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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 A9F0498

SUMMARY

Level II (i.e., EPA Stage 2A) data validation was performed on the data for two water samples prepared and analyzed using approved procedures for method SW846 8260C (VOCs) and one water sample prepared and analyzed using approved procedures for methods SW846 8270D (SVOCs), NWTPH-Gx (gasoline range organics [GRO]), NWTPH-Dx (diesel and oil), SW846 6020A (metals by ICPMS), EPA 335.4 (total cyanide), OIA/D6888 (available cyanide), and ASTM D4282 (free 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 samples included in this validation are listed below.

Sample ID	APEX Sample ID	Analysis	Matrix
2708-190614-MULT802-100	A9F0498-01	VOCs, SVOCs, GRO, DRO, Total Metals, Total CN, Available CN, Free CN	Water
2708-190614-MULT802-TB	A9F0498-02	VOCs	Water

DATA QUALIFIERS (see following sections for detailed explanations)

Sample ID	Method	Analyte	Qualifier	Qualifier Code	Reason for Qualification
2708-190614-MULT802-100	8260C	Bromomethane Methylene chloride	UJ	10	Low laboratory control sample recovery
	EPA 335.4	Total cyanide	J	2	Insufficient chemical preservation
	D6888-09	Available cyanide	J	2	Insufficient chemical preservation
	D4282-02	Free cyanide	J	1,2	Analysis beyond the holding time and insufficient chemical preservation
2708-190614-MULT802-TB	8260C	Bromomethane Methylene chloride	UJ	10	Low laboratory control sample 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.

The trip blank was not listed on the COC.

Holding Times and Preservation

The samples were properly preserved and analyzed within the prescribed holding times with the following exceptions.

Methods 8260C and NWTPH-Gx

The pH of the samples at the time of analysis was not included in the Level II data package. There were no preservation problems noted by the laboratory; therefore, it was assumed that the samples were properly preserved and no data were qualified.

Methods EPA 335.4 and OIA/D6888

The NaOH preserved poly container for sample 2708-190614-MULT802-100 was received at the laboratory with a pH of ~7. The laboratory attempted to adjust the pH of the sample with NaOH; however, the pH remained 7. The associated sample results were detects and, therefore, were **qualified J**.

Method ASTM D4282

The NaOH preserved poly container for sample 2708-190614-MULT802-100 was received at the laboratory with a pH of ~7. The laboratory attempted to adjust the pH of the sample with NaOH; however, the pH remained 7. In addition, the sample was analyzed beyond, but within 2X the project-specified holding time. The associated sample result was a detect and, therefore, was **qualified J**.

Blanks

Method 8260C

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

Methods NWTPH-Gx, NWTPH-Dx, 6020A, EPA 335.4, OIA/D6888, and ASTM D4282

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

Method 8270D

Naphthalene was detected in the method blanks. The associated sample result was a detect >10X the method blank value and, therefore, was 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 2708-190614-MULT802-100 (100X) and 2708-190614-MULT802-100 (1000X). No sample results were qualified.

Method NWTPH-Dx

The surrogate was diluted out of sample 2708-190614-MULT802-100 (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 carbon tetrachloride and chloromethane. 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 recoveries associated with batch 9061017 were < the lower acceptance limit but ≥30% for bromomethane and methylene chloride. The associated sample results were non-detects and, therefore, were **qualified UJ**.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

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

Methods 8260C and EPA 335.4

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

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

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

Method 6020A

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

Method OIA/D6888-09

It should be noted that the MS analysis was performed on a project sample from another data package.

Laboratory Duplicate

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

Methods 8260C and NWTPH-Gx

It should be noted that the laboratory duplicate analysis associated with batch 9061060 was performed on a non-project sample.

Field Duplicate

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

Reporting Limits

All reporting limits (RLs) were properly reported. Sample 2708-190614-MULT802-100 was diluted 250X for benzene, naphthalene, toluene and GRO and 10X for all remaining VOC target analytes, 1000X for 3+4-methylphenol and naphthalene and 100X for all remaining SVOC target analytes, 100X for DRO, and 10X for total metals. Reporting limits were adjusted accordingly.

Other QC

Method NWTPH-Dx

The laboratory noted that no fuel pattern was detected for sample 2708-190614-MULT802-100. The diesel result represents carbon range C12 to C24. 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#: A9F0498	Laboratory: Apex	Validator: Jeanne Peterson	Validation Date: 08/29/2019
Site: Mult 802 Decommissioning	COC#: 1		Validation Level: ☒ II ☐ III
Matrix: Water	# of Samples: 2	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
2708-190614-MULT802-100	A9F0498-01	EPA 335.4 total CN	pH >12*; 4°C	06/14/2019	06/20/2019	06/20/2019	NA*	NA*
2708-190614-MULT802-100	A9F0498-01	OIA/D6888-09 Available CN	pH >12*; 4°C	06/14/2019	06/20/2019	06/20/2019	NA*	NA*
2708-190614-MULT802-100	A9F0498-01	D4282-02 Free CN	pH >12*; 4°C	06/14/2019	06/17/2019	06/17/2019	Yes**	No**

Comments: Samples collected 06/14/2019
Temp and containers not completed on COC; documented on Cooler Receipt Form.
The TB was not listed on the COC.
*The NaOH preserved poly container for sample 2708-190614-MULT802-100 was received with a pH of ~7; lab added 1mL OF NaOH, final pH 7.
**Project HT for free CN in water is 48 hours

Hahn Level III GCMS Worksheet

SDG: A9F0498	Method: 8260C	Matrix: Water	Lab Sample ID: A9F0498-01, -02
Seq/Batch #s: --/9061017, 9061060			

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%										
9061017														
Bromomethane					✓	NA	58	✓	NA	NA	✓	✓		
CCl4					✓	NA	126	✓	NA	NA	✓	✓		
Chloromethane					✓	NA	122	✓	NA	NA	✓	✓		
MeCl2					✓	NA	77	✓	NA	NA	✓	✓		
9061060 (B, N, T only)														
None									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; pH unknown
9061017: MB, LCS, -01, -02, A9F0498-01 Dup, unknown MS
9061060: MB, LCS, -01 RE1, unknown Dup, unknown MS
Sample -01 diluted 250X for benzene, naphthalene, and toluene and 10X for all remaining target analytes.
Sample -02 not diluted

Hahn Level III GCMS Worksheet

SDG: A9F0498	Method: 8270D	Matrix: Water	Lab Sample IDs: A9F0498-01
Seq/Batch #s: --/9061036			

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/r^2 ≤30%	ICV %D ±25%	CCV %D ±25%											
Naphthalene					0.923	(9.23)	✓	✓	✓	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	[102] DO	[79] DO	[4] DO	[86] DO	[154] DO	[114] DO
-01 1000X	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/LCSD, -01
Sample -1 diluted 1000X for 3+4-methylphenol and naphthalene and 100X for all remaining target compounds

Hahn Level III NWTPH-GX Worksheet

SDG: A9F0498	Matrix: Water	Lab Sample IDs: A9F0498-01
Seq./Batch #s: --/9061060		

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 unknown
MB, LCS, -01, unknown Dup

Sample -01 diluted 250X

Hahn Level III NWTPH-DX Worksheet

SDG: A9F0498	Matrix: Water	Lab Sample IDs: A9F0498-01
Seq./Batch #s: --/90761096		

(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
-02 100X	o-Terphenyl	DO						

Comments: HTs OK. DO = Diluted out
MB, LCS/LCSD, -01
Sample -01 diluted 100X
Sample -01: F17 No fuel pattern was detected. The diesel result represents carbon range C12 to C24.

Hahn Level III Metals Worksheet

SDG: A9F0498	Matrix: Water	Lab Sample IDs: A9F0498-01
Method: 6020A	Seq/Batch #: --/9061022	

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] ±40%	MB ug/L	10X MB ug/L	LCS %R	Dup RPD *≤20%*	MS %R	MSD %R	MS/ MSD RPD *≤20%*	PS %R	Ser. Dil. %D *≤10%*
	r	ICV	CCV[1]	CRI	ICB	CCB ug/L	5X CCB											
Al										✓	NA	✓	✓	63*	NA	NA	NA	NA
Fe										✓	NA	✓	✓	192*	NA	NA	NA	NA
Mn										✓	NA	✓	✓	283*	NA	NA	NA	NA
Zn										✓	NA	✓	✓	216*	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, A9F0498-01 Dup, A9F0498-01 MS
*Parent sample conc >4X spike amount
#Parent sample <RL and dup >RL; abs diff <RL; OK
Sample -01 diluted 10X for all target analytes
Sample -01: Reporting levels for several analytes were elevated due to preparation and/or analytical dilution necessary for analysis.

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

Hahn Level III Cyanide Worksheet

SDGs: A9F0498	Matrix: Water	Lab Sample IDs: A9F0498-02 thru -08
Method/Seq/Batch #s: EPA 335.4 (Total CN)/--/9061175; OIA/D6888-09 (Available CN)/--/9061164; ASTM D4282-02 (Free CN)/--/9061019		

										(80-120%)	*(≤20%)*	*(75-125%)*		*(≤20%)*		
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)**									
None											NA					

Comments: HTs OK.
Tot CN 9061175: MB, LCS1, LCS2, -01, unknown Dup2, unknown Dup3, unknown MS2, unknown MS3
Avail CN 9061164: MB, LCS, -01, A9F0573-03 MS/MSD
Free CN 9061019: MB, LCS/LCSD, -01, A9F0498-01 Dup, A9F0498-01 MS
*Parent sample conc >4X spike amount
No dilutions