LABORATORY DATA CONSULTANTS, INC.
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AECOM
1001 Bishop Street Suite 1600
Honolulu, HI 96813
ATTN: Dr. Brant Landers

June 25, 2018

SUBJECT: Andersen AFB, CTO JQ13, Data Validation

Dear Dr. Landers

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on May 30, 2018. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #42338:

SDG #	**Fraction**
18D194, 18D202 18D210, 680-151865-1 680-151914-1, 680-151915-1	2,4-D & 2,4,5-T

The data validation was performed under Level C & D validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Final Work Plan for Limited Investigation into Alleged Herbicide Orange Use at Three Sites, Andersen Air Force Base, Guam; 2018,
- Project Procedures Manual, U.S. Naval Facilities Engineering Command Evironmental Restoration Program, NAVFAC Pacific; DON 2015
- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories; Version 5.1; 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

Please feel free to contact us if you have any questions.

Sincerely,

Stella Cuenco
Project Manager/Senior Chemist

1,468 pages-DL

Attachment 1

90/10 (client select) **EDD**

LDC #42338 (AECOM - Honolulu, HI / Andersen AFB, CTO JQ13)

LDC	SDG#	DATE REC'D	(3) DATE DUE	2,4-D & 2,4,5-T (8151A)																											
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	18D194	05/30/18	06/20/18	0	5																										
A	18D194	05/30/18	06/20/18	0	2																										
B	18D202	05/30/18	06/20/18	0	6																										
B	18D202	05/30/18	06/20/18	0	1																										
C	18D210	05/30/18	06/20/18	0	6																										
C	18D210	05/30/18	06/20/18	0	1																										
D	680-151865-1	05/30/18	06/20/18	0	3																										
D	680-151865-1	05/30/18	06/20/18	0	2																										
E	680-151914-1	05/30/18	06/20/18	0	2																										
E	680-151914-1	05/30/18	06/20/18	0	1																										
F	680-151915-1	05/30/18	06/20/18	0	2																										
F	680-151915-1	05/30/18	06/20/18	0	1																										
Total	T/SC			0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32

Shaded cells indicate Level D validation (all other cells are Level C validation). These sample counts include MS/MSD, and DUPs

L:\AECOM\Andersen\42338ST.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Andersen AFB, CTO JQ13

LDC Report Date: June 18, 2018

Parameters: 2,4-D & 2,4,5-T

Validation Level: Level C & D

Laboratory: EMAX Laboratories, Inc.

Sample Delivery Group (SDG): 18D194

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GQ001**	18D194-01**	Soil	04/23/18
GQ002	18D194-02	Soil	04/23/18
GQ003**	18D194-03**	Soil	04/23/18
GQ002DUP	18D194-02DUP	Soil	04/23/18
GQ002TRP	18D194-02TRP	Soil	04/23/18
GQ003MS	18D194-03MS	Soil	04/23/18
GQ003MSD	18D194-03MSD	Soil	04/23/18

**Indicates sample underwent Level D validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Work Plan for Limited Investigation into Alleged Herbicide Orange Use at Three Sites, Andersen Air Force Base (AFB), Guam (March 2018), the Project Procedures Manual, U.S. Naval Facilities Engineering Command (NAVFAC) Environmental Restoration (ER) Program, NAVFAC Pacific (DON 2015), and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

2,4-D and 2,4,5-T by Environmental Protection Agency (EPA) SW 846 Method 8151A

All sample results were subjected to Level C data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Level D data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant.

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank).

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits.

Q MS/MSD recovery was poor.

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory.

M Instrument Performance Check (BFB or DFTPP) was noncompliant.

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor.

V Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were established as required by the method for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

Retention times of all compounds in the calibration standards were within the established retention time windows for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicate/Triplicate Sample Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Triplicate (TRP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Triplicates

Samples GQ001**, GQ002, and GQ003** were identified as field triplicates. No results were detected in any of the samples.

X. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XI. Target Compound Identification

All target compound identifications met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Data Qualification Summary - SDG 18D194

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Laboratory Blank Data Qualification Summary - SDG 18D194

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Field Blank Data Qualification Summary - SDG 18D194

No Sample Data Qualified in this SDG

LDC #: 42338A5 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/5/18
SDG #: 18D194 Level C/D Page: 1 of 1
Laboratory: EMAX Laboratories, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Herbicides (EPA SW 846 Method 8151A) 2,4-D + 2,4,5-T

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20%. ICV ≤ 20%
III.	Continuing calibration	A	CCV ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates LCR	A/A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N/D	TR = 1 + 2 + 3
X.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Level C validation.
XI.	Target compound identification	A	Not reviewed for Level C validation.
XII.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

** Indicates sample underwent Level D validation

	Client ID	Lab ID	Matrix	Date
1	GQ001**	18D194-01**	Soil	04/23/18
2	GQ002	18D194-02	Soil	04/23/18
3	GQ003**	18D194-03**	Soil	04/23/18
4	GQ002DUP	18D194-02DUP	Soil	04/23/18
5	GQ002TRP	18D194-02TRP	Soil	04/23/18
6	GQ003MS	18D194-03MS	Soil	04/23/18
7	GQ003MSD	18D194-03MSD	Soil	04/23/18
8				
9				
10				
11				

Notes:

LDC #: 42338A5

VALIDATION FINDINGS CHECKLIST

Reviewer: 2
2nd Reviewer: A

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
III. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

LDC #: 42338A5

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 9
2nd Reviewer: AC

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	~~✓~~	✓		TR
Were target compounds detected in the field duplicates?			✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 42338A5

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC _____HPLC_____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (94 std)	Recalculated CF (10 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	4/3/18	2,4-D (ZB-35H)	561	561	566.6	566.6	3.2	3.2
	(GC09)		2,4-D (RTX-CLPEST II)	539	539	553.3	553.3	7.5	7.5
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42338A5

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC

Percent difference (%D) = 100 * (N - C)/N

Where: N = __ Initial Calibration Factor or __ Nominal Amount (ng)
C = __ Calibration Factor from Continuing Calibration Standard or __ Calculated Amount (ng)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	QE04002	5/4/18	2,4-D (ZB-35H)	94.0	99.67	99.67	6	6.0
			2,4-D (RTX-CLPEST II)	94.0	98.80	98.8	5	5
2	QE04038	5/5/18	2,4-D (ZB-35H)	94.0	90.94	90.94	3	3.2
			2,4-D (RTX-CLPEST II)	94.0	107.82	107.82	15	14.7
3								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Surrogate Results Verification

Reviewer: 9

2nd reviewer: M

METHOD: √ **GC** ___ **HPLC**

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: /

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
2,4-DCAA	ch1	1000.0	789.293	78.9	78.9	0
√	√2	√	884.143	88.4	884	2

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 40332K15

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer:

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 6/7

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	—	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)	50.6	50.6	ND	38.1	37.4	75	75	74	74	2	2
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: [illegible]

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = | SSCLCS - SSCLCSD | * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS/D

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)	50.0	50.0	52.9	46.9	106	106	94	94	12	
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #~~42338/5~~

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= (A)(Fv)(Df) / (RF)(Vs or Ws)(%S/100)

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. ND #6MS, 2,4-D Compound Name _____

Concentration = (41696)(5)(1) / (553.3)(10.01)(0.989)

= 38.1 µg/kg

#	Sample ID	Compound	Reported Concentrations (µg/kg)	Recalculated Results Concentrations ( )	Qualifications
	6	2,4-D	38.1		

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Andersen AFB, CTO JQ13

LDC Report Date: June 18, 2018

Parameters: 2,4-D & 2,4,5-T

Validation Level: Level C & D

Laboratory: EMAX Laboratories, Inc.

Sample Delivery Group (SDG): 18D202

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GQ004	18D202-01	Soil	04/24/18
GQ005**	18D202-02**	Soil	04/24/18
GQ006	18D202-03	Soil	04/24/18
GQ006MS	18D202-03MS	Soil	04/24/18
GQ006MSD	18D202-03MSD	Soil	04/24/18
GQ006DUP	18D202-03DUP	Soil	04/24/18
GQ006TRP	18D202-03TRP	Soil	04/24/18

**Indicates sample underwent Level D validation

Introduction

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The analyses were performed by the following method:

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All sample results were subjected to Level C data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Level D data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

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UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant.

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank).

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits.

Q MS/MSD recovery was poor.

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory.

M Instrument Performance Check (BFB or DFTPP) was noncompliant.

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor.

V Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were established as required by the method for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

Retention times of all compounds in the calibration standards were within the established retention time windows for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicate/Triplicate Sample Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Triplicate (TRP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Triplicates

Samples GQ004, GQ005**, and GQ006 were identified as field triplicates. No results were detected in any of the samples.

X. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XI. Target Compound Identification

All target compound identifications met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Data Qualification Summary - SDG 18D202

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Laboratory Blank Data Qualification Summary - SDG 18D202

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Field Blank Data Qualification Summary - SDG 18D202

No Sample Data Qualified in this SDG

LDC #: 42338B5 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/5/18
SDG #: 18D202 Level C/D Page: 1 of 1
Laboratory: EMAX Laboratories, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Herbicides (EPA SW 846 Method 8151A) 2,4-D & 2,4,5-T

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	Initial calibration/ICV	A A	RSD≤20%. ICV≤±20%
III.	Continuing calibration	A	CCV≤±20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates LCR	A/A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	TR=4+5+D
X.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Level C validation.
XI.	Target compound identification	A	Not reviewed for Level C validation.
XII.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank
** Indicates sample underwent Level D validation

	Client ID	Lab ID	Matrix	Date
1	GQ004	18D202-01	Soil	04/24/18
2	GQ005**	18D202-02**	Soil	04/24/18
3	GQ006	18D202-03	Soil	04/24/18
4	GQ006MS	18D202-03MS	Soil	04/24/18
5	GQ006MSD	18D202-03MSD	Soil	04/24/18
6	GQ006DUP	18D202-03DUP	Soil	04/24/18
7	GQ006TRP	18D202-03TRP	Soil	04/24/18
8				
9				
10				
11				

Notes:

LDC #: 42338B5

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: M

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. Calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
III. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field Blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VIII. Matrix spike/ Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

LDC #: 42338B5

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: AC

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		TR
Were target compounds detected in the field duplicates?			✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 42338B5

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC _____ HPLC _____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (94 std)	Recalculated CF (10 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	4/3/18	2,4-D (ZB-35H)	561	561	566.6	566.6	3.2	3.2
	(GC09)		2,4-D (RTX-CLPEST II)	539	539	553.3	553.3	7.5	7.5
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42338B5

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC

Percent difference (%D) = 100 * (N - C)/N

Where: N = __ Initial Calibration Factor or __ Nominal Amount (ng)
C = __ Calibration Factor from Continuing Calibration Standard or __ Calculated Amount (ng)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	QE04002	5/4/18	2,4-D (ZB-35H)	94.0	99.67	99.67	6	6.0
			2,4-D (RTX-CLPEST II)	94.0	98.80	98.8	5	5
2	QE04014	5/4/18	2,4-D (ZB-35H)	94.0	99.43	99.43	6	5.8
			2,4-D (RTX-CLPEST II)	94.0	102.75	102.75	9	9.3
3								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Reviewer: [illegible]

2nd reviewer: [illegible]

Surrogate Results Verification

METHOD: ✓ GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 2

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
2,4-DCAA	ch 1	1000.0	626.232	62.6	62.6	0
↓	↓ 2	↓	691.424	69.1	69.1	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference

LDC #: 75520B5S

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer: K

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SC = Sample concentration
SA = Spike added
RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 4/5

Compound	Spike Added (µg/L)		Sample Conc. (µg/L)	Spike Sample Concentration (µg/L)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)	51.9	51.9	ND	29.7	27.0	57	57	52	52	10	10
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: [illegible]

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: K

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = | SSCLCS - SSCLCSD | * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS/D

Compound	Spike Added (µg/L)		Spiked Sample Concentration (µg/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)	50.0	50.0	52.9	~~48.9~~ 49.9	106	106	94	~~94~~ 98	12	12
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 43385E

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: DK

METHOD: ✓ GC __ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound In the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. ND #4 MS, 2,4-D Compound Name _____

Concentration = $\frac{(31699.0)(5)(1)}{(1553.3)(10.04)(0.964)}$

$= 29.6$ µg/kg

#	Sample ID	Compound	Reported Concentrations (µg/kg)	Recalculated Results Concentrations ( )	Qualifications
	4	2,4-D	29.7		

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Andersen AFB, CTO JQ13

LDC Report Date: June 18, 2018

Parameters: 2,4-D & 2,4,5-T

Validation Level: Level C & D

Laboratory: EMAX Laboratories, Inc.

Sample Delivery Group (SDG): 18D210

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GQ007	18D210-01	Soil	04/25/18
GQ008	18D210-02	Soil	04/25/18
GQ009**	18D210-03**	Soil	04/25/18
GQ009MS	18D210-03MS	Soil	04/25/18
GQ009MSD	18D210-03MSD	Soil	04/25/18
GQ009DUP	18D210-03DUP	Soil	04/25/18
GQ009TRP	18D210-03TRP	Soil	04/25/18

**Indicates sample underwent Level D validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Work Plan for Limited Investigation into Alleged Herbicide Orange Use at Three Sites, Andersen Air Force Base (AFB), Guam (March 2018), the Project Procedures Manual, U.S. Naval Facilities Engineering Command (NAVFAC) Environmental Restoration (ER) Program, NAVFAC Pacific (DON 2015), and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

2,4-D and 2,4,5-T by Environmental Protection Agency (EPA) SW 846 Method 8151A

All sample results were subjected to Standard data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Full data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant.

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank).

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits.

Q MS/MSD recovery was poor.

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory.

M Instrument Performance Check (BFB or DFTPP) was noncompliant.

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor.

V Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were established as required by the method for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

Retention times of all compounds in the calibration standards were within the established retention time windows for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicate/Triplicate Sample Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

Triplicate (TRP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Triplicates

Samples GQ007, GQ008, and GQ009** were identified as field triplicates. No results were detected in any of the samples.

X. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XI. Target Compound Identification

All target compound identifications met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Data Qualification Summary - SDG 18D210

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Laboratory Blank Data Qualification Summary - SDG 18D210

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Field Blank Data Qualification Summary - SDG 18D210

No Sample Data Qualified in this SDG

LDC #: 42338C5 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/8/18
SDG #: 18D210 Level C/D Page: 1 of 1
Laboratory: EMAX Laboratories, Inc. Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC Herbicides (EPA SW 846 Method 8151A) 2,4-D & 2,4,5-T

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20%. ICV ≤ 20%
III.	Continuing calibration	A	CCV ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates /LR	A/A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	ND	TR = 1 1+2+3
X.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Level C validation.
XI.	Target compound identification	A	Not reviewed for Level C validation.
XII	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

** Indicates sample underwent Level D validation

	Client ID	Lab ID	Matrix	Date
1	GQ007	18D210-01	Soil	04/25/18
2	GQ008	18D210-02	Soil	04/25/18
3	GQ009**	18D210-03**	Soil	04/25/18
4	GQ009MS	18D210-03MS	Soil	04/25/18
5	GQ009MSD	18D210-03MSD	Soil	04/25/18
6	GQ009DUP	18D210-03DUP	Soil	04/25/18
7	GQ009TRP	18D210-03TRP	Soil	04/25/18
8				
9				
10				
11				

Notes:

LDC #: 42338C5

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: [illegible]
2nd Reviewer: [illegible]

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
III. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) < 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory Blank				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field Blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VIII. Matrix spike/ Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

LDC #: 42338C5

VALIDATION FINDINGS CHECKLIST

Reviewer:
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		TR
Were target compounds detected in the field duplicates?			✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identifications				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 42338C5

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: PG
2nd Reviewer: AC

METHOD: GC _____ HPLC _____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (94 std)	Recalculated CF (10 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	4/3/18	2,4-D (ZB-35H)	561	561	566.6	566.6	3.2	3.2
	(GC09)		2,4-D (RTX-CLPEST II)	539	539	553.3	553.3	7.5	7.5
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42338C5

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC

Percent difference (%D) = 100 * (N - C)/N

Where: N = __ Initial Calibration Factor or __ Nominal Amount (ng)
C = __ Calibration Factor from Continuing Calibration Standard or __ Calculated Amount (ng)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	QE04002	5/4/18	2,4-D (ZB-35H)	94.0	99.67	99.67	6	6.0
			2,4-D (RTX-CLPEST II)	94.0	98.80	98.8	5	5
2	QE04014	5/4/18	2,4-D (ZB-35H)	94.0	99.43	99.43	6	5.8
			2,4-D (RTX-CLPEST II)	94.0	102.75	102.75	9	9.3
3								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Surrogate Results Verification

Reviewer: Q
2nd reviewer: A

METHOD: √ **GC** __ **HPLC**

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 3

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
2,4-DCAA	ch 1	1000.0	795.99	79.6	79.6	
↓	↓ 2	↓	788.42	78.8	78.8	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 42338C5

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = I SSCLCS - SSCLCSD I * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: LCS/D

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)	50.0	50.0	52.9	46.9	106	106	94	94	12	12
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #42338C8

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer: AK

METHOD: ✓ GC __ HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SC = Sample concentration
SA = Spike added
RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 4/5

Compound	Spike Added (ug/L)		Sample Conc. (ug/L)	Spike Sample Concentration (ug/L)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)	54.4	54.4	ND	48.1	38.0	88	88	70	70	23	23
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 43338C5

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: AK

METHOD: ✓ GC __ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= (A)(Fv)(Df) / (RF)(Vs or Ws)(%S/100)

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. 3 Compound Name ND
#4(MS): 2,4-D

Concentration = (5009.2)(5)(1) / (566.59)(10.03)(0.919)

= 48.0 µg/kg

#	Sample ID	Compound	Reported Concentrations (MQL/SQL)	Recalculated Results Concentrations ( )	Qualifications
	4(MS)	2,4-D	48.1		

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Andersen AFB, CTO JQ13

LDC Report Date: June 18, 2018

Parameters: 2,4-D & 2,4,5-T

Validation Level: Level C & D

Laboratory: TestAmerica, Inc.

Sample Delivery Group (SDG): 680-151865-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GQ001**	680-151865-1**	Soil	04/23/18
GQ002	680-151865-2	Soil	04/23/18
GQ003**	680-151865-3**	Soil	04/23/18
GQ003MS	680-151865-3MS	Soil	04/23/18
GQ003MSD	680-151865-3MSD	Soil	04/23/18

**Indicates sample underwent Level D validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Work Plan for Limited Investigation into Alleged Herbicide Orange Use at Three Sites, Andersen Air Force Base (AFB), Guam (March 2018), the Project Procedures Manual, U.S. Naval Facilities Engineering Command (NAVFAC) Environmental Restoration (ER) Program, NAVFAC Pacific (DON 2015), and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

2,4-D and 2,4,5-T by Environmental Protection Agency (EPA) SW 846 Method 8151A

All sample results were subjected to Standard data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Full data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant.

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank).

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits.

Q MS/MSD recovery was poor.

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory.

M Instrument Performance Check (BFB or DFTPP) was noncompliant.

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor.

V Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were established as required by the method for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

Retention times of all compounds in the calibration standards were within the established retention time windows for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Column	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
GQ001**	DB-35MS	2,4-Dichlorophenyl acetic acid	23 (27-122)	All compounds	J (all detects) UJ (all non-detects)	P

Sample	Column	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
GQ002	DB-35MS	2,4-Dichlorophenyl acetic acid	15 (27-122)	All compounds	UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
GQ003MS/MSD (GQ003**)	2,4,5-T 2,4-D	-236 (31-138) -668 (31-138)	-139 (31-138) -502 (31-138)	J (all detects) J (all detects)	A
GQ003MS/MSD (5X*) (GQ003** (5X*))	2,4,5-T 2,4-D	-130 (28-144) -514 (28-144)	-74.4 (28-144) -354 (28-144)	J (all detects) J (all detects)	A

*Sample GQ003, GQ003MS and GQ003MSD were analyzed at a 5X dilution because 2,4-D exceeded the calibration range in the undiluted analysis of GQ003.

Although the 2,4,5-T and 2,4-D results for parent sample GQ003 were greater than 2X the spike concentration and GQ003, GQ003MS and GQ003MSD were analyzed at 5X dilution for 2,4-D, using professional judgment, the associated results were qualified as estimated due to excessively high negative MS/MSD %Rs.

High negative MS/MSD %Rs indicate that the sample aliquots used to prepare GQ003, GQ003MS and GQ003MSD may not be from the same sample. Additionally, high negative %Rs at 5X dilution indicate that 2,4-D did not exceed the calibration range in GQ003MS and GQ003MSD which is not consistent with the reported results for 2,4-D in the parent sample GQ003.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
GQ003MS/MSD (GQ003**)	2,4,5-T 2,4-D	94 (≤30) 105 (≤30)	J (all detects) J (all detects)	A
GQ003MS/MSD (5X) (GQ003** (5X))	2,4,5-D	126 (≤30)	J (all detects)	A

Although the 2,4,5-T and 2,4-D results for parent sample GQ003 were greater than 2X the spike concentration and GQ003, GQ003MS and GQ003MSD were analyzed at 5X dilution for 2,4-D, using professional judgment, the associated results were qualified as estimated due to excessively high MS/MSD RPDs.

High MS/MSD RPDs may indicate a high degree of heterogeneity in the sample matrix, however, in this case, based on the excessively high negative MS/MSD %Rs, imprecision may be due to either improper sample handling or inconsistent sample preparation.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Triplicates

Samples GQ001**, GQ002, and GQ003** were identified as field triplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)			%RSD (Limits)	RPD (Limits)	Flag	A or P
	GQ001**	GQ002	GQ003** (5X)				
2,4-D	10	8.4U	380	-	190 (≤100)	J (all detects)	A

Compound	Concentration (ug/Kg)			%RSD (Limits)	RPD (Limits)	Flag	A or P
	GQ001**	GQ002	GQ003**				
2,4,5-T	4.4U	4.3U	49J	Not calculable	-	J (all detects)	A

The laboratory indicated that the presence of 2,4-D in the project samples is likely a result of glassware contamination. The laboratory received 10-15 samples that came in around the same time that required 10,000 to 100,000 fold dilutions for 2,4-D.

Chromatograms were reviewed by the validator to verify the reason for the imprecision. The chromatogram for sample GQ003 does not match the chromatograms for samples GQ001 and GQ002. Additionally, matrix interference was apparent for samples GQ001 and GQ002 but not for sample GQ003.

Although sample data are not qualified on the basis of field triplicate imprecision per NAVFAC SOP, using professional judgment, associated results were qualified as estimated due to possible 2,4-D contamination and the uncertainty that GQ003 may not be a field sample based on the field triplicate results and the negative MS/MSD %Rs.

X. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Level D validation.

The laboratory detection limit (DL) and limit of detection (LOD) were less than or equal to the QAPP DL and LOD with the following exceptions:

Sample	Compound	Laboratory DL	QAPP DL	Laboratory LOD	QAPP LOD
GQ001** GQ003**	2,4-D	5.0 ug/Kg	2.5 ug/Kg	8.3 ug/Kg	5.0 ug/Kg

Raw data were not reviewed for Level C validation.

XI. Target Compound Identification

All target compound identifications met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to surrogate %R, MS/MSD %R and RPD, and field triplicate imprecision, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Data Qualification Summary - SDG 680-151865-1

Sample	Compound	Flag	A or P	Reason (Code)
GQ001** GQ002	All compounds	J (all detects) UJ (all non-detects)	P	Surrogates (%R) (S)
GQ003**	2,4,5-T	J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)(RPD) (Q)(E)
GQ003** (5X)	2,4-D	J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)(RPD) (Q)(E)
GQ001** GQ003** (5X)	2,4-D	J (all detects)	A	Field triplicates (RPD) (V)
GQ003**	2,4,5-T	J (all detects)	A	Field triplicates (imprecision) (V)

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Laboratory Blank Data Qualification Summary - SDG 680-151865-1

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Field Blank Data Qualification Summary - SDG 680-151865-1

No Sample Data Qualified in this SDG

LDC #: 42338D5 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/8/18
SDG #: 680-151865-1 Level C/D Page: 1 of 1
Laboratory: Test America, Inc Reviewer: Q
2nd Reviewer: R

METHOD: GC Herbicides (EPA SW 846 Method 8151A) 2,4-D & 2,4,5-T

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	Initial calibration/ICV	A A	RSD ≤ 20%. ICV ≤ 20%
III.	Continuing calibration	A	CCV ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	FR = 1+2+3
X.	Compound quantitation RL/LOQ/LODs	SW	Not reviewed for Level C validation.
XI.	Target compound identification	A	Not reviewed for Level C validation.
XII.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank
** Indicates sample underwent Level D validation

	Client ID	Lab ID	Matrix	Date
1	GQ001**	680-151865-1**	Soil	04/23/18
2	GQ002	680-151865-2	Soil	04/23/18
3	GQ003**	680-151865-3**	Soil	04/23/18
4	GQ003MS	680-151865-3MS	Soil	04/23/18
5	GQ003MSD	680-151865-3MSD	Soil	04/23/18
6				
7				
8				
9				
10				
11				

Notes:

LDC #: 42338D5

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: Q
2nd Reviewer: JC

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
III. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field Blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate Spikes				
Were all surrogate percent recovery (%R) within the QC limits?		✓		
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?		✓		
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VIII. Matrix Spike/Matrix Spike Duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		

LDC #: 42338 05

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: AC

Validation Area	Yes	No	NA	Findings/Comments
VII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓	✓		TR
Were target compounds detected in the field duplicates?	✓		✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 42338D5

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: 9
2nd Reviewer: N

METHOD: ✓ GC __ HPLC

Are surrogates required by the method? Yes___ or No___.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were surrogates spiked into all samples and blanks?

Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	1*	DB-35MS	8	23 (27-122)	J/UJ/P (dets+ND)
				( )	
	2*		8	15 ( )	(ND)
				( )	
				( )	
				( )	
				( )	
				( )	
	* ~~Insufficient sample to re-extraction.~~			( )	
				( )	
				( )	
	* Lab indicated that there was insufficient sample to perform a re-extraction.			( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	1,2-Dinitrobenzene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	2,4-Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #42338D5

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer: A

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
(Y) N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y (N) N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	4/5 (1x)	2,4,5-T	-236 (31-138)	-139 (31-138)	( )	3 (dets)	↓UN/A(Q)
		↓	( )	( )	94 (≤30)		~~dets~~/AE)
	(5x)	2,4-D	~~SOR out~~	( )	( )		No dil
		↓	-514 (29-144)	-354 (29-144)	( )		>4x SA
			( )	( )	36 (≤30)		↓
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
		* GR003MS results (below) spike added and			( )		txf
		were consistent with LCS results			( )		
		** 2,4-D did not exceed calib range in			( )		
		GR003MS/MSD (1x) but did for GR003 (1x)			( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC#: 42338D5

VALIDATION FINDINGS WORKSHEET
Field Triplicates

Page: 1 of 1
Reviewer: a
2nd Reviewer: [illegible]

METHOD: Herbicides (EPA SW 846 Method 8151A)

Y N NA Were field triplicates sets identified in this SDG?
Y N NA Were target analytes detected in the field triplicate sets?

Analyte	Concentration (ug/Kg)			RSD (≤ 35)	RPD (≤ 100)
	1	2	3		
2,4-D (5x*)	10	8.4U	380 *		190
2,4,5-T (1x)	4.4U	4.3U	49J	NC	

V:\FIELD DUPLICATES\Field Triplicates\2018\42338D5_AECOM.wpd

* GQ003 also does not match GQ001 & GQ002 (Ext)
Lab indicated likely result of glassware contamination. 10-15 samples rec'd at same time that rq'd 10,000-100,000 dilution for 2,4-D

LDC #: 42338D5

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and RLs

Reviewer: 9
2nd Reviewer: K

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Compound	Findings Lab DL/LOD > QAPP DL/LOD	Qualifications
		ALL	2,4-D	5.0/8.3 ug/kg > 2.5/5.0 ug/kg	Text
		1, 3	All dets RPD = 40%		
			#1 2,4-D = 30.3%		
			#2: 2,4-D = 2.4%		
			2,4,5-T = 2.0%		

LDC #: 42338D5

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC _____HPLC_____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.25 std)	Recalculated CF (0.25 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	IACL	5/9/18	2,4-D (DB-35MS)	1445576004	1445576004	1459816204	1459816204	6.0	6.0
	(CSGS)		2,4-D (DB-XLB)	310716568	310716568	315815394	315615394	2.6	2.6
2	IACL	5/11/18	2,4-D (DB-35MS)	1317914556	1317914556	1258856811	1258856811	12.8	12.8
	(CSGS)		2,4-D (DB-XLB)	268581372	268581372	273146870	273146870	10.7	10.7
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42338D5

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC

Percent difference (%D) = 100 * (N - C)/N

Where: N = __ Initial Calibration Factor or __ Nominal Amount (ng)
C = __ Calibration Factor from Continuing Calibration Standard or __ Calculated Amount (ng)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	SE090032	5/10/18	2,4-D (DB-35MS)	1459816204	1478123040	1478123040	1.3	1.3
			2,4-D (DB-XLB)	315615394	320574760	320574760	1.6	1.6
2	SE110030	5/11/18	2,4-D (DB-35MS)	1258856811	1079069800	1079069800	14.3	14.3
			2,4-D (DB-XLB)	273146870	259613330	259613330	5.0	5.0
3								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Surrogate Results Verification

METHOD: ✓ GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: /

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
2,4-D	DB-35MS	0.2000	0.0468	23	23	0

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 42200V5

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer: AC

METHOD: ✓ GC ___HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SC = Sample concentration
SA = Spike added
RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 4/5

Compound	Spike Added (MS)	Spike Added (MSD)	Sample Conc.	Spike Sample Concentration (MS)	Spike Sample Concentration (MSD)	Matrix spike Percent Recovery Reported	Matrix spike Percent Recovery Recalc.	Matrix Spike Duplicate Percent Recovery Reported	Matrix Spike Duplicate Percent Recovery Recalc.	MS/MSD RPD Reported	MS/MSD RPD Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)	167.3	4.3	380	31.5	139	-54	-518	-354	-358	126	126
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #~~423805~~

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AC

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = | SSCLCS - SSCLCSD | * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 680-522658

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)	64.8	NA	46.3	NA	T2	T2				
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 43385S

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: 9
2nd Reviewer: K

METHOD: √ GC __ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. 3 Compound Name 2,4-D

Concentration = $\frac{(28169999)(10,000)(5)}{(1459816304)(30.05)(0.989)}$
(12588562811)

$= 37.11$ µg/kg

#	Sample ID	Compound	Reported Concentrations (µg/kg)	Recalculated Results Concentrations (µg/kg)	Qualifications
	1	2,4-D	10	10	
	3	2,4-D	380	37.11	
		2,4,5-T	49	48.9	

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Andersen AFB, CTO JQ13

LDC Report Date: June 18, 2018

Parameters: 2,4-D & 2,4,5-T

Validation Level: Level C & D

Laboratory: TestAmerica, Inc.

Sample Delivery Group (SDG): 680-151914-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GQ007	680-151914-1	Soil	04/25/18
GQ008	680-151914-2	Soil	04/25/18
GQ009**	680-151914-3**	Soil	04/25/18

**Indicates sample underwent Level D validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Work Plan for Limited Investigation into Alleged Herbicide Orange Use at Three Sites, Andersen Air Force Base (AFB), Guam (March 2018), the Project Procedures Manual, U.S. Naval Facilities Engineering Command (NAVFAC) Environmental Restoration (ER) Program, NAVFAC Pacific (DON 2015), and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

2,4-D and 2,4,5-T by Environmental Protection Agency (EPA) SW 846 Method 8151A

All sample results were subjected to Standard data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Full data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant.

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank).

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits.

Q MS/MSD recovery was poor.

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory.

M Instrument Performance Check (BFB or DFTPP) was noncompliant.

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor.

V Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were established as required by the method for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

Retention times of all compounds in the calibration standards were within the established retention time windows for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicate

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Triplicates

Samples GQ007, GQ008, and GQ009** were identified as field triplicates. No results were detected in any of the samples.

X. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Level D validation.

The laboratory detection limit (DL) and limit of detection (LOD) were less than or equal to the QAPP DL and LOD with the following exceptions:

Sample	Compound	Laboratory DL	QAPP DL	Laboratory LOD	QAPP LOD
All samples in SDG 680-151914-1	2,4-D	5.0 ug/Kg	2.5 ug/Kg	8.3 ug/Kg	5.0 ug/Kg

Raw data were not reviewed for Level C validation.

XI. Target Compound Identification

All target compound identifications met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Data Qualification Summary - SDG 680-151914-1

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Laboratory Blank Data Qualification Summary - SDG 680-151914-1

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Field Blank Data Qualification Summary - SDG 680-151914-1

No Sample Data Qualified in this SDG

LDC #: 42338E5

SDG #: 680-151914-1

Laboratory: Test America, Inc

VALIDATION COMPLETENESS WORKSHEET

Level C/D

Date: 6/8/18

Page: 1 of 1

Reviewer: 1

2nd Reviewer: 1

METHOD: GC Herbicides (EPA SW 846 Method 8151A) 2,4-D + 2,4,5-T

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20%, ICV ≤ 20%
III.	Continuing calibration	A	CCV ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	ND	FR = 0/1+2+3
X.	Compound quantitation RL/LOQ/LODs	SW	Not reviewed for Level C validation.
XI.	Target compound identification	A	Not reviewed for Level C validation.
XII.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

** Indicates sample underwent Level D validation

	Client ID	Lab ID	Matrix	Date
1	GQ007	680-151914-1	Soil	04/25/18
2	GQ008	680-151914-2	Soil	04/25/18
3	GQ009**	680-151914-3**	Soil	04/25/18
4				
5				
6				
7				
8				
9				
10				
11				

Notes:

LDC #: 423385

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 2
2nd Reviewer: 1

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
III. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VIII. Matrix spikes				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

LDC #: 42338E5

VALIDATION FINDINGS CHECKLIST

Reviewer: A
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		TR
Were target compounds detected in the field duplicates?			✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 42338E5

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and RLs

Reviewer: 9
2nd Reviewer: K

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Compound	Findings Lab DL/LOD > QAPP DL/LOD	Qualifications
		ALL	2,4-D	5.0/8.3 ug/kg > 2.5/5.0 ug/kg	Text

LDC #: 42338E5

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC _____ HPLC _____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.25 std)	Recalculated CF (0.25 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	IACL	5/8/18	2,4-D (DB-35MS)	1676989976	1676989976	1593535987	1593535987	12.0	12.0
	(CSGS)		2,4-D (DB-XLB)	325959236	325959236	302399622	302399622	14.4	14.4
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42338E5

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC

Percent difference (%D) = 100 * (N - C)/N

Where: N = __ Initial Calibration Factor or __ Nominal Amount (ng)
C = __ Calibration Factor from Continuing Calibration Standard or __ Calculated Amount (ng)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	SE080028	5/8/18	2,4-D (DB-35MS)	1593535987	1336273560	1336273560	16.1	16.1
			2,4-D (DB-XLB)	302399622	279399860	279399860	7.6	7.6
2								
3								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

METHOD: ✓ GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 3

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
2,4-DCAA	DB-35MS	0.200	0.2046	102	102	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #42330E5

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: A

METHOD: √ GC __ HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = | SSCLCS - SSCLCSD | * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 680-52254 /

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)	65.4	NA	44.5	NA	68	68				
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #~~423825~~

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: A

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= (A)(Fv)(Df) / (RF)(Vs or Ws)(%S/100)

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound In the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. #3 Compound Name ND
LCS 680-~~532~~541, 2,4-D

Concentration = $\frac{(217039232)(10)(1)(1000)}{(1593535987)(30.59)}$

= 44.5 ug/kg

#	Sample ID	Compound	Reported Concentrations (~~MRL~~)	Recalculated Results Concentrations ( )	Qualifications
	LCS	2,4-D	44.5		

Comments: _____

SAMPCAL.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Andersen AFB, CTO JQ13

LDC Report Date: June 18, 2018

Parameters: 2,4-D & 2,4,5-T

Validation Level: Level C & D

Laboratory: TestAmerica, Inc.

Sample Delivery Group (SDG): 680-151915-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
GQ004	680-151915-1	Soil	04/24/18
GQ005**	680-151915-2**	Soil	04/24/18
GQ006	680-151915-3	Soil	04/24/18

**Indicates sample underwent Level D validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Work Plan for Limited Investigation into Alleged Herbicide Orange Use at Three Sites, Andersen Air Force Base (AFB), Guam (March 2018), the Project Procedures Manual, U.S. Naval Facilities Engineering Command (NAVFAC) Environmental Restoration (ER) Program, NAVFAC Pacific (DON 2015), and the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

2,4-D and 2,4,5-T by Environmental Protection Agency (EPA) SW 846 Method 8151A

All sample results were subjected to Standard data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Full data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

H Holding times were exceeded.

S Surrogate recovery was outside QC limits.

C Calibration %RSD, r, r^2 or %D were noncompliant.

R Calibration RRF was <0.05.

B Presumed contamination from preparation (method blank).

L Laboratory Control Sample/Laboratory Control Sample Duplicate %R or RPD was not within control limits.

Q MS/MSD recovery was poor.

E MS/MSD or Duplicate RPD was high.

I Internal standard performance was unsatisfactory.

M Instrument Performance Check (BFB or DFTPP) was noncompliant.

T Presumed contamination from trip blank.

F Presumed contamination from FB or ER.

D The analysis with this flag should not be used because another more technically sound analysis is available.

P Instrument performance for pesticides was poor.

V Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were established as required by the method for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

Retention times of all compounds in the calibration standards were within the established retention time windows for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicate

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Triplicates

Samples GQ004, GQ005**, and GQ006 were identified as field triplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)			%RSD (Limits)	RPD (Limits)
	GQ004	GQ005**	GQ006		
2,4-D	9.0U	8.3J	9.0U	Not calculable	-

The laboratory indicated that the presence of 2,4-D in the project sample is likely a result of glassware contamination. The laboratory received 10-15 samples that came in around the same time that required 10,000 to 100,000 fold dilutions for 2,4-D.

X. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Level D validation.

The laboratory detection limit (DL) and limit of detection (LOD) were less than or equal to the QAPP DL and LOD with the following exceptions:

Sample	Compound	Laboratory DL	QAPP DL	Laboratory LOD	QAPP LOD
All samples in SDG 680-151915-1	2,4-D	5.0 ug/Kg	2.5 ug/Kg	8.3 ug/Kg	5.0 ug/Kg

Raw data were not reviewed for Level C validation.

XI. Target Compound Identification

All target compound identifications met validation criteria for samples which underwent Level D validation. Raw data were not reviewed for Level C validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Data Qualification Summary - SDG 680-151915-1

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Laboratory Blank Data Qualification Summary - SDG 680-151915-1

No Sample Data Qualified in this SDG

Andersen AFB, CTO JQ13
2,4-D & 2,4,5-T - Field Blank Data Qualification Summary - SDG 680-151915-1

No Sample Data Qualified in this SDG

LDC #: 42338F5

SDG #: 680-151915-1

Laboratory: Test America, Inc

VALIDATION COMPLETENESS WORKSHEET

Level C/D

Date: 6/8/18

Page: 1 of 1

Reviewer: Q

2nd Reviewer: M

METHOD: GC Herbicides (EPA SW 846 Method 8151A) 2,4-D & 2,4,5-T

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	Initial calibration/ICV	A/A	RSD ≤ 20%. ICV ≤ 20%
III.	Continuing calibration	A	CCV ≤ 20%
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	FR = 1+2+3
X.	Compound quantitation RL/LOQ/LODs	SW	Not reviewed for Level C validation.
XI.	Target compound identification	A	Not reviewed for Level C validation.
XII.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

** Indicates sample underwent Level D validation

	Client ID	Lab ID	Matrix	Date
1	GQ004	680-151915-1	Soil	04/24/18
2	GQ005**	680-151915-2**	Soil	04/24/18
3	GQ006	680-151915-3	Soil	04/24/18
4				
5				
6				
7				
8				
9				
10				
11				

Notes:

LDC #: 42338F5

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: Q
2nd Reviewer: K

Method: ✓ GC _____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
III. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recoveries (%R) 80-120%?	✓			
Were all the retention times within the acceptance windows?	✓			
V. Laboratory blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?		✓		
Were target compounds detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		TR
Were target compounds detected in the field duplicates?			✓	
X. Compound quantitation				
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target compound identification				
Were the retention times of reported detects within the RT windows?	✓			
XII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC#: 42338F5

VALIDATION FINDINGS WORKSHEET

Field Triplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: Herbicides (EPA SW 846 Method 8151A)

Y N NA Were field triplicates sets identified in this SDG?
Y N NA Were target analytes detected in the field triplicate sets?

Analyte	Concentration (ug/Kg)			RSD (≤ 35)	RPD (≤ 100)
	1	2	3		
2,4-D	9.0U	8.3J	9.0U	NC	

V:\FIELD DUPLICATES\Field Triplicates\2018\42338F5_AECOM.wpd

LDC #: 42338F5

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and RLs

Reviewer: T
2nd Reviewer: AC

METHOD: GC Herbicides (EPA SW 846 Method 8151A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Compound	Findings Lab DL/LOD > QAPP DL/LOD	Qualifications
		ALL	2,4-D	5.0/8.3 ug/kg > 2.5/5.0 ug/kg	Text
		2	2,4-D	RPD = 40% (19%)	
			presence of 2,4-D likely resulted in glassware contamination per lab		Text

42338F5_COMQUA.wpd

LDC #: 42338F5

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC _____HPLC_____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (0.25 std)	Recalculated CF (0.25 std)	Reported Ave CF (initial)	Recalculated Ave CF (intial)	Reported %RSD	Recalculated %RSD
1	IACL	5/8/18	2,4-D (DB-35MS)	1676989976	1676989976	1593535987	1593535987	12.0	12.0
	(CSGS)		2,4-D (DB-XLB)	325959236	325959236	302399622	302399622	14.4	14.4
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42338F5

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: PG
2nd Reviewer:

METHOD: GC

Percent difference (%D) = 100 * (N - C)/N

Where: N = __ Initial Calibration Factor or __ Nominal Amount (ng)
C = __ Calibration Factor from Continuing Calibration Standard or __ Calculated Amount (ng)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	SE080028	5/8/18	2,4-D (DB-35MS)	1593535987	1336273560	1336273560	16.1	16.1
			2,4-D (DB-XLB)	302399622	279399860	279399860	7.6	7.6
2								
3								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Surrogate Results Verification

Reviewer: Q
2nd reviewer: [illegible]

METHOD: ✓ **GC** ___ **HPLC**

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 2

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
2,4-DCBP	DB-35MS	0.200	0.1865	93	93	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 4-22045

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: AK

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = | SSCLCS - SSCLCSD | * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 680-522541

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)	65.1	NA	44.5	NA	68	68				
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42333F5

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: 2
2nd Reviewer: K

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= (A)(Fv)(Df) / (RF)(Vs or Ws)(%S/100)

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. 2 Compound Name 2,4-D

Concentration = $\frac{(36113981)(10000)(1)}{(1693535987)(30.03)(0.911)}$

= 8.28 ug/kg

#	Sample ID	Compound	Reported Concentrations (ug/kg)	Recalculated Results Concentrations ( )	Qualifications
	2	2,4-D	8.3		

Comments: _____

EPA_NO	LAB_SAMPLE	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: **8151A**													
GQ001	680-151865-1	1	2,4,5-T	9/2018 1:20:00 PM	/2018 4:28:00 AM	D		UG_KG	U	8.4	4.4	UJ	s
GQ001	680-151865-1	1	2,4-D	9/2018 1:20:00 PM	/2018 4:28:00 AM	D	10	UG_KG	M	8.4	8.4	J	s,v
GQ002	680-151865-2	1	2,4,5-T	9/2018 1:25:00 PM	/2018 4:47:00 AM	C		UG_KG	U M	8.4	4.3	UJ	s
GQ002	680-151865-2	1	2,4-D	9/2018 1:25:00 PM	/2018 4:47:00 AM	C		UG_KG	U M	8.4	8.4	UJ	s
GQ003	680-151865-3	1	2,4,5-T	9/2018 1:30:00 PM	/2018 5:07:00 AM	D	49	UG_KG	J1	8.4	4.3	J	e,q,v
GQ003	680-151865-3	5	2,4-D	9/2018 1:30:00 PM	/2018 9:55:00 PM	D	380	UG_KG	D J1	42	42	J	e,q,v
GQ007	680-151914-1	1	2,4,5-T	2018 11:00:00 AM	2018 11:56:00 PM	C		UG_KG	U	8.7	4.5		
GQ007	680-151914-1	1	2,4-D	2018 11:00:00 AM	2018 11:56:00 PM	C		UG_KG	U M	8.7	8.7		
GQ008	680-151914-2	1	2,4,5-T	2018 11:05:00 AM	018 12:16:00 AM	C		UG_KG	U	8.5	4.4		
GQ008	680-151914-2	1	2,4-D	2018 11:05:00 AM	018 12:16:00 AM	C		UG_KG	U	8.5	8.5		
GQ009	680-151914-3	1	2,4,5-T	2018 11:10:00 AM	018 12:35:00 AM	D		UG_KG	U	8.6	4.5		
GQ009	680-151914-3	1	2,4-D	2018 11:10:00 AM	018 12:35:00 AM	D		UG_KG	U M	8.6	8.6		
GQ004	680-151915-1	1	2,4,5-T	2018 11:40:00 AM	2018 10:58:00 PM	C		UG_KG	U M	9.0	4.7		
GQ004	680-151915-1	1	2,4-D	2018 11:40:00 AM	2018 10:58:00 PM	C		UG_KG	U	9.0	9.0		
GQ005	680-151915-2	1	2,4,5-T	2018 11:45:00 AM	2018 11:17:00 PM	D		UG_KG	U	9.1	4.7		
GQ005	680-151915-2	1	2,4-D	2018 11:45:00 AM	2018 11:17:00 PM	D	8.3	UG_KG	J	9.1	9.1		
GQ006	680-151915-3	1	2,4,5-T	2018 11:50:00 AM	2018 11:36:00 PM	C		UG_KG	U	9.0	4.7		
GQ006	680-151915-3	1	2,4-D	2018 11:50:00 AM	2018 11:36:00 PM	C		UG_KG	U M	9.0	9.0		
GQ001	D194-01	1	2,4,5-T	8/2018 1:20:00 PM	/2018 6:07:00 AM	D	5.1	UG_KG	U	10	5.1		
GQ001	D194-01	1	2,4-D	8/2018 1:20:00 PM	/2018 6:07:00 AM	D	5.1	UG_KG	U	10	5.1		
GQ002	D194-02	1	2,4,5-T	8/2018 1:25:00 PM	/2018 6:41:00 AM	C	5.0	UG_KG	U	10	5.0		
GQ002	D194-02	1	2,4-D	8/2018 1:25:00 PM	/2018 6:41:00 AM	C	5.0	UG_KG	U	10	5.0		
GQ002DUP	D194-02D	1	2,4,5-T	8/2018 1:25:00 PM	/2018 7:15:00 AM	C	5.1	UG_KG	U	10	5.1		
GQ002DUP	D194-02D	1	2,4-D	8/2018 1:25:00 PM	/2018 7:15:00 AM	C	5.1	UG_KG	U	10	5.1		
GQ002TRIP	D194-02R	1	2,4,5-T	8/2018 1:25:00 PM	/2018 7:49:00 AM	C	5.1	UG_KG	U	10	5.1		

EPA_NO	LAB_SAMPLE	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: **8151A**													
GQ002TRIP	D194-02R	1	2,4-D	3/2018 1:25:00 PM	/2018 7:49:00 AM	C	5.1	UG_KG	U	10	5.1		
GQ003	D194-03	1	2,4,5-T	3/2018 1:30:00 PM	/2018 8:24:00 AM	D	5.1	UG_KG	U	10	5.1		
GQ003	D194-03	1	2,4-D	3/2018 1:30:00 PM	/2018 8:24:00 AM	D	5.1	UG_KG	U	10	5.1		
GQ004	D202-01	1	2,4,5-T	2018 11:40:00 AM	/2018 2:05:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ004	D202-01	1	2,4-D	2018 11:40:00 AM	/2018 2:05:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ005	D202-02	1	2,4,5-T	2018 11:45:00 AM	/2018 4:25:00 PM	D	5.1	UG_KG	U	10	5.1		
GQ005	D202-02	1	2,4-D	2018 11:45:00 AM	/2018 4:25:00 PM	D	5.1	UG_KG	U	10	5.1		
GQ006	D202-03	1	2,4,5-T	2018 11:50:00 AM	/2018 5:00:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ006	D202-03	1	2,4-D	2018 11:50:00 AM	/2018 5:00:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ006DUP	D202-03D	1	2,4,5-T	2018 11:50:00 AM	/2018 5:34:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ006DUP	D202-03D	1	2,4-D	2018 11:50:00 AM	/2018 5:34:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ006TRIP	D202-03R	1	2,4,5-T	2018 11:50:00 AM	/2018 6:08:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ006TRIP	D202-03R	1	2,4-D	2018 11:50:00 AM	/2018 6:08:00 PM	C	5.2	UG_KG	U	10	5.2		
GQ007	D210-01	1	2,4,5-T	2018 11:00:00 AM	/2018 7:51:00 PM	C	5.4	UG_KG	U	11	5.4		
GQ007	D210-01	1	2,4-D	2018 11:00:00 AM	/2018 7:51:00 PM	C	5.4	UG_KG	U	11	5.4		
GQ008	D210-02	1	2,4,5-T	2018 11:05:00 AM	/2018 8:25:00 PM	C	5.5	UG_KG	U	11	5.5		
GQ008	D210-02	1	2,4-D	2018 11:05:00 AM	/2018 8:25:00 PM	C	5.5	UG_KG	U	11	5.5		
GQ009	D210-03	1	2,4,5-T	2018 11:10:00 AM	/2018 9:00:00 PM	D	5.4	UG_KG	U	11	5.4		
GQ009	D210-03	1	2,4-D	2018 11:10:00 AM	/2018 9:00:00 PM	D	5.4	UG_KG	U	11	5.4		
GQ009DUP	D210-03D	1	2,4,5-T	2018 11:10:00 AM	/2018 9:34:00 PM	C	5.4	UG_KG	U	11	5.4		
GQ009DUP	D210-03D	1	2,4-D	2018 11:10:00 AM	/2018 9:34:00 PM	C	5.4	UG_KG	U	11	5.4		
GQ009TRIP	D210-03R	1	2,4,5-T	2018 11:10:00 AM	2018 11:16:00 PM	C	5.4	UG_KG	U	11	5.4		
GQ009TRIP	D210-03R	1	2,4-D	2018 11:10:00 AM	2018 11:16:00 PM	C	5.4	UG_KG	U	11	5.4		