



AGRICULTURE & PRIORITY POLLUTANTS LABORATORIES

A METIRI GROUP COMPANY

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NELAP Certification Number: CA00046

DoD-ELAP Certification Number 4064.01

State Certification Number:

March 23, 2023

Watson Tanji
AECOM Honolulu
1001 Bishop Street, Suite 1600
Honolulu, HI 96813

RE: Red Hill AFFF Assessment Sampling
23C0146

Enclosed are the results of analyses for samples received by our laboratory on 3/16/2023. If you have any questions concerning this report, please feel free to contact me.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC and DoD QSM. Release of the hard copy has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

Karen Volpendesta
Project Manager

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AECOM Honolulu
1001 Bishop Street, Suite 1600
Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
Project Number: Red Hill AFFF Assessment Sampling
Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Work Order Case Narrative

As directed, this report was amended to update the IDs for sample RHS-IF-TRAIN-01-031523-N-R1 to RHSF-PUMP-PR-01-031523-N and RHS-EF-TRAIN-01-031523-N-R1 to RHS-EF-TRAIN-01-031523-N. A revised Chain of Custody was provided via email on March 17, 2023.

Analysis Case Narrative

EPA 1633: Manual integrations were performed for this method in accordance with APPL's SOP. Chromatograms after manual integration are enclosed for specific samples and analytes. Abbreviated flags for technical justification are listed on the chromatogram.

Some extracted internal standards recovered outside of control limits in some samples; these samples were diluted and recovered in control, unless stated otherwise.

The extracted internal standard 13C2-4:2FTS recovered above the upper control limit in sample 02 - RHS-EF-TRAIN-01-031523-N.

The extracted internal standards 134-PFHpA and 13C2-4:2FTS, recovered above the upper control limit in the BCC0177-BLK1.

The extracted internal standards 134-PFHpA and 13C2-4:2FTS recovered above the upper control limit in the BCC0177-BS1.

The analytes PFBA, PFHxA, and 11CL-PF3OUDS recovered above the upper control limit in the BCC0177-MRL1. The extracted internal standard 13C2-4:2FTS recovered above the upper control limit.

The analytes PFEESA, 9CL-PF3ONS, 11CL-PF3OUDS recovered above the upper control limit in the SC01124-LCV1. The analyte 5:3FTCA recovered below the lower control limit.

The analyte PFDoS recovered above the upper control limit in the SC01124-CCV1.

The analyte PFPeS recovered above the upper control limit in the SC01124-CCV2.

The analyte 9CL-PF3ONS recovered above the upper control limit in the SC01124-CCV4.

Samples in this Report

Lab ID	Sample	Matrix	Date Sampled	Date Received
23C0146-01	RHSF-PUMP-PR-01-031523-N	Water	03/15/2023 12:00	03/16/2023
23C0146-02	RHS-EF-TRAIN-01-031523-N	Water	03/15/2023 11:25	03/16/2023

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Sample Results

Sample: RHSF-PUMP-PR-01-031523-N
23C0146-01 (Water)

Per- and Polyfluoroalkyl Substances

Analyte	Result /Qual	LOQ	LOD	DL	Units	Date Analyzed	DF	Method	Prep Batch
PFBA	0.65 J	1.4	0.69	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
PFPEA	0.92	0.69	0.34	0.056	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHXA	0.72	0.34	0.17	0.047	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHPA	0.48	0.34	0.17	0.035	ng/L	03/21/23	1	EPA 1633	BCC0177
PFOA	0.73	0.34	0.26	0.13	ng/L	03/21/23	1	EPA 1633	BCC0177
PFNA	0.17 U	0.34	0.17	0.070	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDA	0.17 U	0.34	0.17	0.087	ng/L	03/21/23	1	EPA 1633	BCC0177
PFUnA	0.26 U	0.34	0.26	0.14	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDOA	0.17 U	0.34	0.17	0.096	ng/L	03/21/23	1	EPA 1633	BCC0177
PFTRDA	0.26 U	0.34	0.26	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
PFTEDA	0.26 U	0.34	0.26	0.17	ng/L	03/21/23	1	EPA 1633	BCC0177
PFBS	0.60	0.34	0.17	0.032	ng/L	03/21/23	1	EPA 1633	BCC0177
PFPEs	0.093 J	0.34	0.17	0.054	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHXS	0.83	0.34	0.17	0.027	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHPS	0.17 U IR1,	0.34	0.17	0.044	ng/L	03/21/23	1	EPA 1633	BCC0177
PFOS	0.76	0.34	0.17	0.055	ng/L	03/21/23	1	EPA 1633	BCC0177
PFNS	0.17 U	0.34	0.17	0.11	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDS	0.26 U	0.34	0.26	0.13	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDOS	0.17 U	0.34	0.17	0.11	ng/L	03/21/23	1	EPA 1633	BCC0177
4:2FTS	0.69 U	1.4	0.69	0.25	ng/L	03/21/23	1	EPA 1633	BCC0177
6:2FTS	0.69 U	1.4	0.69	0.27	ng/L	03/21/23	1	EPA 1633	BCC0177
8:2FTS	0.69 U	1.4	0.69	0.071	ng/L	03/21/23	1	EPA 1633	BCC0177
PFOSA	0.17 U	0.34	0.17	0.090	ng/L	03/21/23	1	EPA 1633	BCC0177
NMeFOSA	0.69 U	1.4	0.69	0.41	ng/L	03/21/23	1	EPA 1633	BCC0177
NEtFOSA	0.69 U	1.4	0.69	0.35	ng/L	03/21/23	1	EPA 1633	BCC0177
NMeFOSAA	0.17 U	0.34	0.17	0.091	ng/L	03/21/23	1	EPA 1633	BCC0177
NEtFOSAA	0.17 U	0.34	0.17	0.099	ng/L	03/21/23	1	EPA 1633	BCC0177
NMeFOSE	1.0 U	1.4	1.0	0.87	ng/L	03/21/23	1	EPA 1633	BCC0177
NEtFOSE	1.0 U	1.4	1.0	0.90	ng/L	03/21/23	1	EPA 1633	BCC0177
HFPO-DA	0.34 U	0.69	0.34	0.15	ng/L	03/21/23	1	EPA 1633	BCC0177
ADONA	0.34 U	0.69	0.34	0.11	ng/L	03/21/23	1	EPA 1633	BCC0177
PFEESA	0.34 U	0.69	0.34	0.094	ng/L	03/21/23	1	EPA 1633	BCC0177
PFMPA	0.34 U	0.69	0.34	0.046	ng/L	03/21/23	1	EPA 1633	BCC0177
PFMBA	0.34 U	0.69	0.34	0.078	ng/L	03/21/23	1	EPA 1633	BCC0177
NFDHA	0.34 U	0.69	0.34	0.26	ng/L	03/21/23	1	EPA 1633	BCC0177
9CL-PF3ONS	0.34 U	0.69	0.34	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
11CL-PF3OUDS	0.34 U	0.69	0.34	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
3:3FTCA	0.69 U	1.4	0.69	0.49	ng/L	03/21/23	1	EPA 1633	BCC0177
5:3FTCA	0.69 U	1.4	0.69	0.38	ng/L	03/21/23	1	EPA 1633	BCC0177
7:3FTCA	0.69 U	1.4	0.69	0.48	ng/L	03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C4-PFBA	81.7%		10-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C5-PFPEA	92.7%		35-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C5-PFHXA	97.1%		55-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C4-PFHPA	102%		55-150			03/21/23	1	EPA 1633	BCC0177

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Sample Results (Continued)

Sample: RHSF-PUMP-PR-01-031523-N (Continued)
23C0146-01 (Water)

Per- and Polyfluoroalkyl Substances (Continued)

Analyte	Result /Qual	LOQ	LOD	DL	Units	Date Analyzed	DF	Method	Prep Batch
Surrogate: 13C8-PFOA	89.9%		60-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C9-PFNA	95.4%		55-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C6-PFDA	90.9%		50-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C7-PFUnA	75.6%		30-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-PFDOA	82.0%		10-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-PFTEDA	62.6%		10-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C3-PFBS	84.6%		55-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C3-PFHXS	87.6%		55-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C8-PFOS	86.3%		45-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-4:2FTS	196%		60-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-6:2FTS	137%		60-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-8:2FTS	209% S2		50-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-8:2FTS	166%		50-200			03/21/23	10	EPA 1633	BCC0177
Surrogate: 13C8-PFOA	65.9%		30-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: D3-NMEFOA	24.5%		15-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: D5-NETFOA	22.4%		10-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: D3-NMEFOSAA	118%		45-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: D5-NETFOSAA	84.7%		10-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: D7-NMEFOSE	33.9%		10-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: D9-NETFOSE	42.3%		10-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C3-HFPO-DA	98.9%		25-160			03/21/23	1	EPA 1633	BCC0177

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Reported: 03/23/2023 14:16

Sample Results (Continued)

**Sample: RHS-EF-TRAIN-01-031523-N
23C0146-02 (Water)**

Per- and Polyfluoroalkyl Substances

Analyte	Result /Qual	LOQ	LOD	DL	Units	Date Analyzed	DF	Method	Prep Batch
PFBA	0.63 J	1.4	0.71	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
PFPEA	0.35 U	0.71	0.35	0.058	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHXA	0.18 U	0.35	0.18	0.049	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHPA	0.18 U	0.35	0.18	0.036	ng/L	03/21/23	1	EPA 1633	BCC0177
PFOA	0.27 U	0.35	0.27	0.13	ng/L	03/21/23	1	EPA 1633	BCC0177
PFNA	0.18 U	0.35	0.18	0.072	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDA	0.18 U	0.35	0.18	0.090	ng/L	03/21/23	1	EPA 1633	BCC0177
PFUnA	0.27 U	0.35	0.27	0.14	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDOA	0.18 U	0.35	0.18	0.099	ng/L	03/21/23	1	EPA 1633	BCC0177
PFTRDA	0.27 U	0.35	0.27	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
PFTEDA	0.27 U	0.35	0.27	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
PFBS	0.037 J IR2,	0.35	0.18	0.033	ng/L	03/21/23	1	EPA 1633	BCC0177
PFPEs	0.18 U IR1,	0.35	0.18	0.055	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHXS	0.18 U	0.35	0.18	0.028	ng/L	03/21/23	1	EPA 1633	BCC0177
PFHPS	0.18 U	0.35	0.18	0.045	ng/L	03/21/23	1	EPA 1633	BCC0177
PFOS	0.11 J	0.35	0.18	0.056	ng/L	03/21/23	1	EPA 1633	BCC0177
PFNS	0.18 U	0.35	0.18	0.11	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDS	0.27 U	0.35	0.27	0.13	ng/L	03/21/23	1	EPA 1633	BCC0177
PFDOS	0.18 U	0.35	0.18	0.11	ng/L	03/21/23	1	EPA 1633	BCC0177
4:2FTS	0.71 U	1.4	0.71	0.26	ng/L	03/21/23	1	EPA 1633	BCC0177
6:2FTS	0.71 U	1.4	0.71	0.28	ng/L	03/21/23	1	EPA 1633	BCC0177
8:2FTS	0.14 J	1.4	0.71	0.073	ng/L	03/21/23	1	EPA 1633	BCC0177
PFOSA	0.18 U	0.35	0.18	0.092	ng/L	03/21/23	1	EPA 1633	BCC0177
NMeFOSA	0.71 U	1.4	0.71	0.42	ng/L	03/21/23	1	EPA 1633	BCC0177
NEtFOSA	0.71 U	1.4	0.71	0.37	ng/L	03/21/23	1	EPA 1633	BCC0177
NMeFOSAA	0.18 U	0.35	0.18	0.094	ng/L	03/21/23	1	EPA 1633	BCC0177
NEtFOSAA	0.18 U	0.35	0.18	0.10	ng/L	03/21/23	1	EPA 1633	BCC0177
NMeFOSE	1.1 U	1.4	1.1	0.90	ng/L	03/21/23	1	EPA 1633	BCC0177
NEtFOSE	1.1 U	1.4	1.1	0.93	ng/L	03/21/23	1	EPA 1633	BCC0177
HFPO-DA	0.35 U	0.71	0.35	0.15	ng/L	03/21/23	1	EPA 1633	BCC0177
ADONA	0.35 U	0.71	0.35	0.11	ng/L	03/21/23	1	EPA 1633	BCC0177
PFEESA	0.35 U	0.71	0.35	0.096	ng/L	03/21/23	1	EPA 1633	BCC0177
PFMPA	0.35 U	0.71	0.35	0.048	ng/L	03/21/23	1	EPA 1633	BCC0177
PFMBA	0.35 U	0.71	0.35	0.080	ng/L	03/21/23	1	EPA 1633	BCC0177
NFDHA	0.35 U	0.71	0.35	0.27	ng/L	03/21/23	1	EPA 1633	BCC0177
9CL-PF3ONS	0.35 U	0.71	0.35	0.19	ng/L	03/21/23	1	EPA 1633	BCC0177
11CL-PF3OUDS	0.35 U	0.71	0.35	0.18	ng/L	03/21/23	1	EPA 1633	BCC0177
3:3FTCA	0.71 U	1.4	0.71	0.51	ng/L	03/21/23	1	EPA 1633	BCC0177
5:3FTCA	0.71 U	1.4	0.71	0.39	ng/L	03/21/23	1	EPA 1633	BCC0177
7:3FTCA	0.71 U	1.4	0.71	0.49	ng/L	03/21/23	1	EPA 1633	BCC0177
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Surrogate: 13C4-PFBA	78.5%		10-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C5-PFPEA	116%		35-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C5-PFHXA	122%		55-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C4-PFHPA	133%		55-150			03/21/23	1	EPA 1633	BCC0177

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Project: Red Hill AFFF Assessment Sampling
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Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Sample Results (Continued)

Sample: RHS-EF-TRAIN-01-031523-N (Continued)
23C0146-02 (Water)

Per- and Polyfluoroalkyl Substances (Continued)

Analyte	Result /Qual	LOQ	LOD	DL	Units	Date Analyzed	DF	Method	Prep Batch
Surrogate: 13C8-PFOA	92.1%		60-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C9-PFNA	84.2%		55-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C6-PFDA	89.2%		50-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C7-PFUnA	80.8%		30-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-PFDOA	80.9%		10-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-PFTEDA	73.7%		10-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C3-PFBS	82.3%		55-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C3-PFHXS	88.9%		55-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C8-PFOS	81.3%		45-140			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-4:2FTS	217% S2		60-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-4:2FTS	216% S2		60-200			03/21/23	10	EPA 1633	BCC0177
Surrogate: 13C2-6:2FTS	116%		60-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C2-8:2FTS	179%		50-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C8-PFOA	63.4%		30-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: D3-NMEFOA	24.6%		15-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: D5-NETFOA	22.3%		10-130			03/21/23	1	EPA 1633	BCC0177
Surrogate: D3-NMEFOSA	104%		45-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: D5-NETFOSA	82.4%		10-200			03/21/23	1	EPA 1633	BCC0177
Surrogate: D7-NMEFOSE	34.7%		10-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: D9-NETFOSE	43.3%		10-150			03/21/23	1	EPA 1633	BCC0177
Surrogate: 13C3-HFPO-DA	121%		25-160			03/21/23	1	EPA 1633	BCC0177

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Reported: 03/23/2023 14:16

PREPARATION BATCH SUMMARY

EPA 1633

Laboratory: APPL, LLC

Client: AECOM

Batch: BCC0177 Batch Matrix: Water Preparation: EPA 1633

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT mL	FINAL VOL. mL
RHSF-PUMP-PR-01-031523-N	23C0146-01	03/17/23 11:22	581.10	2.00
RHSF-PUMP-PR-01-031523-N	23C0146-01RE1	03/17/23 11:22	581.10	2.00
RHS-EF-TRAIN-01-031523-N	23C0146-02	03/17/23 11:22	565.00	2.00
RHS-EF-TRAIN-01-031523-N	23C0146-02RE1	03/17/23 11:22	565.00	2.00
Blank	BCC0177-BLK1	03/17/23 11:22	500.00	2.00
LCS	BCC0177-BS1	03/17/23 11:22	500.00	2.00
MRL Check	BCC0177-MRL1	03/17/23 11:22	500.00	2.00

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Quality Control

Per- and Polyfluoroalkyl Substances

Analyte	Result/Qual	LOQ	LOD	MDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Method: EPA 1633

Batch: BCC0177 - EPA 1633

	ng/L								
Blank (BCC0177-BLK1)									
PFBA	0.80 U	1.6	0.80	0.21					
PFPEA	0.40 U	0.80	0.40	0.065					
PFHXA	0.20 U	0.40	0.20	0.055					
PFHPA	0.20 U	0.40	0.20	0.041					
PFOA	0.30 U	0.40	0.30	0.15					
PFNA	0.20 U	0.40	0.20	0.082					
PFDA	0.20 U	0.40	0.20	0.10					
PFUnA	0.30 U	0.40	0.30	0.16					
PFDOA	0.20 U	0.40	0.20	0.11					
PFTRDA	0.30 U	0.40	0.30	0.20					
PFTEDA	0.30 U	0.40	0.30	0.20					
PFBS	0.20 U	0.40	0.20	0.037					
PFPEs	0.20 U IR2,	0.40	0.20	0.063					
PFHXS	0.20 U	0.40	0.20	0.032					
PFHPS	0.20 U	0.40	0.20	0.051					
PFOS	0.0941 J MI2,	0.40	0.20	0.064					
PFNS	0.20 U	0.40	0.20	0.12					
PFDS	0.30 U	0.40	0.30	0.15					
PFDOS	0.20 U	0.40	0.20	0.12					
4:2FTS	0.80 U	1.6	0.80	0.29					
6:2FTS	0.80 U	1.6	0.80	0.31					
8:2FTS	0.80 U	1.6	0.80	0.082					
PFOSA	0.295 J	0.40	0.20	0.10					
NMeFOSA	0.80 U	1.6	0.80	0.47					
NEtFOSA	0.80 U	1.6	0.80	0.41					
NMeFOSAA	0.20 U	0.40	0.20	0.11					
NEtFOSAA	0.20 U	0.40	0.20	0.11					
NMeFOSE	1.2 U	1.6	1.2	1.0					
NEtFOSE	1.2 U	1.6	1.2	1.0					
HFPO-DA	0.40 U	0.80	0.40	0.17					
ADONA	0.40 U	0.80	0.40	0.12					
PFEESA	0.40 U	0.80	0.40	0.11					
PFMPA	0.40 U	0.80	0.40	0.054					
PFMBA	0.40 U	0.80	0.40	0.091					
NFDHA	0.40 U	0.80	0.40	0.30					
9CL-PF3ONS	0.40 U	0.80	0.40	0.21					
11CL-PF3OUDS	0.40 U	0.80	0.40	0.21					
3:3FTCA	0.80 U	1.6	0.80	0.57					
5:3FTCA	0.80 U	1.6	0.80	0.44					
7:3FTCA	0.80 U	1.6	0.80	0.55					

Prepared: 03/17/23 11:22 Analyzed: 03/21/23 16:32

Surrogates

13C4-PFBA	30.0	32.0	93.9	10-130
13C5-PFPEA	23.4	16.0	146	35-150
13C5-PFHXA	11.7	8.00	147	55-150

AECOM Honolulu
1001 Bishop Street, Suite 1600
Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
Project Number: Red Hill AFFF Assessment Sampling
Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Quality Control (Continued)

Per- and Polyfluoroalkyl Substances (Continued)

Analyte	Result/Qual	LOQ	LOD	MDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Blank (BCC0177-BLK1)										
Prepared: 03/17/23 11:22 Analyzed: 03/21/23 16:32										
<i>Surrogates</i>										
13C4-PFHPA	13.5 S2				8.00		168	55-150		
13C8-PFOA	9.15				8.00		114	60-140		
13C9-PFNA	3.73				4.00		93.2	55-140		
13C6-PFDA	3.90				4.00		97.5	50-140		
13C7-PFUnA	3.71				4.00		92.7	30-140		
13C2-PFDOA	3.49				4.00		87.2	10-150		
13C2-PFTEDA	3.37				4.00		84.4	10-130		
13C3-PFBS	7.74				8.00		96.8	55-150		
13C3-PFHXS	7.51				8.00		93.9	55-150		
13C8-PFOS	7.05				8.00		88.1	45-140		
13C2-4:2FTS	36.9 S2				16.0		231	60-200		
13C2-6:2FTS	23.6				16.0		147	60-200		
13C2-8:2FTS	23.8				16.0		149	50-200		
13C8-PFOA	6.36				8.00		79.4	30-130		
D3-NMEFOA	2.75				8.00		34.4	15-130		
D5-NETFOA	2.86				8.00		35.7	10-130		
D3-NMEFOSAA	16.7				16.0		104	45-200		
D5-NETFOSAA	12.7				16.0		79.6	10-200		
D7-NMEFOSE	37.6				80.0		47.1	10-150		
D9-NETFOSE	46.2				80.0		57.7	10-150		
13C3-HFPO-DA	43.9				32.0		137	25-160		
LCS (BCC0177-BS1)										
Prepared: 03/17/23 11:22 Analyzed: 03/21/23 16:45										
PFBA	16.0				16.0		100	58-148		
PFPEA	8.01				8.00		100	54-152		
PFHXA	4.00				4.00		100	55-152		
PFHPA	3.60				4.00		90.1	54-154		
PFOA	4.10				4.00		103	52-161		
PFNA	3.67				4.00		91.8	59-149		
PFDA	3.72				4.00		93.0	52-147		
PFUnA	3.76				4.00		94.0	48-159		
PFDOA	3.85				4.00		96.2	64-142		
PFTRDA	3.65				4.00		91.4	49-148		
PFTEDA	3.91				4.00		97.6	47-161		
PFBS	3.49				3.54		98.7	62-144		
PFPEA	4.48				3.76		119	59-151		
PFHXS	3.69				3.66		101	57-146		
PFHPS	3.02				3.82		79.0	55-152		
PFOS	3.16				3.72		85.1	58-149		
PFNS	3.31				3.84		86.3	52-148		
PFDS	3.16				3.86		81.8	51-147		
PFDOS	2.82				3.88		72.7	36-145		
4:2FTS	14.5				15.0		97.0	67-146		
6:2FTS	16.0				15.2		105	61-151		
8:2FTS	14.4				15.4		94.0	63-152		
PFOSA	3.89				4.00		97.2	61-148		

AECOM Honolulu
1001 Bishop Street, Suite 1600
Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
Project Number: Red Hill AFFF Assessment Sampling
Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Quality Control (Continued)

Per- and Polyfluoroalkyl Substances (Continued)

Analyte	Result/Qual	LOQ	LOD	MDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
ng/L										
LCS (BCC0177-BS1)								Prepared: 03/17/23 11:22 Analyzed: 03/21/23 16:45		
NMeFOSA	16.1				16.0		101	63-145		
NETFOSA	15.5				16.0		97.1	65-139		
NMeFOSAA	3.01				4.00		75.2	58-144		
NETFOSAA	4.17				4.00		104	59-146		
NMeFOSE	15.3				16.0		95.6	71-136		
NETFOSE	14.8				16.0		92.3	69-137		
HFPO-DA	9.88				8.00		123	63-144		
ADONA	7.88				7.56		104	68-146		
PFEESA	7.91				7.12		111	56-151		
PFMPA	7.06				8.00		88.3	51-145		
PFMBA	8.51				8.00		106	55-148		
NFDHA	7.58				8.00		94.7	48-161		
9CL-PF3ONS	10.1				7.48		134	56-156		
11CL-PF3OUDS	9.70				7.56		128	46-156		
3:3FTCA	14.7				16.0		92.1	62-129		
5:3FTCA	12.4				16.0		77.3	63-134		
7:3FTCA	14.4				16.0		89.7	50-138		
<hr/>										
Surrogates										
13C4-PFBA	31.5				32.0		98.4	10-130		
13C5-PFPEA	23.4				16.0		146	35-150		
13C5-PFHXA	11.7				8.00		146	55-150		
13C4-PFHFA	12.8 S2				8.00		160	55-150		
13C8-PFOA	8.40				8.00		105	60-140		
13C9-PFNA	3.97				4.00		99.4	55-140		
13C6-PFDA	4.06				4.00		102	50-140		
13C7-PFUnA	3.64				4.00		90.9	30-140		
13C2-PFDOA	3.73				4.00		93.2	10-150		
13C2-PFTEDA	3.31				4.00		82.6	10-130		
13C3-PFBS	6.86				8.00		85.7	55-150		
13C3-PFHXS	7.32				8.00		91.5	55-150		
13C8-PFOS	7.88				8.00		98.5	45-140		
13C2-4:2FTS	34.8 S2				16.0		218	60-200		
13C2-6:2FTS	19.1				16.0		120	60-200		
13C2-8:2FTS	23.9				16.0		149	50-200		
13C8-PFOSA	6.25				8.00		78.1	30-130		
D3-NMEFOSA	2.19				8.00		27.4	15-130		
D5-NETFOSA	2.08				8.00		26.0	10-130		
D3-NMEFOSAA	17.2				16.0		108	45-200		
D5-NETFOSAA	13.7				16.0		85.9	10-200		
D7-NMEFOSE	33.7				80.0		42.1	10-150		
D9-NETFOSE	40.5				80.0		50.6	10-150		
13C3-HFPO-DA	43.5				32.0		136	25-160		

AECOM Honolulu
 1001 Bishop Street, Suite 1600
 Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
 Project Number: Red Hill AFFF Assessment Sampling
 Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Quality Control
 (Continued)

Per- and Polyfluoroalkyl Substances (Continued)

Analyte	Result/Qual	LOQ	LOD	MDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
MRL Check (BCC0177-MRL1)		ng/L		Prepared: 03/17/23 11:22 Analyzed: 03/21/23 16:58						
PFBA	1.94 BS2				1.60		121	44-157		
PFPEA	0.946				0.800		118	57-148		
PFHXA	0.607 BS2				0.400		152	62-149		
PFHPA	0.503				0.400		126	56-150		
PFOA	0.422				0.400		106	57-161		
PFNA	0.460				0.400		115	53-157		
PFDA	0.572				0.400		143	43-158		
PFUnA	0.420 IR1				0.400		105	50-155		
PFDOA	0.419 IR2				0.400		105	60-141		
PFTRDA	0.433				0.400		108	52-140		
PFTEDA	0.374 J				0.400		93.4	52-156		
PFBS	0.503				0.354		142	63-145		
PFPEs	0.499				0.376		133	58-144		
PFHXS	0.412				0.366		113	44-158		
PFHPS	0.307 J				0.382		80.3	51-150		
PFOS	0.384 J				0.372		103	43-162		
PFNS	0.382 J				0.384		99.6	46-151		
PFDS	0.372 J				0.386		96.3	50-144		
PFDOS	0.296 J				0.388		76.4	30-138		
4:2FTS	1.57 J				1.50		105	52-158		
6:2FTS	1.46 J				1.52		96.1	48-158		
8:2FTS	1.24 J				1.54		80.6	46-165		
PFOSA	0.428				0.400		107	47-163		
NMeFOSA	1.74				1.60		109	54-155		
NETFOSA	1.71				1.60		107	49-156		
NMeFOSAA	0.320 J				0.400		80.0	32-160		
NETFOSAA	0.317 J				0.400		79.3	51-154		
NMeFOSE	1.84				1.60		115	56-151		
NETFOSE	1.58 J				1.60		98.9	60-147		
HFPO-DA	1.02				0.800		128	58-154		
ADONA	0.853				0.756		113	61-148		
PFEESA	0.800				0.712		112	56-144		
PFMPA	0.710 J				0.800		88.8	48-150		
PFMBA	0.887				0.800		111	49-154		
NFDHA	0.956				0.800		120	47-160		
9CL-PF3ONS	0.994				0.748		133	44-167		
11CL-PF3OUDS	1.21 BS2				0.756		160	36-158		
3:3FTCA	1.42 J				1.60		88.8	32-161		
5:3FTCA	1.47 J				1.60		91.7	39-156		
7:3FTCA	2.01				1.60		126	36-149		
Surrogates										
13C4-PFBA	29.0				32.0		90.7	10-130		
13C5-PFPEA	17.7				16.0		111	35-150		
13C5-PFHXA	8.82				8.00		110	55-150		
13C4-PFHPA	9.67				8.00		121	55-150		
13C8-PFOA	7.51				8.00		93.9	60-140		
13C9-PFNA	3.96				4.00		99.0	55-140		

AECOM Honolulu
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 Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
 Project Number: Red Hill AFFF Assessment Sampling
 Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Quality Control
 (Continued)

Per- and Polyfluoroalkyl Substances (Continued)

Analyte	Result/Qual	LOQ	LOD	MDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
ng/L										
MRL Check (BCC0177-MRL1)							Prepared: 03/17/23 11:22	Analyzed: 03/21/23 16:58		
<i>Surrogates</i>										
13C6-PFDA	3.84				4.00		96.0	50-140		
13C7-PFUnA	3.85				4.00		96.2	30-140		
13C2-PFDOA	3.64				4.00		90.9	10-150		
13C2-PFTEDA	3.21				4.00		80.3	10-130		
13C3-PFBS	7.57				8.00		94.7	55-150		
13C3-PFHXS	7.86				8.00		98.3	55-150		
13C8-PFOS	7.00				8.00		87.5	45-140		
13C2-4:2FTS	38.2 S2				16.0		239	60-200		
13C2-6:2FTS	24.3				16.0		152	60-200		
13C2-8:2FTS	26.0				16.0		163	50-200		
13C8-PFOA	6.28				8.00		78.5	30-130		
D3-NMEFOA	2.45				8.00		30.6	15-130		
D5-NETFOA	2.26				8.00		28.3	10-130		
D3-NMEFOA	16.2				16.0		101	45-200		
D5-NETFOA	12.7				16.0		79.1	10-200		
D7-NMEFOE	32.7				80.0		40.9	10-150		
D9-NETFOE	38.8				80.0		48.5	10-150		
13C3-HFPO-DA	33.4				32.0		104	25-160		

AECOM Honolulu
 1001 Bishop Street, Suite 1600
 Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
 Project Number: Red Hill AFFF Assessment Sampling
 Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

Notes and Definitions

Item	Definition
BS2	Blank spike recovered above the upper control limit
CV1	Calibration verification recovered below the lower control limit
CV2	Calibration verification recovered above the upper control limit
IR1	Ion ratio below the lower control limit
IR2	Ion ratio above the upper control limit
IS1	Internal standard recovered below the lower control limit
J	Estimated value
MI2	Manual integration, non-target peak interference
S1	Surrogate recovered below the lower control limit
S2	Surrogate recovered above the upper control limit
U	Not detected
Dry	Sample results reported on a dry weight basis.
DF	Dilution Factor
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
LOQ, Limit of Quantitation = Method Reporting Limit (MRL).	

AECOM Honolulu
 1001 Bishop Street, Suite 1600
 Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
 Project Number: Red Hill AFFF Assessment Sampling
 Project Manager: Watson Tanji

Reported: 03/23/2023 14:16



WORK ORDER

23C0146

Printed: 03/23/2023 2:16 pm

Project: Red Hill AFFF Assessment Sampling
Project Number: Red Hill AFFF Assessment Sampling
Project Manager: Karen Volpendesta
PO Number: 60697810

Report To:

AECOM Honolulu
 Watson Tanji
 1001 Bishop Street, Suite 1600
 Honolulu, HI 96813
 Phone: (808) 954-4512
 Fax: (808) 523-8950

Invoice To:

AECOM Honolulu
 Watson Tanji
 1001 Bishop Street, Suite 1600
 Honolulu, HI 96813
 Phone: (808) 954-4512
 Fax: (808) 523-8950

Date Received: 03/16/2023 09:30 AM
 Date Due: 03/23/2023 (5.00 day TAT)

Logged In By: Megan Salata
 Received By: Megan Salata

Analysis	Comments
23C0146-01 RHSF-PUMP-PR-01-031523-N [Water] Sampled 3/15/2023 12:00:00PM 1633 NONE	"Report relevant surrogates"
23C0146-02 RHS-EF-TRAIN-01-031523-N [Water] Sampled 3/15/2023 11:25:00AM 1633 NONE	"Report relevant surrogates"

AECOM Honolulu
 1001 Bishop Street, Suite 1600
 Honolulu, HI 96813

Project: Red Hill AFFF Assessment Sampling
 Project Number: Red Hill AFFF Assessment Sampling
 Project Manager: Watson Tanji

Reported: 03/23/2023 14:16

23C0146

Sample Receipt Log

Default Cooler

Samples Received at: **-1.7°C**

Custody Seals	Yes	Were all containers sealed in separate bags?	Yes
Containers Intact	Yes	Did all containers arrive in good condition?	Yes
COC/Labels Agree	Yes	Correct containers/preserv. for tests indicated?	Yes
Preservation Confirmed	No	Sufficient volume sent for tests requested?	Yes
Received On Ice	Yes	Were bubbles absent in volatile samples?	No
Was a chain of custody received?	Yes	Sufficient remaining holding time for analyses?	Yes
COCs complete/signed in the appropriate places?	Yes	pH of non-VOA preserved containers documented?	No
Sample labels complete? Sample ID, date/time, etc.	Yes	Unpreserved vials received for VOA analysis?	No
Did all container labels agree with COCs?	Yes	If "yes", are unpreserved VOA vials noted on ARF?	No



APPL, Inc.
 908 N Temperance Ave
 Clovis, CA 93611
 www.applinc.com

ELECTRONIC CHAIN OF CUSTODY RECORD
 Phone: (559) 275-2175
 Fax: (559) 275-4422
 coc@applinc.com C.O.C. 2303W2AFAL01

23C0146

Report to: PLEASE PRINT
 Company Name: **AECOM** Phone: 808-954-4512 / 303-796-4624
 Address: **1001 Bishop St ste1600**
Honolulu, HI 96813 Fax:
 Attn: **Watson Tanji / Katie Abbott**
 Email: **watson.tanji@aecom.com/katie.abbott@aecom.com**

Invoice to: PLEASE PRINT
 Company Name: **AECOM** Phone:
 Address: Fax:
 Attn: **Sheree Smith**
 Email: **USAPimaging@aecom.com**

Project Name/Number	Sampler (Print)	Analysis Requested/Method Number					Date Shipped:
		Matrix			PFAS EPA Draft 1633		
Purchase Order Number	Sampler (Signature)	No. of Containers	Aq	Sed.	Soil	Waybill No.:	
Sample Identification	Location	Date Collected	Time Collected	Time Zone		Comments: EDMS upload database: JBPHE EDMS Coverage: AFFF Assessment Sampling <i>GW GAC</i>	
CTO N6274223F0104 / 60697810							
RHS-IF-TRAIN-01-031523-N-R1	<i>INFILTRANT</i>	<i>3/15/23</i>	<i>1200</i>	<i>HST</i>	<i>2</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RHS-EF-TRAIN-01-031523-N-R1	<i>RHS TRAIN DI</i>	<i>3/15/23</i>	<i>1125</i>	<i>HST</i>	<i>2</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>FO 3/15/23</i>							

Shuttle Temperature: *IRB 1.3/-1.7°C* Turnaround Requested: Check one
 Standard 2-3 wk One week 3 days 24/48 Hrs Other: *5 day TAT* Sample Disposal:
 Return to client Disposal by Lab (30-day retention)

Relinquished by sampler: *Angelo Garcia* Date: *3/15/23* Time: *1245* Received by: *Ken Yoon*
 Relinquished by: Date: *3/16/23* Time: *1400* Received by:
 Relinquished by: Date: *3/16/23* Time: *930* Received at lab by:

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.



APPL, Inc.
 908 N Temperance Ave
 Clovis, CA 93611
 www.appline.com

ELECTRONIC CHAIN OF CUSTODY RECORD
 Phone: (559) 275-2175
 Fax: (559) 275-4422
 coc@appline.com C.O.C. 2303W2AFAL01

Report to: **PLEASE PRINT**
 Company Name: **AECOM** Phone: 808-954-4512 / 303-796-4624
 Address: **1001 Bishop St ste1600**
Honolulu, HI 96813 Fax:
 Attn: **Watson Tanji / Katie Abbott**
 Email: **watson.tanji@aecom.com/katie.abbott@aecom.com**

Invoice to: **PLEASE PRINT**
 Company Name: **AECOM** Phone:
 Address: Fax:
 Attn: **Sheree Smith**
 Email: **USAPimaging@aecom.com**

Project Name/Number		Sampler (Print)					Analysis Requested/Method Number					Date Shipped:		
CTO N6274223F0104 / 60697810												Carrier: Fed Ex		
Purchase Order Number		Sampler (Signature)										Waybill No.:		
Sample Identification		Location		Date Collected	Time Collected	Time Zone	No of Containers	Aq	Sed.	Soil	PFAS EPA Draft 1633	Comments: EDMS upload database JRPLIE EDMS Coverage: AFFF Assessment Sampling GAC		
RHS-IF-TRAIN-01-031523-N-RT 3/15/23		RHS-PUMP-PR-01-031523-DI 3/15/23		3/15/23	1200	HST	2	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			
RHS-EF-TRAIN-01-031523-N-RT 3/15/23		RHS-TRAIN-DI 3/15/23		3/15/23	1125	HST	2	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			
<div style="position: absolute; top: 10px; left: 10px; border: 1px solid black; padding: 5px;"> 3/15/23 FO </div>														

Shuttle Temperature: Turnaround Requested: Check one: Standard 2-3 wk One week 3 day 24/48 Hr Other: **5 day TAT**

Sample Disposal: Return to client Disposal by Lab (30-day retention)

Relinquished by sampler: Angela Garcia	Date 3/15/23	Time 1245	Received by: 16 Jan	Relinquished by: 16 Jan	Date 3/15/23	Time 1400	Received by:
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by:

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

CUSTODY SEAL

AECOM (808)-521-3051

Initials:

18

Date

3/15/23