PO Box 21987
Albuquerque, NM 87154
1-888-678-5447
www.aqainc.net

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 A9E0508

SUMMARY

Level II (i.e., EPA Stage 2A) data validation was performed on the data for one composite solid sample prepared and analyzed using approved procedures for methods SW846 8260C (VOCs), SW846 8260C TCLP (TCLP 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
COMP1	A9E0508-05	VOCs, VOC TCLP, 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
COMP1	8260C	Methylene chloride	UJ	10	Low laboratory control sample recovery
	8260 TCLP	Naphthalene	J	8	High matrix spike recovery
	8270D	Acenaphthene	J	10	High laboratory control sample recovery
	6020A	Copper Nickel	J	8	High matrix spike recovery
		Aluminum Zinc	J	8	Low matrix spike recovery

DISCUSSION

Sample Shipping/Receiving

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

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

The time the sample was relinquished to the laboratory was documented in the “Received by” block of the COC.

The collection time for sample 2708-190513-001 was 15:**15** on the COC but 15:**50** on the sample container.

Extra analyses were requested by email dated 05/22/2019.

Holding Times and Preservation

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

Blanks

Methods 8260C, NWTPH-Gx, NWTPH-Dx, 6020A, and D7511-12

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

Method 8260C TCLP

Methylene chloride was detected in the TCLP method blank. The associated sample result was a non-detect and, therefore, was not qualified.

Method 8270D

Acenaphthene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, dibenzofuran, and phenol were detected in the method blank. The associated sample results were either non-detects or detects >10X the method blank value and, therefore, were not qualified.

Surrogates

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

Method 8270D

The surrogates were diluted out of samples COMP1 (10000X) and COMP1 DUP (10000X). No sample results were qualified.

Method NWTPH-Dx

The surrogates were diluted out of samples COMP1 (100X) and COMP1 DUP (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; bromomethane; carbon tetrachloride; 2,2-dichloropropane; methylene chloride; chloroethane; dibromomethane; 1,1,2,2-tetrachloroethane; and trichlorofluoromethane. 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 8260C TCLP

The LCS recoveries were > the upper acceptance limit for methylene chloride, bromochloromethane, bromodichloromethane, bromoform, bromomethane, and carbon tetrachloride. The associated sample results were non-detects and not affected by the high bias and, therefore, were not qualified based on professional judgment.

Method 8270D

The LCS recoveries were > the upper acceptance limit for acenaphthene; 2-methylnaphthalene; naphthalene; and 3,3'-dichlorobenzidine. The acenaphthene result for sample COMP1 was a detect and, therefore, was **qualified J**. The remaining 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

The MS recoveries were > the upper acceptance limit for bromoform; chloroethane; dibromomethane; 1,1,2,2-tetrachloroethane; and trichlorofluoromethane. The MS analysis was performed on a non-project sample; therefore, no sample results were qualified based on professional judgment.

Method 8260C TCLP

The MS recoveries were > the upper acceptance limit for bromochloromethane, bromomethane, carbon tetrachloride, and naphthalene. The naphthalene result for parent sample COMP1 was a detect and, therefore, was **qualified J**. The remaining associated sample results were non-detects and not affected by the high bias and, therefore, were not qualified based on professional judgment.

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 upper acceptance limit for copper and nickel. The associated sample results were detects and, therefore, were **qualified J**.

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

Method D7511-12

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

Laboratory Duplicate

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

Method 8260C

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

Method NWTPH-Gx

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

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 COMP1 was diluted 10000X for VOCs, SVOCs, and GRO; 50X for TCLP VOCs, 100X for DRO; 10X for total metals; and 20X for total cyanide. Reporting limits were adjusted accordingly.

Other QC

Method 8260C TCLP

The laboratory noted that the methylene chloride detection limit for sample COMP1 was raised due to possible contamination.

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 COMP1. 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 COMP1. 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#: A9E0508	Laboratory: Apex	Validator: Jeanne Peterson	Validation Date: 08/27/2019
Site: Mult 802 Decommissioning	COC#: 1		Validation Level: ☒ II ☐ III
Matrix: Solid	# of Samples: 4*	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 05/13/2019; *Composited into 1 sample
Temp and containers not completed on COC; documented on Cooler Receipt Form.
Time samples relinquished documented in Received By block
Collection time for sample 2708-190513-001 was 15:15 on the COC but 15:50 on the sample container.
Extra analyses were requested by email dated 05/22/2019.

Hahn Level III GCMS Worksheet

SDG: A9E0508	Method: 8260C	Matrix: Solid	Lab Sample ID: A9E0508-05
Seq/Batch #s: --/9051006			

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	124	139	NA	NA	✓	NA		
Bromomethane					✓	NA	124	✓	NA	NA	✓	NA		
CCl4					✓	NA	123	✓	NA	NA	✓	NA		
2,2-Dichloropropane					✓	NA	129	✓	NA	NA	✓	NA		
MeCl2					✓	NA	74	✓	NA	NA	✓	NA		
Chloroethane					✓	NA	✓	204	NA	NA	✓	NA		
Dibromomethane					✓	NA	✓	127	NA	NA	✓	NA		
1,1,2,2-PCA					✓	NA	✓	130	NA	NA	✓	NA		
Trichlorofluoromethane					✓	NA	✓	413	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, -05, unknown Dup1. Unknown Dup2, unknown MS1
Sample -05 diluted 10000X

Hahn Level III GCMS Worksheet

SDG: A9E0508	Method: 8260C TCLP	Matrix: Leachate	Lab Sample ID: A9E0508-05
Seq/Batch #s: --/9051258 (l)/9051246 (a)			

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**			
	RF ≥0.05	**RSD/r²** ≤30% ≥0.990	**ICV[1] %D** ±25%	**CCV %D** ±25%										
MeCl2					0.281	(2.81)	132	✓	NA	NA	✓			
Bromochloromethane					✓	NA	133	132	NA	NA	✓			
Bromodichloromethane					✓	NA	128	✓	NA	NA	✓			
Bromoform					✓	NA	126	✓	NA	NA	✓			
Bromomethane					✓	NA	162	141	NA	NA	✓			
CCl4					✓	NA	132	131	NA	NA	✓			
Naphthalene					✓	NA	✓	131	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 for unpreserved samples.
MB, LCS, -05, A9E0508-05 Dup, A9E0508-05 MS
Sample -05 diluted 50X
DL raised for MeCl2 due to possible contamination.

Hahn Level III GCMS Worksheet

SDG: A9E0508	Method: 8270D	Matrix: Solid	Lab Sample IDs: A9E0508-05
Seq/Batch #s: --/9051065			

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%											
Acenaphthene					148	(1480)	128	NA	NA	NA	NA	NA	✓		
Fluorene					26.2	(262)	✓	NA	NA	NA	NA	NA	✓		
1-Methylnaphthalene					108	(1080)	✓	NA	NA	NA	NA	NA	✓		
2-Methylnaphthalene					223	(2230)	139	NA	NA	NA	NA	NA	✓		
Naphthalene					1070	(10700)	273	NA	NA	NA	NA	NA	✓		
Phenanthrene					27.7	(277)	✓	NA	NA	NA	NA	NA	✓		
Dibenzofuran					46.6	(466)	✓	NA	NA	NA	NA	NA	✓		
Phenol					23.4	(234)	✓	NA	NA	NA	NA	NA	✓		
3,3'-Dichlorobenzidine					✓	✓	277	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**
-05 10000X	DO	DO	DO	DO	DO	DO
-05 Dup 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, -05, A9E0508-05 Dup

***One result ND and one result either <RL or slightly >RL, and abs diff <RL (1/2RL used for ND); OK

Sample -05 diluted 10000X for all target compounds

Sample -05: 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: A9E0508	Matrix: Solid	Lab Sample IDs: A9E0508-05
Seq./Batch #s: --/9051006		

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, -05, unknown Dup1, unknown Dup2
Sample -05 diluted 10000X

Hahn Level III NWTPH-DX Worksheet

SDG: A9E0508	Matrix: Solid	Lab Sample IDs: A9E0508-05
Seq./Batch #s: --/9051067		

(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
-05 (100X)	o-Terphenyl	DO						
-05 Dup (100X)	o-Terphenyl	DO						

Comments: HTs OK. DO = Diluted out
MB, LCS, -05, A9E0508-05 Dup
Sample -05 diluted 100X
Sample -05: 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: A9E0508	Matrix: Solid	Lab Sample IDs: A9E0508-05
Method: 6020A	Seq/Batch #: --/9051011	

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**											
Cd										✓	NA	✓	46#	✓	NA	NA	NA	NA
Cu										✓	NA	✓	✓	126	NA	NA	NA	NA
Al										✓	NA	✓	✓	74	NA	NA	NA	NA
Fe										✓	NA	✓	✓	47*	NA	NA	NA	NA
Mn										✓	NA	✓	✓	-346*	NA	NA	NA	NA
Ni										✓	NA	✓	✓	131	NA	NA	NA	NA
Zn										✓	NA	✓	✓	51	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, -05, A9E0508-05 Dup, A9E0508-05 MS
*Parent sample conc >4X spike amount
#Parent and dup sample conc <5*RL and abs diff <RL; OK
Sample -05 diluted 10X

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

Hahn Level III Cyanide Worksheet

SDGs: A9E0508	Matrix: Solid	Lab Sample IDs: A9E0508-05
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**	**CN-I**
	r ≥0.995	**ICV**	**CCV**	**Dist. ICV**	**ICB (ug/L)**	**CCB (ug/L)**	**5X CB (mg/L)**									
Total CN								✓	NA	✓	NA	-95*	-266*	✓	NA	0.11

Comments: HTs OK.
Tot CN: MB, LCS1, LCS2, -05, A9E0508-05 MS/MSD
*Parent sample conc >4X spike amount
Sample -05 diluted 20X for total CN