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 A9E0902

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 SIM (PAHs), 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.
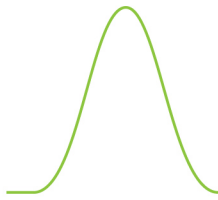
SAMPLES

The sample included in this validation is listed below.

Sample ID	APEX Sample ID	Analysis	Matrix
2708-190524-014	A9E0902-01	VOCs, PAHs, 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
2708-190524-014	8260C	Trichlorofluoromethane	UJ	10	Low laboratory control sample recovery
	6020A	Barium	J	8, 9	Low matrix spike recovery and poor duplicate precision
		Aluminum Arsenic Beryllium Cadmium Iron Nickel Vanadium Zinc	J	9	Poor duplicate precision

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.
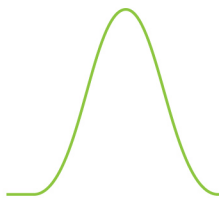
The sample collection time was listed as 12:50 on the COC but was 11:20 on the sample containers.

Extra analyses were requested by email dated 05/30/2019.

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 SIM

The surrogates were diluted out of samples 2708-190524-014 (100X) and 2708-190524-014 (1000X). No sample results were qualified.

Method NWTPH-Dx

The surrogate was diluted out of sample 2708-190524-014 (50X). 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 exception.

Method 8260C

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD analyses met laboratory QC acceptance criteria with the following exceptions.
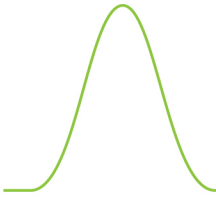
Method 8260C

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

Methods 8270D SIM, 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 recovery was < the lower acceptance limit but ≥10% for barium. The associated sample result was a detect and, therefore, was **qualified J**.

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

<u>Laboratory Duplicate</u>

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

Methods 8260C and NWTPH-Gx

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

Method 6020A

The duplicate sample relative percent differences (RPDs) and/or absolute differences were >the acceptance limit for aluminum, arsenic, barium, beryllium, cadmium, iron, nickel, vanadium, and zinc. The associated sample results were detects and therefore, were **qualified J**.

<u>Field Duplicate</u>

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

<u>Reporting Limits</u>

All reporting limits (RLs) were properly reported. Sample 2708-190524-014 was diluted 10000X for VOCs and GRO, 1000X for fluoranthene, naphthalene, phenanthrene, and pyrene and 100X for all remaining PAH target analytes, 50X for DRO, and 10X for total metals and total cyanide. Reporting limits were adjusted accordingly.
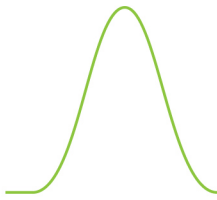
Other QC

Method 8270D SIM

The laboratory noted that peak separation of structural isomers was insufficient for accurate quantification of benzo(b)fluoranthene and benzo(k)fluoranthene for sample 2708-190524-014. 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 2708-190524-014. 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#: A9E0902	Laboratory: Apex	Validator: Jeanne Peterson	Validation Date: 08/28/2019
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 05/24/2019;

Temp and containers not completed on COC; documented on Cooler Receipt Form.

Sample collection time 12:50 on COC but 11:20 on sample containers.

Extra analyses were requested by email dated 05/30/2019.

Hahn Level III GCMS Worksheet

SDG: A9E0902	Method: 8260C	Matrix: Solid	Lab Sample ID: A9E0902-01

Seq/Batch #s: --/9061463

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%										
Trichlorofluoromethane					✓	NA	76	✓	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 Dup1, unknown MS

Sample -01 diluted 10000X

Hahn Level III GCMS Worksheet

SDG: A9E0902	Method: 8270D SIM	Matrix: Solid	Lab Sample IDs: A9E0902-01
Seq/Batch #s: --/9051465			

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%											
None								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 100X	NA	[78] DO	NA	[121] DO	NA	NA
-01 1000X	NA	DO	NA	DO	NA	NA
Dup 1000X	NA	DO	NA	DO	NA	NA

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, A9E0902-01 Dup

Sample -01 diluted 1000X for fluoranthene, naphthalene, phenanthrene, and pyrene and 100X for all other target analytes.

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: A9E0902	Matrix: Solid	Lab Sample IDs: A9E0902-01
Seq./Batch #s: --/9051463		

Tuning: ☒ Pass ☐ Fail   *(lab limits)*   *(lab limits)*

Analyte (outliers)	Calibration			Method Blank	5X Blank	LCS %R	MS %R	MSD %R	MS/D RPD	Lab Dup1 RPD	
	r² ≥0.990 ±20%	ICV/CCV %D ±20%	RT Windows								
							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
MB, LCS, -01, unknown Dup
Sample -01 diluted 10000X

Hahn Level III NWTPH-DX Worksheet

SDG: A9E0902	Matrix: Solid	Lab Sample IDs: A9E0902-01
Seq./Batch #s: --/9051469		

							(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
	r² ≥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 (50X)	o-Terphenyl	DO						
Dup (50X)	o-Terphenyl	DO						

Comments: HTs OK.   DO = Diluted out
MB, LCS, -01, A9E0902-01 Dup
Sample -01 diluted 50X
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.

Revised 9/2010

Hahn Level III Metals Worksheet

SDG: A9E0902	Matrix: Solid	Lab Sample IDs: A9E0902-01
Method: 6020A	Seq/Batch #: --/9051429	

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											
Al										✓	NA	✓	42	✓	NA	NA	NA	NA
As										✓	NA	✓	^	✓	NA	NA	NA	NA
Ba										✓	NA	✓	60	63	NA	NA	NA	NA
Be										✓	NA	✓	60^	✓	NA	NA	NA	NA
Cd										✓	NA	✓	60^	✓	NA	NA	NA	NA
Cr										✓	NA	✓	53#	✓	NA	NA	NA	NA
Fe										✓	NA	✓	68	-455*	NA	NA	NA	NA
Ni										✓	NA	✓	95^	✓	NA	NA	NA	NA
V										✓	NA	✓	48	✓	NA	NA	NA	NA
Zn										✓	NA	✓	42	✓	NA	NA	NA	NA
Mn										✓	NA	✓	✓	63*	NA	NA	NA	NA

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

Comments: HTs OK.

MB, LCS, -01, A9E0902-01 Dup, A9E0902-01 MS

*Parent sample conc >4X spike amount

#Parent and/or dup sample conc <5*RL and abs diff <RL; OK

^Parent and/or dup sample conc <5*RL and abs diff >RL; qualify

Sample -01 diluted 10X

[1]CRI limits 70-130% (50-150% for Sb, Pb, Tl)   Revised 9/2010

Hahn Level III Cyanide Worksheet

SDGs: A9E0902	Matrix: Solid	Lab Sample IDs: A9E0902-01
Method/Seq/Batch #s: D7511-12 (Total CN)/--/9051383		

Analyte (outliers)	*(85-115%)* Calibration							MB	5X MB	LCS/D %R *(80-120%)*	LCSD RPD *(≤20%)*	MS %R *(75-125%)*	MSD %R	MS/MSD RPD *(≤47%)*	Dup RPD	
	r ≥0.995	ICV	CCV	Dist. ICV	ICB (ug/L)	CCB (ug/L)	5X CB (mg/L)									
None											NA				NA	

Comments: HTs OK.

Tot CN: MB, LCS1, -01, A9E0902-01 MS/MSD

*Parent sample conc >4X spike amount

Sample -01 diluted 10X for total CN