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**Appendix B:  
Field Activity Documentation,  
Second Quarter 2019  
(on CD-ROM at end of document)**

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**Appendix B.1:  
Groundwater Sampling Logs**

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## Red Hill Groundwater Sampling Log

WELL NO. **RHMW2254-01**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

DATE: (Day 1) 04/22/19 Pumps on

TIME: 0809

CLIMATIC CONDITIONS: In Tunnel

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Battery Pack
*82.70	NM	NM	No Product	115.79	NM	300	0839	4.3	14574
**82.66	NM								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			50	50	12	25	18	35	

Headspace VOCs: 0.1 ppm Ambient VOCs: 0.1 ppm

Headspace O<sub>2</sub>: 20.9 % Ambient O<sub>2</sub>: 20.9 %

Headspace LEL: 0 % Ambient LEL: 0 %

Ambient CO: 0 ppm Ambient H<sub>2</sub>S: 0 %

OW Interface Probe Type/Water Level Meter: Heron H.Oil/NA Serial Number: 250750/NA

Gas Detector Type: MultiRAE Serial Number: 120340V2

Water Quality Meter Type: Smartroll Serial Number: 589976

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from outside casing (free fall). Measure to survey mark.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

SAMPLING EQUIPMENT: Dedicated bladder pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: Sulfuric odor

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 primary + 11 dup + 18 MS/MSD =  
AND TYPES OF SAMPLE CONTAINERS USED: 51 total

VOAs	Amber	Poly
HCl: 4+4+4 = <b>12</b>	1-L: 3+3+6= <b>12</b>	250 mL H <sub>2</sub> SO <sub>4</sub> : <b>1</b>
H <sub>2</sub> SO <sub>4</sub> : 8 = <b>8</b>	1-L (800mL): 2+2+4= <b>8</b>	250 mL HCl (brown): <b>1 filtered</b>
	500-mL: 2+2+4= <b>8</b>	250 mL unpreserved.: <b>1</b>

SAMPLE IDENTIFICATION NUMBER(S)	<b>ERH782</b>	<b>ERH783 (Dup)</b>	<b>ERH781</b>
	<b>(N, MS/MSD)</b>		<b>(Trip Blank)</b>

DATE: 04/22/2019	TIME: Start: 0930	End: 1121	Start: 0930	End: 1121	Start: 0842
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DECONTAMINATION PROCEDURES: Alconox, DI H<sub>2</sub>O, Isopropyl, and DI H<sub>2</sub>O wash

NOTES: Pumps ON during sampling (MP3)

NM = no measurement, NA = Not applicable

SAMPLED BY: KL, DH, MM SAMPLES DELIVERED TO: APPL TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW2254-01**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

DATE: (Day 2) 4/23/19 Pumps  
off

TIME: 0745

CLIMATIC CONDITIONS: In Tunnel

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Battery Pack
*82.70	NM	NM	No Product	115.79	NM	300	0802	4	14574
**82.66	NM								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			50	50	12	25	18	35	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

Headspace O<sub>2</sub>: 20.9 % Ambient O<sub>2</sub>: 20.9 %

Headspace LEL: 0 % Ambient LEL: 0 %

Ambient CO: 0 ppm Ambient H<sub>2</sub>S: 0 %OW Interface Probe  
Type/Water Level Meter: Heron H.Oil/NA Serial Number: 250750/

Gas Detector Type: MultiRAE Serial Number: 120340V2

Water Quality Meter Type: Smartroll Serial Number: 589976

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from outside casing (free fall). Measure to survey mark.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

SAMPLING EQUIPMENT: Dedicated bladder pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: None

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 primary + 11 dup + 18 MS/MSD =  
AND TYPES OF SAMPLE CONTAINERS USED: 51 total

VOAs	Amber	Poly
HCl: 4+4+4 = <b>12</b>	1-L: 3+3+6= <b>12</b>	250 mL H <sub>2</sub> SO <sub>4</sub> : <b>1</b>
H <sub>2</sub> SO <sub>4</sub> : 8 = <b>8</b>	1-L (800mL): 2+2+4= <b>8</b>	250 mL HCl (brown): <b>1 filtered</b>
	500-mL: 2+2+4= <b>8</b>	250 mL unpreserved.: <b>1</b>

SAMPLE IDENTIFICATION NUMBER(S)	<b>ERH785</b>	<b>ERH786 (Dup)</b>	<b>ERH784</b>
	<b>(N, MS/MSD)</b>		<b>(Trip Blank)</b>

DATE: 04/23/2019	TIME: Start: 0840	End: 1006	Start: 0840	End: 1006	Start: 0750
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DECONTAMINATION PROCEDURES: Alconox, DI H<sub>2</sub>O, Isopropyl, and DI H<sub>2</sub>O wash

NOTES: NM = no measurement, NA = Not applicable

SAMPLED BY: KL, DH, MM SAMPLES DELIVERED TO: APPL TRANSPORTER: FedEx





## Red Hill Groundwater Sampling Log

WELL NO. **OWDFMW01**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 04/25/2019

TIME: 0820

CLIMATIC CONDITIONS: Sunny 75° F

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*118.93	*119.02	119.34	No Product	144.74	NM	80	0840	1	1000psi to 600psi Battery used as supplement
**118.91	*118.96								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			65	65	13	13	17	17	

Headspace VOCs: 0.1 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe: Heron  
Type/Water Level Meter: Solinst Serial Number: Heron: 250750  
Solinst: N-2

Gas Detector Type: MultiRAE Serial Number: 120340V2

Water Quality Meter Type: In-Situ Smartroll Serial Number: 589976

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

TIME	DTW	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
0844	Water at the surface									
0900	—	—	2835.2	8.19	4.36	11.05	4.30	27.35	135.0	2.3
0904	—	—	2548.49	9.64	3.88	9.67	6.75	26.92	110.5	2.1

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: None

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 Primary = 22 total  
AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H2SO4: 8 = <u>8</u>	Amber 1-L: <u>3</u> 1-L (800 mL): <u>2</u> 500-mL: <u>2</u>	Poly 250 mL H2SO4: <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH809**  
**(Primary)****ERH808**  
**(Trip Blank)**

DATE: 4/25/2019

TIME: Start: 0950 End: 1127 Start: 0845

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: 133.71' depth to pump intake (AECOM N-2 WLM)

NM = no measurement, <sup>a</sup> = Used 1000' Calibrated Water Level Meter measurement (N-2) instead of N-1

SAMPLED BY: DH, MM, KL

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW01**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

DATE: 04/23/2019

TIME: 1115

CLIMATIC CONDITIONS: Inside Tunnel

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Battery Pack
*82.46	*82.52	82.44 <sup>a</sup>	No Product	99.8	NM	80	1135	4 gal	Deep cycle 90 14574
**82.41	<sup>a</sup> 82.48								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			50	50	7	7	8	8	

Headspace VOCs: 0.0 ppm      Ambient VOCs: 0.0 ppm

Headspace O<sub>2</sub>: 20.9 %      Ambient O<sub>2</sub>: 20.9 %

Headspace LEL: 0 %      Ambient LEL: 0 %

Ambient CO: 0 ppm      Ambient H<sub>2</sub>S: 0 ppm

O/W Interface Probe Type/Water Level Meter: Heron H. Oil/Solinst WLM 101      Serial Number: 250750/N-2

Gas Detector Type: MultiRAE      Serial Number: 120340V2

Water Quality Meter Type: Smartroll      Serial Number: 589976

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (< 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

SAMPLING EQUIPMENT: Bladder Pump

APPEARANCE OF SAMPLE: COLOR: None

SEDIMENT: None

ODOR/OTHER: None

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES /

22 Primary = 22 Total

NUMBER AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H <sub>2</sub> SO <sub>4</sub> : 8 = <u>8</u>	Amber 1-L: <u>3</u> 500-mL: <u>2</u> 1-L (800mL): <u>2</u>	Poly 250 mL H <sub>2</sub> SO <sub>4</sub> : <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH788 (N)****ERH787****(Trip Blank)**

DATE: 04/23/2019

TIME: Start: 1535 End: 1703 Start: 1120

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: Depth to top of pump 90.8 ft Btoc, <sup>a</sup> = Used 1000' Calibrated Water Level Meter measurement (N-2) instead of N-1

Need a PVC slip cap cover for well, NM = no measurement

SAMPLED BY: KL, DH, MM

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx

WELL NO. **RHMW01**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

TIME	DTW <sup>a</sup>	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
1137			Water at surface							
1153	82.48	—	205.62	7.08	0.32	1.79	0.02	24.54	37.5	0.2
1157	82.48	—	206.81	6.85	0.32	1.46	0.04	24.09	30.3	0.2
1201	82.48	—	207.14	6.82	0.32	1.27	0.02	23.97	23.7	0.2
1205	82.48	—	207.14	6.81	0.32	1.17	0.01	23.93	18.6	0.2
1209	82.48	—	207.13	6.80	0.32	1.08	0.01	23.89	13.2	0.2
1213	82.48	—	207.09	6.80	0.32	0.99	0.00	23.84	8.7	0.2
1217	82.48	—	206.98	6.79	0.32	0.93	0.01	23.81	5.4	0.2
1221	82.48	—	206.93	6.80	0.32	0.90	0.01	23.78	2.5	0.2
1225	82.48	—	206.87	6.79	0.32	0.85	0.01	23.77	0.1	0.2
1229	82.48	1	206.76	6.80	0.32	0.82	0.00	23.77	-1.7	0.2
1233	82.48	—	206.76	6.80	0.32	0.79	0.01	23.79	-4.0	0.2
1237	82.48	—	206.76	6.79	0.32	1.28	0.02	23.90	-4.0	0.2
1240			Pulled pump due to bubbles in line. Changed bladder. Change in flow rate 80mL/min							
1340	82.48	2	206.61	6.92	0.32	3.20	0.96	24.54	14	0.2
1344	82.48	—	206.75	6.85	0.32	2.02	0.45	24.31	3.6	0.2
1348	82.48	—	206.75	6.83	0.32	1.74	0.32	24.24	-2.2	0.2
1352	82.48	—	206.73	6.83	0.32	1.58	0.01	24.20	-5.4	0.2
1354	82.48	—	206.87	6.83	0.32	1.47	0.10	24.17	-7.3	0.2
1358	82.48	—	206.94	6.82	0.32	1.40	0.11	24.15	-9.3	0.2
1402	82.48	—	206.90	6.82	0.32	1.32	0.09	24.13	-11.3	0.2
1406	82.48	—	206.87	6.83	0.32	1.26	0.10	24.13	-12.4	0.2
1410	82.48	—	206.83	6.83	0.32	1.21	0.13	24.09	-13.9	0.2
1414	82.48	3	206.67	6.83	0.32	1.15	0.09	24.08	-14.7	0.2
1418	82.48	—	206.58	6.83	0.32	1.10	0.09	24.08	-15.3	0.2
1422	82.48	—	206.55	6.82	0.32	1.06	0.09	24.08	-15.6	0.2
1426	82.48	—	206.48	6.81	0.32	1.03	0.11	24.07	-16.2	0.2
1430	82.48	—	206.54	6.82	0.32	1.00	0.12	24.05	-16.4	0.2
1434	82.48	—	206.61	6.83	0.32	0.98	0.13	24.04	-16.0	0.2
1438	82.48	—	206.59	6.83	0.32	0.96	0.13	24.03	-16.4	0.2
1442	82.48	—	206.56	6.83	0.32	0.93	0.14	24.01	-16.4	0.2
1446	82.48	—	206.65	6.83	0.32	0.90	0.15	24.01	-16.7	0.2
1450	82.48	—	206.67	6.83	0.32	0.89	0.16	24.00	-16.7	0.2
1454	82.48	—	206.66	6.82	0.32	0.87	0.14	23.99	-16.8	0.2
1458	82.48	—	206.71	6.83	0.32	0.85	0.14	24.03	-16.9	0.2
1502	82.48	—	206.59	6.83	0.32	0.83	0.12	24.03	-17.0	0.2
1506	82.48	—	206.63	6.83	0.32	0.81	0.14	24.00	-17.3	0.2
1510	82.48	4	206.56	6.83	0.32	0.79	0.11	23.99	-17.1	0.2
1514	82.48	—	206.59	6.83	0.32	0.78	0.15	23.99	-17.5	0.2
1518	82.48	—	206.63	6.83	0.32	0.76	0.12	23.97	-17.5	0.2
1522	82.48	—	206.59	6.83	0.32	0.74	0.12	23.97	-17.7	0.2
1526	82.48	—	206.63	6.84	0.32	0.72	0.12	23.95	-17.7	0.2
1530	82.48	—	206.56	6.84	0.32	0.72	0.12	23.92	-17.6	0.2

## Red Hill Groundwater Sampling Log

WELL NO. **RHMW02**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

DATE: 04/24/2019

TIME: 0750

CLIMATIC CONDITIONS: Inside Tunnel

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Battery Pack
*85.14	*85.29	85.19 <sup>a</sup>	No Product	99	NM	300	0812	2	Deep cycle 90 14513
**85.08	<sup>a</sup> 85.23								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			50	50	10	25	20	35	

Headspace VOCs:	0.2	ppm	Ambient VOCs:	0.0	ppm
Headspace O <sub>2</sub> :	16.2	%	Ambient O <sub>2</sub> :	20.9	%
Headspace LEL:	0	%	Ambient LEL:	0	%
Ambient CO:	0	%	Ambient H <sub>2</sub> S:	0	%
O/W Interface Probe Type/Water Level Meter:	*Heron H. Oil/ **Solinst WLM 101		Serial Number:	250750/N-2	
Gas Detector Type:	MultiRAE		Serial Number:	120340V2	
Water Quality Meter Type:	Smartroll		Serial Number:	589976	

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (< 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: Slight sulfur odor

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES /

22 Primary + 11 Duplicate = 33

NUMBER AND TYPES OF SAMPLE CONTAINERS USED:

Total

VOAs HCl: 4 + 4 = <u>8</u> H <sub>2</sub> SO <sub>4</sub> : <u>8</u>	Amber 1-L: 3 + 3 = <u>6</u> 500-mL: 2 + 2 = <u>4</u> 1-L: (800 ml): 2 + 2 = <u>4</u>	Poly 250 mL H <sub>2</sub> SO <sub>4</sub> : <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH790 (N/Split)**

**ERH791 (dup)**

**ERH789 (Trip Blank)**

DATE: 04/24/2019

TIME:

Start: 0840 End: 0931 Start: 0840 End: 0931 Start: 0800

DECONTAMINATION PROCEDURES:

Alconox, DI water, Isopropyl, and DI water wash

NOTES:

NM = no measurement

<sup>a</sup> = Used 1000' Calibrated Water Level Meter measurement (N-2) instead of N-1

SAMPLED BY:

KL, MM, DH

SAMPLES DELIVERED TO:

APPL

TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW03**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

DATE: 04/24/2019

TIME: 1000

CLIMATIC CONDITIONS: Inside Tunnel

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Battery Pack
*101.30	*102.48	102.46 <sup>a</sup>	No Product	117.30	NM	300	1016	1	Deep cycle 90 14513
**101.26	<sup>a</sup> 102.46								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			57.5	55	35	25	25	35	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

Headspace O<sub>2</sub>: 20.9 % Ambient O<sub>2</sub>: 20.9 %

Headspace LEL: 0 % Ambient LEL: 0 %

Ambient CO: 0 ppm Ambient H<sub>2</sub>S: 0 %

OW Interface Probe Type/Water Level Meter: Heron H. Oil\*  
 /\*\*Solinst WLM 101  
 Serial Number: 250750/N-2

Gas Detector Type: MultiRAE  
 Serial Number: 120340V2

Water Quality Meter Type: Smartroll  
 Serial Number: 589976

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (< 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: None

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES /

22 primary = 22 total

NUMBER AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H <sub>2</sub> SO <sub>4</sub> : <u>8</u>	Amber 1-L: <u>3</u> 500-mL: <u>2</u> 1-L (800mL): <u>2</u>	Poly 250 mL H <sub>2</sub> SO <sub>4</sub> : <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH793 (N)****ERH792 (Trip Blank)**

DATE: 04/24/2018

TIME: Start: 1040 End: 1116 Start: 1002

DECONTAMINATION PROCEDURES:

Alconox, DI water, Isopropyl, and DI water wash

NOTES:

NM = no measurement

<sup>a</sup> = Used 1000' Calibrated Water Level Meter measurement (N-2) instead of N-1

SAMPLED BY: KL, MM, DH

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx





WELL NO. **RHMW04**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/22/19

TIME: 0806

CLIMATIC CONDITIONS: Overcast, light winds, 79°, 75% humidity

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*292.55	*292.83	*292.85	No Product	305	NM	300mL/min	0902	5.2	Start 2300 end 900
**292.53	<sup>a</sup> —								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			140	140	28	28	32	32	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Solinst/Solinst Solinst: 027683

Type/Water Level Meter: Serial Number: Solinst: <sup>a</sup>N-1 (not working)

Gas Detector Type: MiniRAE 3000 (10.6 eV) Serial Number: 592-920683

Water Quality Meter Type: In-Situ Smartroll MP Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (< 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

TIME	DTW**	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
0910					Water at surface					
0920	292.84	1.3	283.95	7.36	0.44	9.38	0.01	23.29	75.2	0.2
0930	292.84	1.8	284.84	7.39	0.44	9.12	0.02	22.57	81.5	0.2

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 Primary = 22 total

AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <b>4</b> H2SO4: <b>8 + 8 filtered = 16</b>	Amber 1-L: <b>3</b> 1-L (800 mL): <b>2</b> 500-mL: <b>2</b>	Poly 250 mL HCl: <b>1</b> 250 mL HCl (brown): <b>1 filtered</b> 250 mL unpres.: <b>1</b>
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SAMPLE IDENTIFICATION NUMBER(S) **ERH795 (N)** **ERH794 (Trip Blank)**

DATE: 4/22/19 TIME: Start:1020 End:1104 Start:0910

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: <sup>a</sup> = N-1 is continuously toning, will not give WL. Called HER to troubleshoot. Could not get DTW with N-1.

NM = no measurement

SAMPLED BY: GM, TV, RS

SAMPLES DELIVERED TO: APPL TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW05**

LOCATION: Inside Tunnel

PROJECT NO. 60571032

DATE: 04/22/2019

TIME: 1250

CLIMATIC CONDITIONS: Inside Tunnel

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Battery Pack
*81.87	*82.04	82.01 <sup>a</sup>	No Product	93	NM	300	1310	2.0	Deep cycle 90 14574
**81.83	<sup>a</sup> 82.00								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			45	45	25	25	35	35	

Headspace VOCs:	0.0	ppm	Ambient VOCs:	0.0	ppm
Headspace O <sub>2</sub> :	20.9	%	Ambient O <sub>2</sub> :	20.9	%
Headspace LEL:	0	%	Ambient LEL:	0	%
Ambient CO:	0	ppm	Ambient H <sub>2</sub> S:	0	%
OW Interface Probe Type/Water Level Meter:	Heron H. Oil/ Solinst WLM 101		Serial Number:	250750/N-2	
Gas Detector Type:	MultiRAE		Serial Number:	120340V2	
Water Quality Meter Type:	Smartroll		Serial Number:	589976	

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (< 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 200' Oil/Water Interface Probe measurement

\*\* 500' Calibrated Water Level Meter measurement (N-1)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: None

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES /

22 Primary = 22 total

NUMBER AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H <sub>2</sub> SO <sub>4</sub> : <u>8</u>	Amber 1-L: <u>3</u> 1-L (800 mL): <u>2</u> 500-mL: <u>2</u>	Poly 250 mL H <sub>2</sub> SO <sub>4</sub> : <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH797 (N)****ERH796 (Trip Blank)**

DATE: 04/22/2019

TIME: Start:1340 End:1408 Start:1300 End: 1303

DECONTAMINATION PROCEDURES:

Alconox, DI water, Isopropyl, and DI water wash

NOTES:

NM = no measurement

<sup>a</sup> = Used 1000' Calibrated Water Level Meter measurement (N-2) instead of N-1

SAMPLED BY: KL, MM, DH

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW06**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/22/2019

TIME: 1136

CLIMATIC CONDITIONS: Sunny, light wind, 81°, 75% humidity

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*239.65	*239.92	*239.95	No Product	263.20	NM	300mL/min	1149	6.5	Start: 2200 End: 800
**239.60	<sup>a</sup> NM								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			120	120	25	25	25	25	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Solinst/Solinst Solinst: \*027683

Type/Water Level Meter: Serial Number: Solinst: <sup>a</sup>N-1 not working

Gas Detector Type MiniRAE 3000 (10.6 eV) Serial Number: 592-920683

Water Quality Meter Type: Smartroll MP Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to groundwater is measured from the top of grey plate (survey mark).**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

TIME	DTW*	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
1202	Water at surface									
1212	239.98	0.2	1173.78	6.84	1.80	6.63	0.00	23.88	112.1	0.9
1217	239.97	0.6	1181.42	6.80	1.81	6.56	0.01	23.44	134.5	0.9

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: None

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES /

22 Primary = 22 total

NUMBER AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H2SO4: <u>8</u>	Amber 1-L: <u>3</u> 1-L (800mL): <u>2</u> 500-mL: <u>2</u>	Poly 250 mL H2SO4: <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH799 (N)****ERH798 (Trip Blank)**

DATE: 4/22/2019

TIME: Start:1335

End:1413

Start: 1200

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: Standpipe w/ Solinst rental tape (027683) 240.02 @ 1141

<sup>a</sup> = N-1 not working, HER repairing, NM = no measurement

SAMPLED BY: GM, RS, TV

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW07**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/22/2019

TIME: 1515

CLIMATIC CONDITIONS: Overcast, light winds, 82°, 75% humidity

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*197.02	*197.06	*197.45	No Product	217.76	NM	180mL/min	1528	4	Start 2800 psi End 750 psi
**197.02	<sup>a</sup> NM								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			95	95	28	30	32	30	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Solinst/Solinst Solinst: \*027683

Type/Water Level Meter: Serial Number: Solinst: <sup>a</sup>N-1 not working

Gas Detector Type MiniRAE 3000 (10.6 eV) Serial Number: 592-920683

Water Quality Meter Type: In-Situ Smartroll MP Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to groundwater is measure from top of grey plate (survey mark).**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

TIME	DTW**	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
1536	Water at surface									
1542	197.29	0.2	1148.49	7.71	1.76	6.89	0.12	25.95	103.2	0.9
1547	197.32	0.5	1167.29	7.17	1.80	5.93	0.10	25.18	134.8	0.9
1552	197.34	0.8	1160.38	7.12	1.78	5.70	0.06	25.22	142.4	0.9

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: No sediment

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 Primary = 22 total

AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <b>4</b> H2SO4: <b>8</b>	Amber 1-L: <b>3</b> 1-L(800mL): <b>2</b> 500-mL: <b>2</b>	Poly 250 mL H2SO4: <b>1</b> 250 mL HCl (brown): <b>1 filtered</b> 250 mL unpres.: <b>1</b>
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SAMPLE IDENTIFICATION NUMBER(S) **ERH801 (N)** **ERH800 (Trip Blank)**

DATE: 04/22/2019 TIME: Start:1645 End:1741 Start:1525

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: <sup>a</sup> = N-1 not working, HER repairing

Standpipe w/ Solinst rental (027683) 197.09 at 1522, NM = no measurement

SAMPLED BY: GM, TV, RS

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx





## Red Hill Groundwater Sampling Log

WELL NO. **HDMW2253-03**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/25/19

TIME: 0755

CLIMATIC CONDITIONS: Sunny, light winds, 80°, 75% humidity

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*205.87	<sup>a</sup> 206.12	206.06 ***	No Product	1575	NM	300mL/min	0832	5.2	Start: 1400 End: NM
**205.84	<sup>b</sup> 206.04								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			170	145	30	30	30	30	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Type/Water Level Meter: Solinst/  
Solinst Serial Number: Solinst: \*027683  
Solinst: N-1

Gas Detector Type: MiniRAE 3000 (10.6 eV) Serial Number: 572-920683

Water Quality Meter Type: In-situ Smartroll MP Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to water measured from red survey mark on top of permanent casing.**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

\*\*\* 500' Calibrated Water Level Meter measurement (N-1)

TIME	DTW**	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
0843	Water at surface									
0855	206.05	1.6	311.02	6.73	0.48	1.82	15.25	23.17	76.8	0.2
0900	206.05	2.0	310.40	6.46	0.48	1.59	15.48	23.06	68.0	0.2
0905	206.05	2.4	307.00	6.46	0.48	1.50	14.84	23.07	66.7	0.2

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear, slightly murky at first - cleared over time

SEDIMENT: No sediment

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 primary = 22 total  
AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <b>4</b> H2SO4: <b>8</b>	Amber 1-L: <b>3</b> 500-mL: <b>2</b> 1-L (800mL): <b>2</b>	Poly 250 mL H2SO4: <b>1</b> 250 mL HCl (brown): <b>1 filtered</b> 250 mL unpres.: <b>1</b>
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SAMPLE IDENTIFICATION NUMBER(S) **ERH811 (N)** **ERH810 (Trip Blank)**

DATE: 04/25/19 TIME: Start:0950 End:1025 Start:0815 End:—

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: <sup>a</sup> = Before pump is deployed for rental oil water interface<sup>b</sup> = Second reading taken after pump deployment w/ calibrated N-1 tape; NM = no measurement

SAMPLED BY: GM, RS, TV

SAMPLES DELIVERED TO: APPL TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW08**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/23/19

TIME: 0920

CLIMATIC CONDITIONS: Sunny, light winds, 79°, 75% humidity

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*291.07	*291.32	***291.20	No Product	311.30	NM	300mL/min	0928	4.8	Start 2800 End 1300
**291.04	***291.18								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			145	—	31	—	29	—	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Solinst/  
Type/Water Level Meter: Solinst Serial Number: Solinst: \*027683  
Solinst: \*\*\*N-1Gas Detector Type MiniRAE 3000  
(10.6 eV) Serial Number: 592-920683Water Quality Meter Type: InSitu Smartroll  
MP Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to groundwater is measure from top of grey plate (survey mark).**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

\*\*\* 500' Calibrated Water Level Meter measurement (N-1)

TIME	DTW**	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
0943	Water at surface									
0955	291.29	0.6	550.73	7.78	0.85	7.53	0.03	24.51	129.9	0.4
1000	291.29	1.0	550.48	8.35	0.85	6.65	-0.01	24.15	113.7	0.4
1005	291.28	1.4	552.37	8.50	0.85	6.36	-0.01	23	132.3	0.4

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: No sediment

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 primary = 22 total  
AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H2SO4: <u>8</u>	Amber 1-L: <u>3</u> 500-mL: <u>2</u> 1-L (800 mL): <u>2</u>	Poly 250 mL H2SO4: <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH803 (N)****ERH802 (Trip Blank)**

DATE: 4/23/19

TIME: Start:1045

End:1127

Start:0945

DECONTAMINATION PROCEDURES: Alconox, DI water, Isopropyl, and DI water wash

NOTES: -Workers were welding across the street

NM = no measurement

SAMPLED BY: GM, RS, TV

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW09**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/23/2019

TIME: 1225

CLIMATIC CONDITIONS: Overcast, light winds, 81°/75% humidity

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*376.31	*376.39	***376.29	No Product	396.69	NM	300mL/min	1240	5	Start 1200 End 700 Start 2800 End 1700
**376.27	***376.29								
Pump settings:			Pressure (PSI)		Discharge (sec)			Fill (sec)	
Previous/Actual			180	180	40	40	40	40	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Solinst/  
Type/Water Level Meter: Solinst  
Serial Number: Solinst: \*027683  
Solinst: N-1Gas Detector Type: MiniRAE 3000  
(10.6 eV)  
Serial Number: 592-920683Water Quality Meter Type: In-Situ  
SmarTroll MP  
Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to groundwater is measure from top of grey plate (survey mark).**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

\*\*\* 500' Calibrated Water Level Meter measurement (N-1)

TIME	DTW**	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
1252	Water at surface									
1257	376.31	0.2	220.83	8.03	0.34	7.70	0.23	26.93	135.0	0.1
1302	376.30	0.4	224.51	6.72	0.35	8.37	0.18	24.68	153.8	0.2
1307	376.29	0.7	225.52	9.53	0.35	8.33	0.03	24.52	178.8	0.2
1312	376.31	1.0	225.25	8.09	0.35	8.39	0.02	24.28	161.0	0.2

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: No sediment

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 primary = 22 total

AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H2SO4: <u>8</u>	Amber 1-L: <u>3</u> 500-mL: <u>2</u> 1-L (800 mL): <u>2</u>	Poly 250 mL H2SO4: <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

ERH805 (N)

ERH804 (Trip Blank)

DATE: 4/23/2019

TIME: Start:1415 End:1518 Start:1250

DECONTAMINATION PROCEDURES:

Alconox, DI water, Isopropyl, and DI water wash

NOTES: —

SAMPLED BY: GM, RS, and TV



## Red Hill Groundwater Sampling Log

WELL NO. **RHMW10**

LOCATION: Outside Tunnel

PROJECT NO. 60571032

DATE: 4/24/19

TIME: 0815

CLIMATIC CONDITIONS: Overcast, 88°, light trade winds

Depth to groundwater		Final Depth	Depth to Product	Depth to bottom		Purge			
Previous (ft btoc)	Current (ft btoc)	(ft btoc)	(ft btoc)	Previous (ft btoc)	Current (ft btoc)	Flow rate (mL/min)	Start Time	Total Volume (gal)	Nitrogen used
*476.35	*476.45	***476.31	No Product	497.37	NM	300mL/min	0849	4.8	Start 1700 End 300 Start 2600 End 1700
**476.24	***476.35								
Pump settings:			Pressure (PSI)		Discharge (sec)		Fill (sec)		
Previous/Actual			230	230	40	40	40	40	

Headspace VOCs: 0.0 ppm Ambient VOCs: 0.0 ppm

O/W Interface Probe Solinst/  
Type/Water Level Meter: Solinst Serial Number: Solinst: \*027683  
Solinst: N-1Gas Detector Type: MiniRAE 3000  
(10.6 eV) Serial Number: 592-920683Water Quality Meter Type: InSitu SmarTroll  
MP Serial Number: 589972

Stabilization: +/- 0.2 °C, +/- 3% conductivity, +/- 10% DO, +/- 0.1 pH, +/-10 mv ORP, turb=as low as possible (&lt; 10 NTU ideal) for 3 consecutive readings following a min of 5 readings

**Depth to groundwater is measure from top of grey plate (survey mark).**

\* 500' Oil/Water Interface Probe measurement

\*\* 1000' Calibrated Water Level Meter measurement (N-2)

\*\*\* 500' Calibrated Water Level Meter measurement (N-1)

TIME	DTW**	GALLONS REMOVED	TDS (ppm)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (psu)
0849	Start purge									
0859	Water at surface									
0915	476.35	0.4	199.08	8.15	0.31	8.72	—	23.81	117.6	0.1

(see next page)

SAMPLING EQUIPMENT: Dedicated Bladder Pump

APPEARANCE OF SAMPLE: COLOR: Clear

SEDIMENT: No sediment

ODOR/OTHER: No odor, no bubbles

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER 22 Primary = 22 total

AND TYPES OF SAMPLE CONTAINERS USED:

VOAs HCl: <u>4</u> H2SO4: <u>8</u>	Amber 1-L: <u>3</u> 500-mL: <u>2</u> 1-L (800mL): <u>2</u>	Poly 250 mL H2SO4: <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1</u>
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SAMPLE IDENTIFICATION NUMBER(S)

**ERH807 (N)****ERH806 (Trip Blank)**

DATE: 4/24/19

TIME: Start:1020

End:1128

Start:0821

DECONTAMINATION PROCEDURES:

Alconox, DI water, Isopropyl, and DI water wash

NOTES:

°Water in turbidity meter (0.02 reads 0.23)

SAMPLED BY: GM, RS, TV, MH

SAMPLES DELIVERED TO: APPL

TRANSPORTER: FedEx





# Westbay Well Groundwater Sampling

Field Data Sheet

Project: 60571032 Red Hill      Ambient VOCs (ppm): 0      Date: 4/29/2019  
 Monitoring Well No.: RHMW11      Headspace VOCs (ppm): 0      Sheet: 1 of 1  
 Sampling Zone No(s): Zone 5      Start Time: 8:37      Atm. Reading: 14.75      Sampling Equipment: EMS 5285  
 Sampled by: MH, BM, BL, GM      End Time: 12:50      Atm. Reading: 14.71

Time	Port No.	Run No.	Surface Function Tests (probe in flushing collar)						Position Sampler					Sample Collection Checks (probe located at sampling zone in Westbay casing)						Comments (volume recovered)			
			Shoe Out	Close Valve	Check Vacuum	Open Valve	Evacuate Bottles (3-5 psi)	Close Valve	Shoe In	Arm In	Locate Port	Arm Out	Land Probe	Pressure in Westbay ( )	Shoe Out	Zone Pressure ( )	Open Valve	Zone Pressure ( )	Close Valve		Shoe In	Pressure in Westbay ( )	
8:38	5	1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.86	✓	55.76	✓	55.76	✓	✓	14.92	Used for physical parameters	
9:03	5	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.87	✓	55.76	✓	55.76	✓	✓	14.90	ERH817, VOCs TPH-DRO/ORO	
9:24	5	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.87	✓	55.77	✓	55.77	✓	✓	14.87	TPH-DRO/ORO	
9:44	5	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.87	✓	55.78	✓	55.79	✓	✓	14.89	TPH-DRO & PAHs	
10:08	5	5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.87	✓	55.78	✓	55.79	✓	✓	14.88	PAHs	
10:27	5	6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.86	✓	55.78	✓	55.78	✓	✓	14.89	Used for physical parameters	
10:45	5	7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.85	✓	55.78	✓	55.78	✓	✓	14.88	PAHs & ERH816	
11:05	5	8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.86	✓	55.78	✓	55.77	✓	✓	14.88	PAHs & SVOCs	
11:25	5	9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.85	✓	55.77	✓	55.76	✓	✓	14.90	SVOCs	
11:40	5	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.86	✓	55.78	✓	55.78	✓	✓	14.90	TOC & SVOCs	
12:04	5	11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.85	✓	55.77	✓	55.76	✓	✓	14.91	DOC & Fe <sup>2+</sup>	
12:29	5	12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.85	✓	55.77	✓	55.78	✓	✓	14.90	Used for GW parameters	
12:46	5	13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14.85	✓	55.78	✓	55.81	✓	✓	14.90	ERH819+	

TIME	Liters Removed	TDS (g/L)	pH	SP. COND. (mS/cm)	D.O. (mg/L)	TURB. (NTU)	TEMP. (°C)	ORP (mV)	SAL (ppt)	Comments
9:07	1	269.29	7.31	0.41	0.16	0.65	24.76	53.5	0.2	NA
10:50	6	287.67	7.77	0.44	0.19	0.61	24.99	3.5	0.2	NA
12:47	12	275.84	7.95	0.42	0.19	0.82	27.46	14.6	0.2	NA

Sample Identification Numbers: ERH709 (N, MS/MSD), ERH710 (Dup) & ERH708 (TB)  
 Sample Start Time: 9:00      End Time: 12:50  
 Appearance of Sample:      COLOR: Clear  
    SEDIMENT: None  
    OTHER: No odor  
 Notes: \_\_\_\_\_

LABORATORY ANALYSIS PARAMETERS AND PRESERVATIVES / NUMBER AND TYPES OF SAMPLE CONTAINERS USED:      **22 (N) + 1 (5A) = 1 (5B) + 1 (5C) = 25 total**

<b>VOAs</b> HCl: <u>4</u> H2SO4: <u>4 + 4 (filtered)</u>	<b>Amber</b> 1-L: <u>3</u> 500-mL: <u>2</u> 1-L (800 mL): <u>2</u>	<b>Poly</b> 250 mL H2SO4: <u>1</u> 250 mL HCl (brown): <u>1 filtered</u> 250 mL unpres.: <u>1 + 1 (5A) + 1 (5B) + 1 (5C)</u>
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# Westbay Piezometric Pressures/Levels

## Field Data and Calculation Sheet

Well No.: RHMW11  
 Datum: -  
 Elev. G.S.: -  
 Height of Westbay above G.S.: -  
 Elev. top of Westbay Casing: -  
 Reference Elevation: -  
 Borehole angle: -

Probe Type: EMS  
 Serial No.: EM5285  
 Probe Range: 500 PSI  
 Westbay Casing Type: MP38  
 Sampler Valve Position: -

Date: 4/29/2019  
 Client: NAVFAC  
 Job No.: 60571032  
 Location: Red Hill/HCF  
 Weather: Sunny  
 Operator: BM, MH, GM, BL

Note: "Port position" in angled boreholes refer to position along drillhole. True depth (Dp) needs to be calculated using borehole angle and deviation data to calculate zone piezometric level (Dz).

**Ambient Reading (P<sub>atm</sub>) (pressure, temperature, time)**

Start: Pressure 14.74      Finish: 14.75  
 Temp 26.75      22.26  
 Time 0732      0830

**P<sub>atm</sub>      14.74      psi**

Port No.	Port Position From Log (ft)	Port Position From Cable (ft)	True Port Depth "Dp" (ft)	Fluid Pressure Readings					Pressure Head Outside Port (ft) H = (P2-Patm)/w	Piez. Level Outside Port (ft) Dz = Dp - H	Comments
				Inside Casing (P1)	Outside Casing (P2)	Time H:M:S	Probe Temp. (°C)	Inside Casing (P1)			
Z1	459.3	459.33	459.3	79.79	130.79	0744	23.89	79.8	267.70	191.60	-
Z2	396.0	396.11	—	52.37	103.52	0750	22.03	52.37	204.80	191.20	-
Z3	357.8	358.10	—	35.77	87.03	0756	21.28	35.78	166.76	191.04	-
Z4	330.5	331.19	—	23.93	75.27	0800	21.23	23.95	139.63	190.87	-
Z5	285.3	286.09	—	14.91	55.76	0805	21.26	14.91	94.63	190.67	-
Z6	250.0	251.09	—	14.88	57.48	0808	21.44	14.88	98.59	151.41	-
Z7	234.8	235.20	—	14.86	54.75	0814	21.56	14.86	92.30	142.50	-
Z8a	200.5	201.65	—	14.85	59.82	0818	21.85	14.87	103.99	96.51	-
Z8b	189.3	190.42	—	14.88	54.98	0821	21.88	14.87	92.83	96.47	-
Z8c	169.3	170.53	—	14.83	46.38	0825	21.93	14.85	72.99	96.31	-

Notes:      w = 0.4335 psi/ft (1.422psi/m) of H<sub>2</sub>O      Dz = piezometric level in zone      Patm = atmospheric pressure      H = pressure head of water in zone      Dp = true depth of measurement port



# Hydraulic Pumping Port Operation Field Data Sheet

Project: Red Hill  
Location: Red Hill/HCF  
Monitoring Well No.: RHMW11

Sampling Zone No(s): 5  
Depth to Water in Westbay: 198.10@0825  
Depth to Water in Target Zone: N/A

Date: 4/8/2019  
Job No.: 60571032  
Operators: GM, VT, BM, DT

Desired Operation (Open or Close)	Surface Preparation					Position Sampler			Pumping Port Operation Checks						Comments
	Face Place A or B	Water in Container? <sup>1</sup> (Y/N)	Container Pressure (psi) <sup>1</sup>	Sampler Function Checks <sup>2</sup>	Sampler Valve Closed Container Valve Open	Lower into Well	Pressurize Container downhole? <sup>3</sup> (Y/N)	Release Arm, Locate in Port	Pressure in Westbay (psia)	Shoe Out, Pressure (psia)	Open Valve	Close Valve	Shoe In, Pressure (psia)	Test for Port Open or Closed	
Close	B	Y	✓	✓	✓	✓	N	✓	58.06	79.08	✓	✓	58.09	58.13	closed

Notes: 1. Prepare sample container at surface for either low-pressure operation (Bottle A in Figure 3) or pressurized operation (Bottle B in Figure 3).  
2. Sampler function checks as described in the Model 2532 Sampler Probe Manual.  
3. If pressurizing empty container downhole, lower sampler to >120 m below water, open sampler valve, allow container to fill, close sampler valve.



# Hydraulic Pumping Port Operation

## Field Data Sheet

Project: Red Hill  
 Location: Red Hill/HCF  
 Monitoring Well No.: RHMW11

Sampling Zone No(s): 5  
 Depth to Water in Westbay: N/A  
 Depth to Water in Target Zone: N/A

Date: 4/9/2019  
 Job No.: 60571032  
 Operators: GM, VT, BM

Desired Operation (Open or Close)	Surface Preparation					Position Sampler			Pumping Port Operation Checks						Comments
	Face Place A or B	Water in Container? <sup>1</sup> (Y/N)	Container Pressure (psi) <sup>1</sup>	Sampler Function Checks <sup>2</sup>	Sampler Valve Closed Container Valve Open	Lower into Well	Pressurize Container downhole? <sup>3</sup> (Y/N)	Release Arm, Locate in Port	Pressure in Westbay (psia)	Shoe Out, Pressure (psia)	Open Valve	Close Valve	Shoe In, Pressure (psia)	Test for Port Open or Closed	
Close	B	Y	✓	✓	✓	✓	N	✓	58.11	67.82	✓	✓	58.11	60.00	189.47@0810 bailed ~2 XXXX 195.71@0845

Notes: 1. Prepare sample container at surface for either low-pressure operation (Bottle A in Figure 3) or pressurized operation (Bottle B in Figure 3).  
 2. Sampler function checks as described in the Model 2532 Sampler Probe Manual.  
 3. If pressurizing empty container downhole, lower sampler to >120 m below water, open sampler valve, allow container to fill, close sampler valve.



# Hydraulic Pumping Port Operation

## Field Data Sheet

Project: Red Hill  
 Location: Red Hill/HCF  
 Monitoring Well No.: RHMW11

Sampling Zone No(s): 5  
 Depth to Water in Westbay: 314.78  
 Depth to Water in Target Zone: 190.82

Date: 4/10/2019  
 Job No.: 60571032  
 Operators: GM, VT, BM

Desired Operation (Open or Close)	Surface Preparation					Position Sampler			Pumping Port Operation Checks						Comments
	Face Place A or B	Water in Container? <sup>1</sup> (Y/N)	Container Pressure (psi) <sup>1</sup>	Sampler Function Checks <sup>2</sup>	Sampler Valve Closed Container Valve Open	Lower into Well	Pressurize Container downhole? <sup>3</sup> (Y/N)	Release Arm, Locate in Port	Pressure in Westbay (psia)	Shoe Out, Pressure (psia)	Open Valve	Close Valve	Shoe In, Pressure (psia)	Test for Port Open or Closed	
Open	A	Y	✓	✓	✓	✓	N	✓	48.04	60.17	✓	✓	58.09	✓	—
Close	B	Y	✓	✓	✓	✓	N	✓	58.03	75.33	✓	✓	58.03	—	—

Notes: 1. Prepare sample container at surface for either low-pressure operation (Bottle A in Figure 3) or pressurized operation (Bottle B in Figure 3).  
 2. Sampler function checks as described in the Model 2532 Sampler Probe Manual.  
 3. If pressurizing empty container downhole, lower sampler to >120 m below water, open sampler valve, allow container to fill, close sampler valve.



# Hydraulic Pumping Port Operation

## Field Data Sheet

Project: Red Hill  
 Location: Red Hill/HCF  
 Monitoring Well No.: RHMW11

Sampling Zone No(s): 5  
 Depth to Water in Westbay: 201  
 Depth to Water in Target Zone: 190.68

Date: 4/29/2019  
 Job No.: 60571032  
 Operators: MM, GM, BM, BL

Desired Operation (Open or Close)	Surface Preparation					Position Sampler			Pumping Port Operation Checks						Comments
	Face Place A or B	Water in Container? <sup>1</sup> (Y/N)	Container Pressure (psi) <sup>1</sup>	Sampler Function Checks <sup>2</sup>	Sampler Valve Closed Container Valve Open	Lower into Well	Pressurize Container downhole? <sup>3</sup> (Y/N)	Release Arm, Locate in Port	Pressure in Westbay (psia)	Shoe Out, Pressure (psia)	Open Valve	Close Valve	Shoe In, Pressure (psia)	Test for Port Open or Closed	
Open	A	Y	✓	✓	✓	✓	N	✓	55.3	67.35	✓	✓	57.96	✓	—

Notes: 1. Prepare sample container at surface for either low-pressure operation (Bottle A in Figure 3) or pressurized operation (Bottle B in Figure 3).  
 2. Sampler function checks as described in the Model 2532 Sampler Probe Manual.  
 3. If pressurizing empty container downhole, lower sampler to >120 m below water, open sampler valve, allow container to fill, close sampler valve.

1  
2

**Appendix B.2:  
Field Logbooks**

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Location Red Hill Bulk Fuel Date 04/22/2019Project / Client LTM GW Tunnel Apr 2019

- 0600 KL arrives at warehouse. helps GM, DH, TV, PS, MM load up vehicles. GM & DH calibrating equipment. See cal. logs for details
- 0630 Tailgate safety meeting by KL. GM, PS, TV, MM, DH in attendance.
- 0645 KL, MM, DH depart for site.
- 0700 KL, MM, DH arrive at RH main gate. KL to Adit 6 to get carts, then to Adit 3. DH, MM straight to Adit 3
- 0710 KL, MM, DH begin loading equipment in Adit 3. Outside Ambient: 20.9% O<sub>2</sub>, 0-VOCLCLH<sub>2</sub>S, CO weather Sunny ~80°F ~60% humidity
- 0730 M. Muraoka (Navy) arrives at Adit 3 to open door to pump house. Pumps ON. MP3
- 0735 begin loading equipment into pumphouse. Ambient in Pump house: 20.9% O<sub>2</sub>, 0.1 ppm VOC, 0-LELH<sub>2</sub>S, CO Set up mid rail protection around shaft manhole.
- 0809 Mid rail in place. Set up water sampling equipment, MultiRAE #120340m2, Smartboll MP#589976 MP50-1446 (HGF), West Marine Deep Cycle battery #14571
- 0829 Water to surface. See pump log for details
- 0842 ERH781 Trip blank for RHMW2254-01 taken
- 0900 Forgot Dup bottle set for RHMW2254-01. DH offsite.

Location Red Hill Bulk Fuel Date 04/22/19Project / Client LTM GW Tunnel Apr 2019

- 0917 Readings stabilized for RHMW2254-01.
- 0930 Sample started for RHMW2254-01.  
N/MS/MSD: ERH782, DUP: ERH783  
Sampling held for additional bottle set.
- 0945 DH returns with bottles. Continue sampling.
- 1121 End sampling at RHMW2254-01 pump ON. Clean up.
- 1140 Exit pump house. M. Muraoka (Navy) offsite.
- 1155 Exit Adit 3. Completed samples brought out for outdoor team.
- 1205 KL, DH, MM re-enter Adit 3. Move to RHMW05.
- 1250 Arrive at RHMW05
- 1310 Begin purging at RHMW05  
Late entry 1300 trip blank taken for RHMW05 ERH796
- 1340 Sample started for ERH797, RHMW05
- 1408 Sample completed for RHMW05.
- 1450 KL, DH, MM exit Adit 3. load vehicles.
- 1505 KL assists GM & TV setting up at RHMW07. DH & MM run <sup>KL yield</sup> ~~set~~ 10W to 10W drums.
- 1610 KL, MM, DH offsite.
- 1630 KL, MM, DH arrive at warehouse. Unload.

*[Signature]* 4/22/19 *Rite in the rain.*

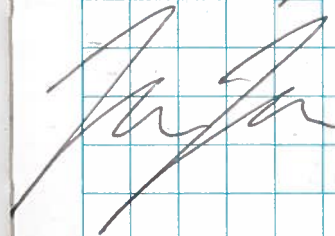
Location Red Hill Bulk Fuel Date 04/23/19Project / Client LTM GW Tunnel Apr 2019

- 0600 KL arrives at warehouse. helps GM, DH, TU, RS, MM prep & load equipment. See cal logs for equipment calibration.
- 0630 Tailgate safety meeting by KL. AM, DH, TU, RS, MM present.
- 0645 KL, MM, DH depart for site.
- 0700 KL, MM, DH arrive at <sup>RH</sup> main gate. Cloudy ~75°F ~75% humidity.
- 0710 KL, MM, DH begin loading equipment into Adit 3. Outside Ambient: 20.9% O<sub>2</sub>, 0-VOC, LEL, H<sub>2</sub>S, CO
- 0730 M. Muraoka (Navy) arrives. Pump house opened. begin setting up on RHMW2254-01. Pumps OFF  
Equipment used: MultiRAE #120340mz, Smartroll MP#511776, MP50-1446 (HEP), West Marine Deep Cycle Battery #14574
- 0750 Trip Blanks taken for RHMW2254-01 ERH784
- 0758 Water to surface. See purge log for details.
- 0840 Stabilization reached for RHMW2254-01. Start sampling. ERH785 (M) (ms/msd) & ERH786 (Dup)
- 1006 End sampling for RHMW2254-01. Clean up.
- 1030 Exit Adit 3. M. Muraoka (Navy) offsite. KL takes RHMW2254-01 (Day 2) samples to outside team at RHMW08.
- 1050 Re-enter tunnel at Adit 3.
- 1115 KL, DH, MM arrive at RHMW01. Set up.

Location Red Hill Bulk fuel Date 04/23/19Project / Client LTM GW Tunnel Apr 2019

- 1120 Trip blank taken for RHMW01 ERH787
- 1137 Water to surface at RHMW01. See purge logs.
- 1240 Bubbles from line/down hole. Pump pulled to troubleshoot.
- 1340 RHMW01 producing water without bubbles again. resume purging.
- 1535 start sample for RHMW01 ERH788
- 1703 end sampling at RHMW01
- 1830 exit adit 6. load vehicle.
- 1745 Pump IDW water at IDW area.
- 1800 KL, MM, DH offsite.
- 1825 KL, MM, DH arrive at warehouse. unload.

reviewed by:



04/23/19

Location Red Hill Bulk Fuel Date 04/24/19  
 Project / Client LTM GW Tunnel Apr 2019

- 0530 KL arrives at warehouse. Joins MM in calibrating equipment. TV loading up equipment  
 see cal logs for equipment calibration
- 0600 GM, RS, DH, M+ arrive to load up.
- 0645 Tailgate safety meeting by MH, KL, DH, GM, RS  
 TV, MM present.
- 0855 depart for site.
- 0915 KL, MM, DH arrive at RH main Gate. Move to Adit 6. Cloudy ~75°F ~70% humidity
- 0925 Enter Adit 6. Ambient outside 20.9% O<sub>2</sub>,  $\beta$ -Vocs, CO, H<sub>2</sub>S  
 $\beta$ -Lec
- 0950 KL, MM, DH arrive at RHMW02. Set up.  
 Equipment used: MultiRAE #120340 m2, Smart toll #589976  
 MP 50-1446 (HEP), West marine dual purpose battery #14513  
 Aedon WLM: N-2, PINE, solinst interface probe 112 #250750
- 0800 Trip blank taken for ERH789, RHMW02
- 0807 Water to surface. begin purging.
- 0840 RHMW02 stabilized. begin sampling. ERH790(N)  
ERH791 (Dup)
- 0931 RHMW02 end sampling.
- 1000 Arrive at RHMW03. Set up.
- 1002 Trip blank for RHMW03 ERH792
- 1010 Water to surface at RHMW03. Begin Purge.
- 1040 RHMW03 stabilized begin sample ERH793

Location Red Hill Bulk Fuel Date 04/24/19  
 Project / Client LTM GW Tunnel Apr 2019

- 1116 End sampling RHMW03. Clean up.
- 1135 Exit tunnel through Adit 6. load up vehicles.
- 1150 Meet GM at IDW area to exchange samples/IDW
- 1210 KL, MM, DH assist outside team pulling RHMW10 pump.
- 1235 KL, MM, DH offsite
- 1255 KL, MM, DH arrive at warehouse. Unload and prep for next day.

reviewed by:

*[Handwritten signature]*

04/24/19

Location Red Hill Bulk Fuel Date 04/25/2019Project / Client LTM GW Bulk Fuel

0600 KL arrives at warehouse. Join GM, TV, PS, DH,  
MM in loading equipment

0645 Tailgate safety meeting by GM/KL, DH, MM, TV,  
PS present.

0700 KL, MM, DH depart for site

0720 MM, DH arrive at RH main gate. KL returns  
to warehouse. Forgot spare bladder for  
OWDFMWO1.

0800 KL arrives at OWDFMWO1. Join MM, DH. Set up  
on OWDFMWO1. ~80°F Sunny ~60% humidity

0820 Begin set up pump and sampling equipment  
on OWDFMWO1

0840 Begin purging OWDFMWO1. See purge log for  
details. Equipment used: MULTRAE#120340VZ,  
Smart toll #589976, MP50-1446 (HCP), West Marine  
dual purpose battery #14513, AECOM WMM-N-2,  
Pine solinst interface probe 172 #280750

0845 Trip blank taken for OWDFMWO1. ERH808

0950 OWDFMWO1 stabilized. Start sampling. ERH809

~~1030 DH offsite to get sample bottles. 04/25/19~~

1127 OWDFMWO1 sampling completed. Clean up.

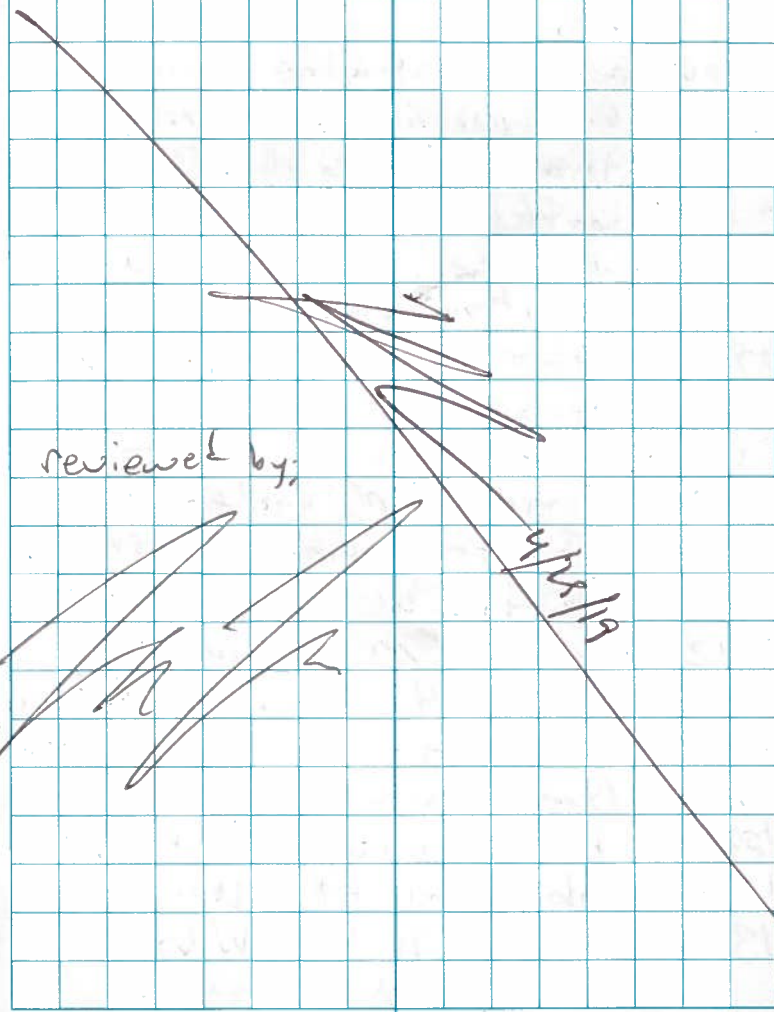
1145 Meet Outdoor team at RHUWO7.

1205 KL, DH, MM move up to IDW area to drop  
IDW.

Location Red Hill Bulk Fuel Date 4/25/2019Project / Client LTM GW Tunnel Apr 2019

1220 KL, MM, DH depart site.

1245 KL, MM, DH arrive at warehouse.  
Unload.



0530 GM and DH arrive at warehouse to meet TV.  
GM and TV calibrate equipment. See calibration logs for details.

0600 RS, MM, and KL arrive at warehouse and help TV load equipment.

0645 TV conducts H&S tailgate meeting with both sampling groups. Discusses safe driving practices. See H&S log for details.

0655 Depart from Warehouse.

0720 Arrive at RH main gate and check in. Call main gate guards to have them open up gate to RHMW04.

0735 Guard opens gate to RHMW04. Team drives back to set up at well.

Weather: Overcast, light wind, 79°, 75% humidity  
Personnel: AECOH (GM, TV, and RS)

Objective: Sample convention wells (RHMW04, 07, and 06) for April Event.

08:05 Set up at RHMW04. Problem w/ M-1 water level meter. Constant tone, could not take water level. Told JK about water level and contacted Joel at H&E to schedule pick up and repair.

09:10 Water at surface, started taking water readings. Collected TB = ERH794 @ 9:10. See log for details.

09:40 Stopped readings and recalibrated D.O. sensor. Continued readings.

10:20 Readings stabilized, began collecting RHMW04 sample = ERH795 @ 10:20

Scale: 1 square = \_\_\_\_\_

11:04 Finished collecting sample ERH795. Picked up at RHMW04. Moved down to RHMW06.

11:36 Set up at RHMW06. Collected PID and WL readings. Started purging well.

12:02 Water at surface, started collecting water readings. See log for details. Collected TB = ERH798 @ 12:00.

13:02 Battery troubles were preventing flow, had to switch out battery. Seems to be a problem with the battery adapter plug.

13:35 Readings stabilized, began collecting RHMW06 sample = ERH799 @ 13:35

14:13 Finish collecting sample ERH799. Picked up at RHMW06 and headed to RHMW07. Sent RS to pick up additional battery at warehouse. MT and SM brought extra bottle to the site for RHMW07 samples.

15:15 Set up at RHMW07. KL helped team set up while RS was at warehouse.

15:28 Set up pump at RHMW07 and started pumping. RS returns to site w/ extra battery.

15:36 Water at surface, started collecting water readings. See log for details. Collected TB = ERH800 @ 15:25.

16:02 Had to decrease flow rate to prevent well drawdown, continued purge.

Scale: 1 square = \_\_\_\_\_

*Rite in the Rain*

04/22/19 cont...

1645 Started collecting RHMW07 sample  
ERH800<sup>cont</sup> @ 16:45.

1741 Finished collecting sample ERH800 had  
to use battery box to finish sampling.

1754 TV and RS return to warehouse and  
GM drops off IDW at IDW storage area.

1828 GM arrives at warehouse. Helps TV  
and RS finish unloading vehicles.

End of Field Day

*GM*  
04/22/19

*RS*

Scale: 1 square = \_\_\_\_\_

04/23/19 Apr LTM Sampling Event

0530 GM and DH arrive at warehouse to meet TV.

GM and DH calibrate equipment. See calibration log for  
details. Trouble calibrating outside well SmartTroll MP.

0640 TV conducts H&S tailgate meeting w/ both  
sampling groups. See H&S log for details.

0700 RS and TV head to site. GM contacts  
HER to get a replacement / fix SmartTroll MP.

0820 Joel arrives from HER and helps GM  
replace pH probe and provide additional replacement  
meter. RS and TV set up at RHMW08

0850 GM leaves warehouse to head to site.

0918 GM arrives at site. Team takes water  
level readings and starts purge of well.

0943 Water at Surface. Started collecting  
water readings. See log for details. Collected

TB = ERH802 @ 9:45. SmartTroll was  
recalibrated again at warehouse w/ Joel.

1045 Readings stabilized, began collecting  
RHMW08 sample = ERH803 @ 10:45. ~~Finish~~ GM

1127 Finished collecting sample ERH803. Packed  
up at RHMW08 and decontaminated equipment. KL  
dropped off tunnel samples to RS.

1158 Waited at top gate for guard to open.  
Proceeded to RHMW09.

1225 Set up at RHMW09. Team takes  
water level readings and starts well purge

Scale: 1 square = \_\_\_\_\_

*Rite in the Rain*

RS leaves site to take morning samples to warehouse.

1252 Water at surface. Started collecting water readings. See log for details. Collected TB = ERH804 @ 12:50.

1415 Readings stabilized, begin collecting RHMW09 Sample = ERH805 @ 1415. RS returned to site to help sample.

1518 Finished collecting sample ERH805. Packed up equipment and closed RHMW09. All water levels today were taken using N-1 water level that was returned by HER this morning.

~~1600~~<sup>6m</sup> 1548 GM went to IDW to drop off today's water in IDW storage drum 066. RS and TV leave for warehouse.

1600 GM leaves site to return to warehouse. Stuck in traffic from site to freeway entrance.

1645 Arrive at warehouse. Help TV and RS unload all equipment and nitro tanks.

1700 Finish unloading equipment.

End of Field Day

04/23/19

Scale: 1 square =

0600 GM, MH, RS arrive at warehouse. MM and KL calibrate equipment for teams. See calibration log for details.

0640 MH conducts H&S meeting w/ both teams. See H&S log for details.

0700 Team leaves warehouse to head to site.

0735 Team arrives at site. Drives up to top gate to get to RHMW10. Called gate guard to open up gate.

0805 Guard did not show up. GM drove down to guard shack to talk to guards. Guard jumped in w/ GM to drive to top of hill to open gate. GM drops off guard at main entry gate.

0815 Team sets up at RHMW<sup>GM</sup>10. Team takes water level readings and stages tables and equipment.

Weather: Overcast, light winds, 78°, 75% humidity

Personnel: AECOM (GM, TV, RS, and MH)

Objective: Sample convention well RHMW10. Pull

pumps at RHMW10, 09, and 08. Measure intake depths.

0859 Water at surface at RHMW10. MH goes to pick up IDW drums at other storage area.

0915 Started taking water quality readings.

Collected TB = ERH806 @ 08:21

1020 Readings stabilized, began collecting RHMW10 Sample = ERH807 @ 10:20. Changed nitrogen tank before sample collection.

Scale: 1 square =

Return the Rain.

- 11:28 Finished sampling RHMW10. Packed up equipment and took samples to tunnel team. Tunnel team assisted in pulling and packing up RHMW10 pump and tubing. Tunnel team took IDW to new IDW storage drum #067.
- 12:10 Finished pulling RHMW10 pump. Handed to RHMW09 to pull pump.
- 12:32 Set up at RHMW09. Started pulling pump. Noticed that metal cable is longer than air/water tubing.
- 12:53 Finished pulling RHMW09 pump and tubing. Proceeded to storage drum to label new drum.
- 13:21 Set up at RHMW08. Attempted to measure intake depth at RHMW08. Could not feel pump w/ water level. No pump intake measurement.
- 13:55 Finished at RHMW08. Handed to RHMW04. Gate not open to RHMW08. Waited for guard to open gate.
- 14:15 Set up at RHMW04. Attempted to measure intake depth but could not feel the top of pump w/ water level. Started to pull pump at RHMW04.
- 14:43 Finished pulling pump/tubing and packed up for the day. Leave RH entry gate and head back to warehouse.
- 15:15 Arrive at warehouse.

Scale: 1 square = \_\_\_\_\_

- 15:38 Finishing unpacking equipment, supplies, and nitrogen tanks. Stage area for tomorrow's work. Team signs out on H2S log.
- 15:45 End of Field Day

GR  
04/24/19

Scale: 1 square = \_\_\_\_\_



0530 TV arrives to load equipment for day. DH and MM show up at warehouse to calibrate instruments. See calibration log for details.

0600 RS, GM, and KL arrive at warehouse to assist w/ loading vehicles.

0645 KL conducts H&S meeting. See H&S log for details. Leave warehouse and head to site.

0714 Team arrives at HCF lot. Check in with guard shack and meet Patrick Casey at parking lot. Head back to HDMW2253-03.

0755 Set up at HDMW2253-03. Deployed pump and tubing after collecting first water level.

Weather: Sunny, light winds, 80°, 75% humidity

Personnel: AECOM (TV, GM, and RS) and USGS (Patrick Casey)

Objective: Sample HDMW2253-03 and pull pumps from RHMW06 and RHMW07.

0832 Started purge of HDMW2253-03. TV collected TB = ERH810 @ 8:15.

0843 Water at surface. Started collecting water quality parameters. See log for details.

0950 Readings stabilized, began collecting HDMW2253-03 sample = ERH811 @ 0950

1025 Finished sampling HDMW2253-03.

Picked up equipment and supplies

~~1045~~ Signed out at HCF guard shack.

Scale: 1 square = \_\_\_\_\_

Sc

Headed to RHMW07.

11:35 Set up and pulled pump/tubing from RHMW07. Tried to measure depth to pump intake w/ Oil Water interface. Could not land oil water interface on top of pump.

1156 Finished pulling pump RHMW07 and packed up for storage.

12:03 Arrived at RHMW06. Set up and pulled pump/tubing from well.

12:24 Finished pulling pump RHMW06 and packed up for storage. KL, MM, and DH picked up IDW to take to IDW storage drum 067.

12:38 Leave site to return to warehouse.

Could not get water level on top of pump. No depth to intake was measured.

13:08 Arrive at warehouse. Help unpack equipment and nitrogen tanks. Call Joel at HER to pickup rental equipment.

13:36 Finished unloading equipment. Waited for Joel to pick up rental equipment.

13:45 End of Field Day

04/25/19

Scale: 1 square = \_\_\_\_\_

Plot in the Rain

(40) 4/29/19 KRMW11 11:00 AM sampling.

- 0530 MH + BM @ warehouse to calibrate equipment. (see cal logs for details). TV helps load.
- 0600 BL + GM arrive to help load.
- 0615 conduct H+S tailgate briefing (see sign in sheet for details)
- 0625 depart warehouse.
- 0635 Arrive @ HCF, sign in w/ guard & mob to ATMW11 & set up.
- 0739 begin pressure profile w/ 500 PSI sampling probe, 250 PSI pressure probe is missing and cap (installed in transducer string in ATMW11)
- 0740 collect TS ERH 812 for EB/FS
- 0745 collect GB ERH 814 from metal sample canister.
- 0810 collect FB ERH 813
- 0830 collect TS ERH 815
- 0837 send sample canisters down for first aliquot to be used for physical parameters. sample canisters have been purged w/ nitrogen.
- 0850 collect ERH 817 GW chemistry sample after first set of parameters.
- 0900 collect ERH 816 Primary sample
- 1005 collect ERH 818 GW chemistry sample after 2<sup>nd</sup> set of physical parameter readings.
- 1250 collect ERH 819 GW chemistry sample after 3<sup>rd</sup> set of physical parameter readings.
- 1250 end sampling, set up to close pps.
- 1310 lightning hold, audible thunder but no lightning.
- 1330 end lightning hold, thunder still audible but no lightning observed.
- 1400 add 100 gal DI water to WB center tube to bring WL up to 201 ft bgs. Pressurize sample canister to 300 psi.
- 1430 PPS open, water in WB center tube equalized w/ zone 5.

4/29/19 cont.

- 1440 setting up Mosdex probe string, see install sheet for more details. use 30 psi probe to record barometric pressure.
- 1450 begin installing Mosdex probe in zone 5.
- 1543 Mosdex string installed, begin logging every 10 min. clean up site.
- 1610 depart ATMW11, GM + BL take ~2.5 gal IDW to staging area, MH + BM proceed to RATB01 to download VWP data.
- 1620 RATB01 data downloaded. Proceed to ATMW11 to download Mosdex data.
- 1635 ATMW11 data downloaded. Depart site, proceed to warehouse.
- 1700 All @ warehouse, end field day.
- Personnel: AECOM (MH, BM, BL, GM)
- Weather: Mostly sunny, light trade wind, 89° afternoon rain + thunderstorms!

~~4/29/19~~

1  
2

**Appendix B.3:  
Tape Correction Factors**

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**For Participant**

**Owner:** U.S. Navy  
**Tape ID:** N-1  
**Make:** Solinst  
**Serial number:** 133795  
**Length:** 500 feet  
**Dates:** 9/13/2017 - 9/15/2017

**Table 1. Correction table for Solinst 500-foot tape (serial number 133795; tape identifier N-1), tested 9/13/2017 to 9/15/2017.**

Tape interval, in feet		<sup>1</sup> Correction to add to depth to water, in feet
From	To	
<i>0.00</i>	<i>6.41</i>	<i>0.00</i>
6.42	14.02	0.00
14.03	52.17	-0.01
52.18	90.33	-0.02
90.34	128.49	-0.03
128.50	166.64	-0.04
166.65	204.80	-0.05
204.81	242.96	-0.06
242.97	392.45	-0.07
<i>392.46</i>	<i>500.00</i>	<i>-0.07</i>

*Values in red italics are extrapolated outside the range defined by the shallowest and deepest test measurements*

<sup>1</sup>Use of the indicated correction values is expected to improve accuracy in water-level measurements made with this tape. However, because of scatter in the calibration data, the indicated corrections for this tape may contain uncertainty on the order of 0.01 - 0.02 feet.

**Table 2. Depth-to-water measurements and errors for Solinst 500-foot tape (serial number 133795; tape identifier N-1), tested 9/13/2017 to 9/15/2017.**

Well site	Reference tape depth to water, in feet	N-1 depth to water, in feet	<sup>1</sup> Error, in feet
Halawa Kiosk	6.40	6.42	-0.02
Moanalua	17.60	17.61	-0.01
Halawa	43.37	43.39	-0.02
Waiawa	69.97	69.96	0.01
Waialae Shaft	152.41	152.44	-0.03
Kapakahi	261.97	262.04	-0.07
Waipio	392.38	392.45	-0.07

<sup>1</sup>Negative error indicates tape shortening; positive error indicates tape stretch

**For Participant**

**Owner:** U.S. Navy  
**Tape ID:** N-2  
**Make:** Solinst  
**Serial number:** 133937  
**Length:** 1,000 feet  
**Dates:** 9/13/2017 - 9/15/2017

**Table 1. Correction table for Solinst 1,000-foot tape (serial number 133937; tape identifier N-2), tested 9/13/2017 to 9/15/2017.**

Tape interval, in feet		<sup>1</sup> Correction to add to depth to water, in feet
From	To	
<i>0.00</i>	<i>6.40</i>	<i>0.01</i>
6.41	8.23	0.01
8.24	80.71	0.00
80.72	161.31	-0.01
161.32	253.61	-0.02
253.62	364.91	-0.03
364.92	516.53	-0.04
516.54	593.17	-0.05
<i>593.18</i>	<i>764.02</i>	<i>-0.05</i>
<i>764.03</i>	<i>1000.00</i>	<i>-0.06</i>

*Values in red italics are extrapolated outside the range defined by the shallowest and deepest test measurements*

<sup>1</sup>Use of the indicated correction values is expected to improve accuracy in water-level measurements made with this tape. However, because of scatter in the calibration data, the indicated corrections for this tape may contain uncertainty on the order of 0.01 - 0.02 feet.

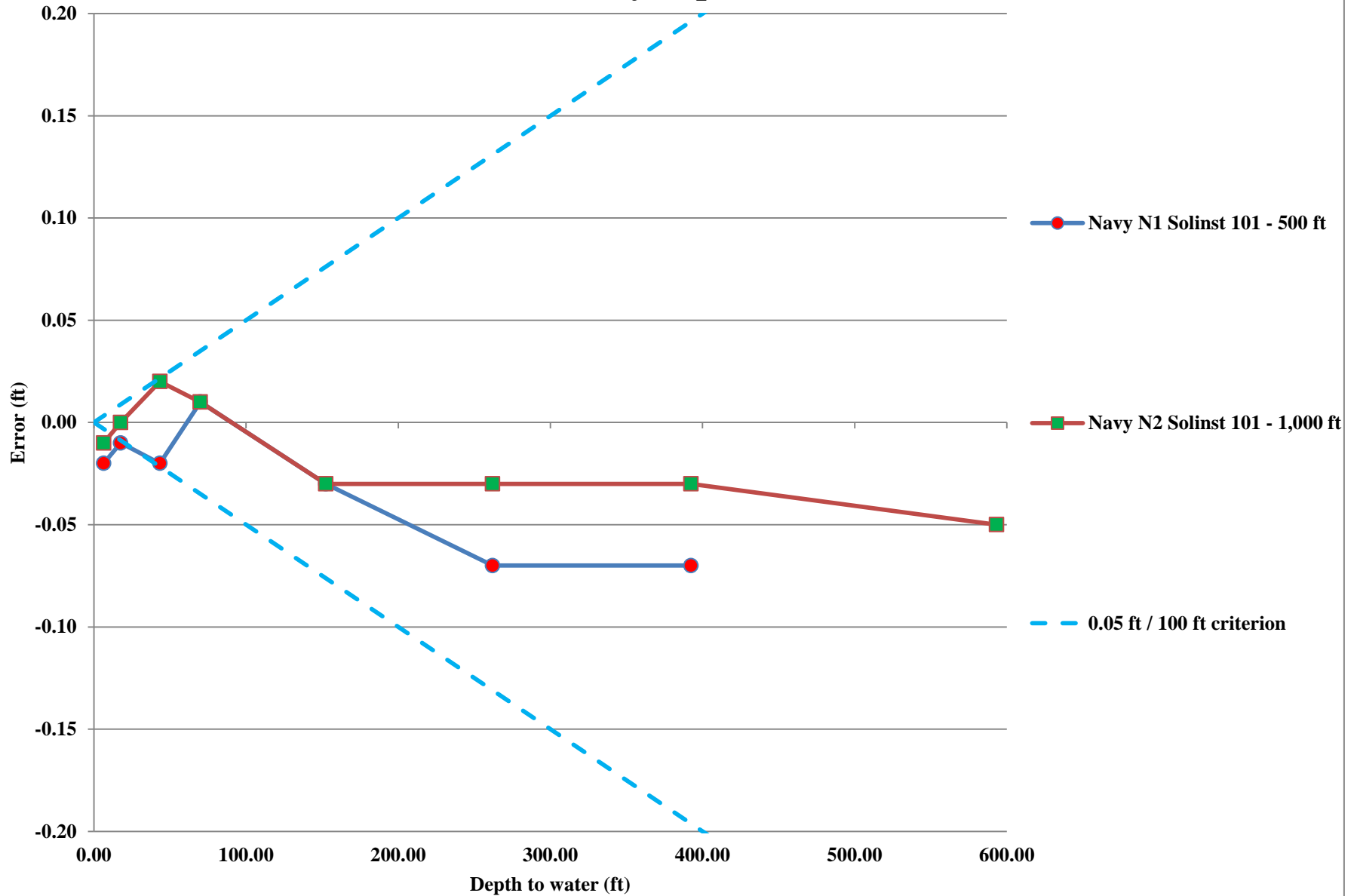
**Table 2. Depth-to-water measurements and errors for Solinst 1,000-foot tape (serial number 133937; tape identifier N-2), tested 9/13/2017 to 9/15/2017.**

Well site	Reference tape depth to water, in feet	N-2 depth to water, in feet	<sup>1</sup> Error, in feet
Halawa Kiosk	6.40	6.41	-0.01
Moanalua	17.60	17.60	0.00
Halawa	43.37	43.35	0.02
Waiawa	69.97	69.96	0.01
Waialae Shaft	152.41	152.44	-0.03
Kapakahi	261.97	262.00	-0.03
Waipio	392.38	392.41	-0.03
Poliwai	593.12	593.17	-0.05

<sup>1</sup>Negative error indicates tape shortening; positive error indicates tape stretch

# USGS Interagency Tape Calibration, September 13-15, 2017

## Navy Tapes



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2

**Appendix B.4:  
Instrument Calibration Log**

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Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <b>MULTIRAE</b>	Manufacturer: <b>RAE Systems</b>
Serial Number: <b>M0120938TB</b>	Last Service Date: <b>04/15/19</b>
Parameter(s): <b>Fresh Air, Isobutylene, mixed gas</b>	Calibration Gas: <b>isobutylene &amp; compressed gas</b>
Calibration Procedure: <b>(oxy, H<sub>2</sub>S, CO, LEL)</b> Start w/ fresh air calibration using Altr. Next hook up isobutylene to multi <sup>(oxygen, nitrogen)</sup> <sub>RAE</sub> and wait one minute. Last hook up multiRAE to mixed gas canister and wait one minute. Fresh Air, VOCs, and mixed gas should show either pass or fail.	
Daily Calibration Results	
Date: <b>4/22/19</b>	Calibration Result: <b>Fresh Air &amp; isobutylene</b> oxy ✓ LEL ✓ 100. ppm H <sub>2</sub> S ✓ @ ✓
Name: <b>Ellie Huang</b>	Signature: <i>Ellie H</i>
Notes: <b>Isobutylene lot # 225112 exp Jan 2022</b> <b>Oxy, H<sub>2</sub>S, CH<sub>4</sub>, CO lot # 206587 exp Aug 2019</b>	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	





Project: **Red Hill Bulk Storage Area**  
 Date: **04/22/19**  
 Instrument:

Job No.: **60571032**  
 Operator: **Ellie Huang**  
 Calibration: **Fresh air, VOCs, H<sub>2</sub>S, CO, LEL, oxy**

Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <b>MultiRae</b>	Manufacturer: <b>RAE Systems</b>
Serial Number: <b>PGM 6228 / 12QT</b>	Last Service Date: <b>04/05/19</b>
Parameter(s): <b>H2S (25ppm), Carbon Monoxide (50ppm) Methane (50% LEL), Oxy (19%) Nitrogen Balance.</b>	Calibration Gas: <b>Isobutylene (100ppm, Jan 2022 Lot # 225112) H2S/Methane/Oxy/Nitro Aug 2019 Lot # 200587</b>
Calibration Procedure: <b>Go to calibration settings. Calibrate to fresh air first, let sit for one minute and wait for indication of pass/fail. Calibrate multi sensor span w/ mixed gas canister. Let sit for one minute and wait for H2S, Oxy, LEL, and CO to pass/fail. Calibrate VOCs w/ Isobutylene canister, let sit for one minute and wait for pass/fail.</b>	
Daily Calibration Results	
Date: <b>04/15/19</b>	Calibration Result: <b>Pass</b>
Name: <b>Garvin Mura</b>	Signature: 
Notes:	
Date: <b>04/16/19</b>	Calibration Result: <b>Pass</b>
Name: <b>Garvin Mura</b>	Signature: 
Notes:	
Date: <b>04/17/19</b>	Calibration Result: <b>Pass</b>
Name: <b>Garvin Mura</b>	Signature: 
Notes:	
Date: <del>04/24/19</del> <b>MM</b>	Calibration Result: <del>Pass</del> <b>MM</b>
Name: <del>04/24/19</del> <b>MARC MURAKA</b> <sup>MM</sup>	Signature:  <sup>MM</sup>
Notes: <del>MARC MURAKA</del> <b>Wrong Form MM 04/25/19</b>	

Project: **Red Hill Bulk Fuel Storage**

Job No.: **60571032**

Date: **04/15/19**

Operator: **Garvin Mura**

Instrument: **MULTI RAE**

Calibration: **Isobutylene, Mixed Gas, Fresh Air**

Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <b>MULTIRAE</b>	Manufacturer: <b>RAE systems</b>
Serial Number: <b>MO120340V2</b>	Last Service Date: <b>04/15/19</b>
Parameter(s): <b>Fresh Air, Isobutylene, mixed gas</b>	Calibration Gas: <b>isobutylene, compressed gas (oxygen)</b>
Calibration Procedure: <b>(oxy, H<sub>2</sub>S, CO, LEL)</b> Start w/ fresh air calibration w/ filter at normal air conditions. Next hook up multiRAE to isobutylene canister and wait one minute. Last hook up multiRAE to mixed gas canister and wait one minute. Fresh air, VOCs, and mixed gas should show either pass or fail.	
Daily Calibration Results	
Date: <b>4/22/19</b>	Calibration Result: <b>fresh air ✓ 20.9 oxy 19.0 LEL 50</b> <b>isobutylene 100.2 ppm H<sub>2</sub>S 25.2 CO 5T</b>
Name: <b>Ellie Huang</b>	Signature: <i>Ellie H</i>
Notes: <b>after calibrating multi for VOC (100 ppm), it asks for a span 2 cal (1000 ppm), just clicked no.</b>	
Date: <b>4/23/19</b>	Calibration Result: <b>Fresh air: 20.9 oxy ✓</b> <b>multi: 19.0% oxy 50 LEL ✓ 120 isobutylene</b> <b>25.0% H<sub>2</sub>S 50 CO ✓ 10.1</b>
Name: <b>Ellie Huang</b>	Signature: <i>Ellie H</i>
Notes: <del>4/24/19</del>	
Date: <b>4/24/19</b>	Calibration Result: <b>PASS FRESH AIR: 20.9 OXY PASS</b> <b>MULTI: PASS</b>
Name: <b>MARC MURAOKA</b>	Signature: <i>Marc Muraoka</i>
Notes:	
Date: <b>4/25/19</b>	Calibration Result: <b>fresh air: pass</b> <b>multi: pass</b>
Name: <b>Ellie</b>	Signature: <i>Ellie H</i>
Notes:	




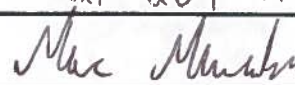
Project: **Red Hill Bulk Storage Area**  
 Date: **04/22/19**  
 Instrument: **MULTIRAE**

Job No.: **60571032**  
 Operator: **Ellie Huang / Marc Muraoka**  
 Calibration: **fresh air, VOCs, H<sub>2</sub>S, CO, LEL, oxy**

Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <u>SmartTroll Mp</u>	Manufacturer: <u>In-Situ</u>
Serial Number: <u>589972</u>	Last Service Date: <u>04/15/19</u>
Parameter(s): <u>RDO, Conductivity, pH, ORP, NTU</u>	Calibration Gas: <u>A-10 Cal Solution - Lot# C825641 (11/17)</u> <u>pH7 - Lot# C819546, pH10 - Lot# C830367 (11/19)</u>
Calibration Procedure: <u>Start w/ just wet sponge in calibration cup and let sit for RDO to (Lot#-C842257(11/19) ORP ↑</u> <u>stabilized to approx 95%-100%. Calibrate conductivity using auto cal solution, wait for stabilization</u> <u>to approx. 4.4 ns/cm. Calibrate pH4 using auto cal solution, rinse, repeat w/ pH 7 solution,</u> <u>rins, repeat w/ pH 10 solution and final rinse. Calibrate ORP using ORP solution to approx.</u> <u>225mV</u>	
Daily Calibration Results	
Date: <u>04/22/19</u>	Calibration Result: <u>RDO - 92.5, 7.56mg/L, 26.12 / Con - 4.44 ns/cm</u> <u>Depth: -0.17 / pH - 4.72, 7.64, 10.17, ORP - 135.0</u>
Name: <u>Garin Mura</u>	Signature: 
Notes:	
<del>Date: <u>04/23/19</u> <u>6m</u></del>	<del>Calibration Result: <u>95.29, 7.69mg/L, 25.20 / Con - 4.31 ns/cm</u> <u>pH 4, 7.69, 9.54 ORP - 4.40 ns/cm</u></del>
<del>Name: <u>Garin Mura</u> <u>6m</u></del>	<del>Signature:  <u>Recalibrated</u> <u>- pH not working</u></del>
Notes:	
Date: <u>04/23/19</u>	Calibration Result: <u>RDO - 75.4%, 8.02mg/L, 24.52 Con - 4.258 ns/cm</u> <u>pH - 4.55, 7.21, 9.28 ORP - 205.0 mV</u>
Name: <u>Garin Mura</u>	Signature: 
Notes:	
Date: <u>4/24/19</u>	Calibration Result: <u>RDO - 95%, 7.86mg/L, 25.20</u> <u>ORP - 204 SPC CON: 4.165 ns/cm</u>
Name: <u>MARC MARAOKA</u>	Signature: 
Notes:	

pH: 4.67  
7.28  
9.65

Project: Red Hill Bulk Storage Area

Job No.: 60571032

Date: 04/22/19

Operator: Garin Mura

Instrument: SmartTroll Mp

Calibration: RDO, ORP, pH, Conductivity

Americas

Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <i>Smartroll</i>	Manufacturer: <i>In Situ</i>
Serial Number: <i>589976</i>	Last Service Date: <i>04/15/19</i>
Parameter(s): <i>rDO, Conductivity, ORP, PH, NTU</i>	Calibration Gas: <i>AutoCal Solution - Lot # C825641 (11/15) pH 7 - Lot # C819546</i>
Calibration Procedure: <i>ORP Lot #: C842257 pH 7.0: C819546 Autocal: C825641 pH 10.0: C830367</i>	<i>See other Smartroll calibration log for details.</i>
Daily Calibration Results	
Date: <i>4/22/2019</i>	Calibration Result: <i>ORP - 75.1, 760, 26.12 / con - 4433 us/cm depth: 0.31 ft / 4.68 (pH), 7.65, 10.38 ORP: 185.9 mV</i>
Name: <i>Ellie Huang</i>	Signature: <i>Ellie H</i>
Notes:	
Date: <i>4/23/2019</i>	Calibration Result: <i>DO: 93.4%, 7.77 mg/L, 25.0°C / con 4333 us/cm pH 4.73 / 7.69 / 10.38, 184.6 mV ORP</i>
Name: <i>Ellie</i>	Signature: <i>Ellie H</i>
Notes:	
Date: <i>4/24/19</i>	Calibration Result: <i>DO: 98.1%, 4.78 ps/cm pH 4.74, 7.63, 10.47, 183.1 mV</i>
Name: <i>Kevin Lee</i>	Signature: <i>Kevin Lee</i>
Notes:	
Date: <i>4/25/19</i>	Calibration Result: <i>4249 us/cm; 4.75 pH, 7.71 pH, 6.40 pH 182.8 mV; DO = 98.2%, 8.12 mg/L</i>
Name: <i>Ellie</i>	Signature: <i>Ellie H</i>
Notes:	

Project: *Red Hill Bulk Storage Area*  
 Date: *04/22/19*  
 Instrument: *Smartroll Mp*

Job No.: *60571032*  
 Operator: *Ellie Huang / Kevin Lee*  
 Calibration: *rDO, ORP, PH, Conductivity*

Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <i>Smartroll Mp</i>	Manufacturer: <i>IN-SITU</i>
Serial Number: <i>589972</i>	Last Service Date: <i>04/15/19</i>
Parameter(s): <i>RDO, CONDUCTIVITY, PH, ORP</i>	Calibration Gas: <i>AUTO CAL SOLUTION - LOT C93B641C11/19) PH 7 - LOT C819546, PH 10 - LOT C93B0367 (11/11)</i>
Calibration Procedure: <i>START WITH WET SPONGE IN CAL CUP AND LET SIT FOR RDO TO STABILIZE TO 95%-100%. CALIBRATE CONDUCTIVITY USING AUTO CAL SOLUTION, WAIT TO STABILIZE TO ABOUT 4.49MS/CM. ALSO CAL PH4 USING AUTO CAL SOLUTION, REMOVE AND USE PH7 SOLUTION THEN REMOVE AND USE PH10 SOLUTION. CALIBRATE ORP USING ORP SOLUTION TO APPROX 228 MV. RINSE IN BETWEEN CHANGING SOLUTIONS.</i>	
Daily Calibration Results	
Date: <i>4/25/19</i>	Calibration Result: <i>RDO: 95.8%, 7.81 mg/L, 25.9°C SP CON: 4283 MS/CM, PH: 4.73, 7.63, 9.87</i>
Name: <i>MARC MURAOKA</i>	Signature: <i>Marc Muraoaka</i>
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	

ORP LOT: C842357 (11/19)

ORP: 197.3mv

Project: *Red Hill Bulk Storage Area*

Job No.: *60571032*

Date: *04/25/19*

Operator: *Marc Muraoaka*

Instrument: *Smartroll Mp*

Calibration: *rDO, ORP, PH, conductivity*



Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <i>miniRAE</i>	Manufacturer: <i>RAE systems</i>
Serial Number: <i>592-920403</i>	Last Service Date:
Parameter(s): <i>Air, VOCs</i>	Calibration Gas: <i>isobutylene (100 ppm)</i>
Calibration Procedure: <i>lot #: 225112 exp: Jan 2022</i> Start w/ fresh air calibration with Alter at normal air conditions. Next hook up miniRAE to isobutylene canister and let sit for one minute. Fresh Air and VOC Calibration should show either pass or fail.	
Daily Calibration Results	
Date: <i>4/22/19</i>	Calibration Result: <i>zero air 0.0 ppm</i> <i>Isobutylene 100.1 ppm</i>
Name: <i>Garin Mura</i>	Signature: <i>[Signature]</i>
Notes:	
Date: <i>4/23/19</i>	Calibration Result: <i>zero air = 0.0 ppm</i> <i>isobutylene = 100.0 ppm</i>
Name: <i>Ellie</i>	Signature: <i>[Signature]</i>
Notes:	
Date: <i>4/24/19</i>	Calibration Result: <i>zero air : 0.0 ppm</i> <i>isobutylene = 100.0 ppm</i>
Name: <i>Kevin Lee</i>	Signature: <i>[Signature]</i>
Notes:	
Date: <i>4/25/19</i>	Calibration Result: <i>ZERO AIR: 0.0 ppm</i> <i>ISOBUTYLENE: 100 ppm</i>
Name: <i>MARC MURAKA</i>	Signature: <i>[Signature]</i>
Notes:	

Project: *Red Hill Bulk Storage Area*  
 Date: *04/22/19*  
 Instrument: ~~*S...*~~  
*MiniRAE*

Job No.: *60571032*  
 Operator: *Garin Mura / Marc Muraka, Ellie Hwang*  
 Calibration: *Fresh Air, VOCs*

Americas

# Instrument Calibration Log

S3AM-127-FM10

Instrument Information	
Instrument Name: <i>Smartroll</i>	Manufacturer: <i>In Situ</i>
Serial Number: <i>589976</i>	Last Service Date: <i>4/15/2019</i>
Parameter(s): <i>pH, Spec. Cond, ORP, RDO</i>	Calibration Gas: <i>( )</i>
Calibration Procedure: <i>pH 7.00 → Lot # C819546 exp 11/2019 → 7.03</i> <i>pH 10.00 → Lot # C830367 exp 11/2019 → 10.47</i> <i>pH 4.00 → Lot # C825641 exp 11/2019 → 4.79</i> <i>Spec. Conductivity 4.49 mS/cm Lot # C825641 exp 11/2019 → 4.123 mS/cm</i> <i>ORP → +228mV Lot # C42267 exp 11/2019 → 182.8mV</i> <i>RDO → sparge → 93.5%</i>	
Daily Calibration Results	
Date: <i>4/29/19</i>	Calibration Result: <i>pass</i>
Name: <i>Bianca Mintz</i>	Signature: <i>Bianca Mintz</i>
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	

Project: *60571032 Redfill*  
 Date: *4/29/19*  
 Instrument: *Smartroll*

Job No.: *60571032*  
 Operator: *Bianca Mintz*  
 Calibration: *pass*

Americas

**Instrument Calibration Log**

S3AM-127-FM10

Instrument Information	
Instrument Name: <i>MultiRae</i>	Manufacturer: <i>RAE Systems</i>
Serial Number: <i>592-920683</i>	Last Service Date: <i>4/15/2019</i>
Parameter(s):	Calibration Gas:
Calibration Procedure: <i>fresh or isobutylene 100ppm, exp Jan 2022, Lot No. 225112</i>	
Daily Calibration Results	
Date: <i>4/29/19</i>	Calibration Result: <i>pass</i>
Name: <i>Bianca Monte</i>	Signature: <i>Bianca Monte</i>
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	

Project: *Rail Hill*  
 Date: *4/29/19*  
 Instrument: *MultiRae*


Job No.: *60574632*  
 Operator: *Bianca Monte*  
 Calibration: *pass*



# Certificate of Calibration

Instrument Type: MINIRAE RAE 3000 Serial Number: 920683

Calibration Gas	Lot Number	Result
<b>Isobutylene 100 ppm</b>	<b>987369</b>	<b>100ppm</b>

Calibrated by:  Calibration Date: 04/15/19

Calibration Report: Conductivity Calibration Report  
2019-04-15 11:34:40  
Probe: 589976  
Cell Constant: 1.1430  
Stability: Nominal

Calibration Report: RDO Calibration Report  
2019-04-15 11:32:57  
Probe: 589976  
Slope: 1.0179  
Offset: -0.0000  
Stability: Nominal

Calibration Report: ORP Calibration Report  
2019-04-15 11:39:37  
Probe: 589976  
ZoBell's  
Offset: 39.7 mV  
Stability: Full

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