

Field Duplicate

A field duplicate was not collected with the sample in this data package.

Reporting Limits

All reporting limits (RLs) were properly reported.

Sample 2708-190520-006 was diluted 100000X for VOCs and GRO, 10000X for SVOCs, 100X for DRO, 10X for total metals, and 5X total cyanide. Reporting limits were adjusted accordingly.

Other QC

Method 8270D

The laboratory noted that peak separation of structural isomers was insufficient for accurate quantification of benzo(b)fluoranthene and benzo(k)fluoranthene for sample 2708-190520-006. Because this could not be verified with a Level II data package, the sample results were not qualified by the validator; however, the end user of the results should be aware that the results were considered to be estimated.

Method NWTPH-Dx

The laboratory noted that no fuel pattern was detected for sample 2708-190520-006. The diesel result represents carbon range C12 to C24, and the oil result represents >C24 to C40. Because this could not be verified with a Level II data package, the sample results were not qualified by the validator; however, the end user of the results should be aware that the results were considered to be estimated.

No other specific issues that affect data quality were identified.

Hahn Data Validation Summary Worksheet

SDG#: A9E0677	Laboratory: Apex	Validator: Jeanne Peterson	Validation Date: 08/27/2019
Site: Mult 802 Decommissioning	COC#: 1		Validation Level: ☒ II ☐ III
Matrix: Solid	# of Samples: 1	Tracking docs present: See sample receipt and log-in documentation	
COCs present: Yes	COCs signed: Yes	COCs dated: Yes	Sample Container Integrity: OK

Analyses:
☒ VOCs ☒ SVOCs ☐ PAHs ☒ GRO ☒ DRO ☐ Pests ☐ PCBs ☒ Metals ☐ Gen Chem ☒ Cyanide
☐ Other: VPH/EPH

Requested Analyses Not Reported

Client Sample ID	Lab Sample ID	Analysis	Comments
None			

Hold Time/Preservation Outliers

Client Sample ID	Lab Sample ID	Analysis	Pres.	Collection Date	Preparation Date	Analysis Date	Analysis <2X HT	Analysis ≥2X HT
None								

Comments: Samples collected 05/20/2019;
Temp and containers not completed on COC; documented on Cooler Receipt Form.

Hahn Level III GCMS Worksheet

SDG: A9E0677	Method: 8260C	Matrix: Solid	Lab Sample ID: A9E0677-01
Seq/Batch #s: --/9051092			

Tuning: ☐ Pass ☐ Fail TICs Required? ☐ Yes ☒ No *(lab limits)* *(lab limits)*

Analyte (outliers)	Calibration				Method Blank	5X (10X) Method Blank	LCS %R	MS %R	MSD %R	MS/ MSD RPD	LAB DUP RPD	TB		
	RF ≥0.05	RSD/r² ≤30% ≥0.990	ICV[1] %D ±25%	CCV %D ±25%										
Bromoform					✓	NA	129	✓	NA	NA	✓	NA		
CCl4					✓	NA	123	✓	NA	NA	✓	NA		
Dichlorofluoromethane					✓	NA	122	✓	NA	NA	✓	NA		
2,2-Dichloropropane					✓	NA	125	✓	NA	NA	✓	NA		
MeCl2					✓	NA	71	✓	NA	NA	✓	NA		

Surrogate Recovery Outliers *(method/lab limits)*

Sample ID	DBFM	1,4-DCB	Tol-d8	4-BFB	Sample ID	DBFM	1,4-DCB	Tol-d8	4-BFB
None									

IS Outliers *(-50% to +100% of CCV)*

Sample ID	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
NA												

Comments: HTs OK.
MB, LCS, -01, unknown Dup, unknown MS
Sample -01 diluted 100000X

Hahn Level III GCMS Worksheet

SDG: A9E0677	Method: 8270D	Matrix: Solid	Lab Sample IDs: A9E0677-01
Seq/Batch #s: --/9051172			

Tuning: ☐ Pass ☐ Fail TICs Required? ☐ Yes ☒ No *(lab limits)* *(lab limits)*

Analyte (outliers)	**Calibration**				**Method Blank**	**5X (10X) Method Blank**	**LCS %R**	**LCSD %R**	**LCS/D RPD**	**MS %R**	**MSD %R**	**MS/D RPD**	**Lab Dup RPD**		
	RF ≥0.05	**RSD/r²** ≤30%	**ICV %D** ±25%	**CCV %D** ±25%											
2,4-Dinitrophenol					✓	NA	141	NA	NA	NA	NA	NA	✓		
4,6-Dinitro-2-methylphenol					✓	NA	141	NA	NA	NA	NA	NA	✓		
3,3'-Dichlorobenzidine					✓	NA	184	NA	NA	NA	NA	NA	✓		

Surrogate Recovery Outliers *(lab limits)*

Sample ID	**Nitrobenzene-d5**	**2-Fluorobiphenyl**	**Phenol-d6**	**p-Terphenyl-d14**	**2-Fluorophenol**	**2,4,6-Tribromophenol**
-01 10000X	DO	DO	DO	DO	DO	DO
-01Dup 10000X	DO	DO	DO	DO	DO	DO

IS Outliers *(-50% to +100% of CCV)*

Sample ID	**Acen-d10**	**RT**	**Chry-d12**	**RT**	**Per-d12**	**RT**	**Dibenz-d14**	**RT**	**Area**	**RT**	**Area**	**RT**
NA												

Comments: HTs OK. DO = Diluted out
MB, LCS, -01, A9E0677-01 Dup
Sample -01 diluted 10000X for all target compounds
Sample -01: The benzo(b)fluoranthene and benzo(k)fluoranthene results are estimated; peak separation for structural isomers is insufficient for accurate quantification.

Hahn Level III NWTPH-GX Worksheet

SDG: A9E0677	Matrix: Solid	Lab Sample IDs: A9E0677-01
Seq./Batch #s: --/9051092		

Tuning: ☒ Pass ☐ Fail

Analyte (outliers)	Calibration			Method Blank	5X Blank	LCS %R	MS %R	MSD %R	MS/D RPD	Lab Dup1 RPD	
	r^2 ≥0.990	ICV/CCV %D ±20%	RT Windows ±20%				*(lab limits)*	*(lab limits)*			
None							NA	NA	NA		

Surrogate Outliers *(50-150%)*

Sample ID	Surrogate	%R	Sample ID	Surrogate	%R	Sample ID	Surrogate	%R
None								

IS Outliers *(-50% to +100% of CCV)*

Area	RT	Area	RT	Area	RT	Area	RT	Area	RT	Area	RT
NA											

Comments: HT OK for unpreserved samples (pH of samples unknown).
MB, LCS, -01, unknown Dup1, unknown Dup2
Sample -01 diluted 100000X

Hahn Level III NWTPH-DX Worksheet

SDG: A9E0677	Matrix: Solid	Lab Sample IDs: A9E0677-01
Seq./Batch #s: --/9051229		

(lab limits) *(lab limits)*

Analyte (outliers)	Calibration			Method Blank	5X Blank	LCS/ LCSD %R	MS %R	MSD %R	MS/D RPD	LCSD %R	LAB RPD
	r^2 ≥0.990 ±20%	ICV/CCV %D ±15%	RT Windows								
None							NA	NA	NA	NA	

Surrogate Outliers *(50-150%)*

Sample ID	Surrogate	%R	Sample ID	Surrogate	%R	Sample ID	Surrogate	%R
-01 (100X)	o-Terphenyl	DO						

Comments: HTs OK. DO = Diluted out
MB, LCS, -01, unknown Dup
Sample -01 diluted 100X
Sample -01: F17 No fuel pattern was detected. The diesel result represents carbon range C12 to C24, and the oil result represents >C24 to C40.

Hahn Level III Metals Worksheet

SDG: A9E0677	Matrix: Solid	Lab Sample IDs: A9E0677-01
Method: 6020A	Seq/Batch #: --/9051152	

ICPMS Mass Cal: ☐ Pass ☐ Fail ☒ NA ICPMS %RSD: ☐ Pass ☐ Fail ☒ NA *(80-120%)* *(75-125%)*

Analyte (outliers)	*(90-110%)* **Calibration**							**ICS A** *<IDL*[1]	**ICS AB %R**[1] ±20%	**MB** ug/L	**10X MB** ug/L	**LCS %R**	**Dup RPD** *≤40%*	**MS %R**	**MSD %R**	**MS/ MSD RPD** *≤40%*	**PS %R**	**Ser. Dil. %D** *≤10%*
	r	**ICV**	**CCV**[1]	**CRI**	**ICB**	**CCB** ug/L	**5X CCB**											
Ba										✓	NA	✓	41	69	NA	NA	NA	NA
Ni										✓	NA	✓	77	✓	NA	NA	NA	NA
Fe										✓	NA	✓	✓	63	NA	NA	NA	NA
Mn										✓	NA	✓	✓	-11*	NA	NA	NA	NA
Zn										✓	NA	✓	✓	57	NA	NA	NA	NA

IS Outliers *(Samples 60-125%; CCV/CCB 80-120%)*					
Sample ID	**Li6 %R**	**Sc45 %R**	**Ge74 %R**	**Rh103 %R**	**Tb159 %R**
NA					

IS Outliers *(Samples 60-125%; CCV/CCB 80-120%)*					
CCV/CCB ID	**Li6 %R**	**Sc45 %R**	**Ge74 %R**	**Rh103 %R**	**Tb159 %R**
NA					

Comments: HTs OK.
MB, LCS, -01, unknown Dup, unknown MS
*Parent sample conc >4X spike amount
#Parent and dup sample conc <5*RL and abs diff <RL; OK
Sample -01 diluted 10X

[1]CRI limits 70-130% (50-150% for Sb, Pb, Tl)

Hahn Level III Cyanide Worksheet

SDGs: A9E0677	Matrix: Solid	Lab Sample IDs: A9E0677-01
Method/Seq/Batch #s: D7511-12 (Total CN)/--/9051027		

											(80-120%)	*(≤20%)*	*(75-125%)*		*(≤47%)*	
Analyte (outliers)	*(85-115%)* **Calibration**							**MB**	**5X MB**	**LCS/D %R**	**LCSD RPD**	**MS %R**	**MSD %R**	**MS/MSD RPD**	**Dup RPD**	
	r ≥0.995	**ICV**	**CCV**	**Dist. ICV**	**ICB (ug/L)**	**CCB (ug/L)**	**5X CB (mg/L)**									
Total CN								✓	NA	✓	NA	57	154	✓	NA	

Comments: HTs OK.
Tot CN: MB, LCS1, -01, A9E0677-01 MS/MSD
*Parent sample conc >4X spike amount
Sample -01 diluted 5X for total CN