



# EBERLINE

SERVICES

EBERLINE ANALYTICAL CORPORATION

2030 Wright Avenue

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[www.eberlineservices.com](http://www.eberlineservices.com)

May 2, 2011

Mr. Adam Teekell  
State of Hawaii – Department of Health  
591 Ala Moana Blvd.  
Honolulu, HI 96813

**Ref: Water Sampling**  
**Eberline Analytical S104144-8233**

Dear Mr. Teekell:

Enclosed are results from the analyses of four water samples received at Eberline Analytical on April 25, 2011. The samples were analyzed for gamma emitting radionuclides, and I-131 by radiochemical separation and gas proportional counting. The parenthetical G after a nuclide indicates that the result was obtained by gamma spectroscopy; a "U" in the results column indicates that the nuclide was not detected greater than the indicated minimum detectable activity (MDA). Results were corrected for decay during counting. Eberline Analytical does not maintain a stock of I-131 activity therefore I-129 was substituted as the nuclide for the laboratory controlled spike sample (LCS) for the I-131 analysis. No problems were encountered during the processing of the samples.

Regards,

Joseph Verville  
Client Services Manager

NJV/ljb  
Enclosure: Report

# Eberline Analytical

## ANALYSIS RESULTS

SDG <u>8233</u> Work Order <u>S104144-01</u> Received Date <u>04/22/11</u>	Client <u>STATE HAWAII</u> Contract _____ Matrix <u>WATER</u>
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Client	Lab										
<u>Sample ID</u>	<u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>		<u>Results ± 2σ</u>	<u>Units</u>	<u>MDA</u>			
SAMPLE #1	8233-001	04/18/11	04/26/11	K-40 (G)		U	pCi/L	182			
			04/26/11	Mn-54 (G)		U	pCi/L	9.51			
			04/26/11	Co-57 (G)		U	pCi/L	6.47			
			04/26/11	Co-58 (G)		U	pCi/L	9.39			
			04/26/11	Co-60 (G)		U	pCi/L	9.88			
			04/26/11	Ba-133 (G)		U	pCi/L	9.95			
			04/26/11	Cs-134 (G)		U	pCi/L	10.3			
			04/26/11	Cs-137 (G)		U	pCi/L	9.26			
			04/26/11	Eu-152 (G)		U	pCi/L	24.5			
			04/26/11	Eu-154 (G)		U	pCi/L	29.8			
			04/26/11	Ra-226 (G)		U	pCi/L	18.3			
			04/26/11	Ra-228 (G)		U	pCi/L	41.2			
			04/26/11	Th-228 (G)		U	pCi/L	29.0			
			04/26/11	Th-232 (G)		U	pCi/L	41.2			
			04/26/11	U-238 (G)		U	pCi/L	1140			
			04/26/11	Am-241 (G)		U	pCi/L	66.6			
			04/26/11	Am-243 (G)		U	pCi/L	14.6			
			04/27/11	I-131				-0.022 ± 0.22	pCi/L	0.279	
			SAMPLE #2	8233-002	04/18/11	04/26/11	K-40 (G)		U	pCi/L	110
04/26/11	Mn-54 (G)					U	pCi/L	4.47			
04/26/11	Co-57 (G)					U	pCi/L	4.02			
04/26/11	Co-58 (G)					U	pCi/L	5.12			
04/26/11	Co-60 (G)					U	pCi/L	4.74			
04/26/11	Ba-133 (G)					U	pCi/L	6.02			
04/26/11	Cs-134 (G)					U	pCi/L	6.81			
04/26/11	Cs-137 (G)					U	pCi/L	4.98			
04/26/11	Eu-152 (G)					U	pCi/L	15.0			
04/26/11	Eu-154 (G)					U	pCi/L	13.3			
04/26/11	Ra-226 (G)					U	pCi/L	11.3			
04/26/11	Ra-228 (G)					U	pCi/L	23.6			
04/26/11	Th-228 (G)					U	pCi/L	10.1			
04/26/11	Th-232 (G)					U	pCi/L	23.6			
04/26/11	U-238 (G)					U	pCi/L	599			
04/26/11	Am-241 (G)					U	pCi/L	20.4			
04/26/11	Am-243 (G)					U	pCi/L	8.36			
04/27/11	I-131							-0.078 ± 0.21	pCi/L	0.273	

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# Eberline Analytical

## ANALYSIS RESULTS

SDG <u>8233</u>	Client <u>STATE HAWAII</u>
Work Order <u>S104144-01</u>	Contract _____
Received Date <u>04/22/11</u>	Matrix <u>WATER</u>

Client	Lab							
<u>Sample ID</u>	<u>Sample ID</u>	<u>Collected</u>	<u>Analyzed</u>	<u>Nuclide</u>		<u>Results ± 2σ</u>	<u>Units</u>	<u>MDA</u>
SAMPLE #3	8233-003	04/18/11	04/27/11	K-40 (G)		U	pCi/L	85.4
			04/27/11	Mn-54 (G)		U	pCi/L	6.68
			04/27/11	Co-57 (G)		U	pCi/L	4.10
			04/27/11	Co-58 (G)		U	pCi/L	7.43
			04/27/11	Co-60 (G)		U	pCi/L	10.1
			04/27/11	Ba-133 (G)		U	pCi/L	7.16
			04/27/11	Cs-134 (G)		U	pCi/L	9.43
			04/27/11	Cs-137 (G)		U	pCi/L	12.6
			04/27/11	Eu-152 (G)		U	pCi/L	18.9
			04/27/11	Eu-154 (G)		U	pCi/L	23.6
			04/27/11	Ra-226 (G)		U	pCi/L	15.9
			04/27/11	Ra-228 (G)		U	pCi/L	31.4
			04/27/11	Th-228 (G)		U	pCi/L	11.4
			04/27/11	Th-232 (G)		U	pCi/L	31.4
			04/27/11	U-238 (G)		U	pCi/L	858
			04/27/11	Am-241 (G)		U	pCi/L	9.40
			04/27/11	Am-243 (G)		U	pCi/L	5.58
	04/27/11	I-131			0.043 ± 0.19	pCi/L	0.255	
SAMPLE #4	8233-004	04/19/11	04/27/11	K-40 (G)		U	pCi/L	141
			04/27/11	Mn-54 (G)		U	pCi/L	6.12
			04/27/11	Co-57 (G)		U	pCi/L	5.19
			04/27/11	Co-58 (G)		U	pCi/L	6.84
			04/27/11	Co-60 (G)		U	pCi/L	6.55
			04/27/11	Ba-133 (G)		U	pCi/L	8.24
			04/27/11	Cs-134 (G)		U	pCi/L	8.82
			04/27/11	Cs-137 (G)		U	pCi/L	7.04
			04/27/11	Eu-152 (G)		U	pCi/L	19.3
			04/27/11	Eu-154 (G)		U	pCi/L	18.2
			04/27/11	Ra-226 (G)		U	pCi/L	18.4
			04/27/11	Ra-228 (G)		U	pCi/L	33.6
			04/27/11	Th-228 (G)		U	pCi/L	13.8
			04/27/11	Th-232 (G)		U	pCi/L	33.6
			04/27/11	U-238 (G)		U	pCi/L	847
			04/27/11	Am-241 (G)		U	pCi/L	27.1
			04/27/11	Am-243 (G)		U	pCi/L	11.0
	04/27/11	I-131			-0.082 ± 0.17	pCi/L	0.237	

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# Eberline Analytical


SDG <u>8233</u> Work Order <u>S104144-01</u> Received Date <u>04/22/11</u>	Client <u>STATE HAWAII</u> Contract _____ Matrix <u>WATER</u>
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LCS

8233-005	Co-60 (G)	278 ± 12	pCi/Smpl	295	5.92	94% recovery
	Cs-137 (G)	277 ± 11	pCi/Smpl	263	7.62	105% recovery
	I-129	125 ± 3.8	pCi/Smpl	116	1.67	108% recovery

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8233-006	K-40 (G)	U	pCi/Smpl	NA	49.7	<MDA
	Mn-54 (G)	U	pCi/Smpl	NA	3.01	<MDA
	Co-57 (G)	U	pCi/Smpl	NA	2.19	<MDA
	Co-58 (G)	U	pCi/Smpl	NA	3.28	<MDA
	Co-60 (G)	U	pCi/Smpl	NA	3.95	<MDA
	Ba-133 (G)	U	pCi/Smpl	NA	3.41	<MDA
	Cs-134 (G)	U	pCi/Smpl	NA	4.51	<MDA
	Cs-137 (G)	U	pCi/Smpl	NA	3.37	<MDA
	Eu-152 (G)	U	pCi/Smpl	NA	9.10	<MDA
	Eu-154 (G)	U	pCi/Smpl	NA	10.1	<MDA
	Ra-226 (G)	U	pCi/Smpl	NA	6.62	<MDA
	Ra-228 (G)	U	pCi/Smpl	NA	15.1	<MDA
	Th-228 (G)	U	pCi/Smpl	NA	5.24	<MDA
	Th-232 (G)	U	pCi/Smpl	NA	16.1	<MDA
	U-238 (G)	U	pCi/Smpl	NA	401	<MDA
	Am-241 (G)	U	pCi/Smpl	NA	12.6	<MDA
	Am-243 (G)	U	pCi/Smpl	NA	4.33	<MDA
	I-131	-0.156 ± 0.16	pCi/Smpl	NA	0.227	<MDA

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**RICHMOND, CA LABORATORY**  
**Chain of Custody**


CLIENT <u>State of Hawaii - Dept. of Health</u> ADDRESS <u>591 Ala Moana Blvd.</u> <u>Honolulu, HI 96813</u> PROJECT <u>Water Sampling</u>		Purchase Order No. <u>Credit Card</u> PARAMETERS		TAT (in days) <u>21</u>
SAMPLERS SIGNATURE: SAMPLE NO. <u>1</u> DATE <u>4/18</u> TIME <u>1130hrs</u> LOCATION <u>Volcano, HI</u>		SAMPLE TYPE OR MATRIX <u>Catchment water</u>		OBSERVATIONS, COMMENTS, VOLUMES, SPECIAL OR ADDITIONAL TEST
# CONTAINERS <u>1</u>		# CONTAINERS		
1) RELINQUISHED BY / DATE: <u>Adam Teetzel</u> <u>4/21/11</u> COMPANY: <u>Hawaii - DOH</u>		3) RELINQUISHED BY / DATE: COMPANY:		Total No. of Containers: <u>1</u>
2) RECEIVED BY / DATE: COMPANY:		4) RECEIVED BY / DATE: COMPANY:		Method of Shipment: <u>Fed Ex</u>
5) RELINQUISHED BY / DATE: <u>FEDEX</u>		7) RELINQUISHED BY / DATE: <u>Alex Keenan</u> <u>4/25/11 10:00</u> COMPANY: <u>EBERLINE</u>		SPECIAL SHIPMENT, HANDLING, STORAGE REQUIREMENTS, OR POSSIBLE HAZARDS
COMPANY:		COMPANY:		8) RECEIVED BY / DATE: COMPANY:

Eberline Services, Inc. - Richmond, CA Laboratory    2030 Wright Avenue    P. O. Box 4040    Richmond, CA 94804-0040    Tel (510) 235-2633    Fax (510) 235-0438

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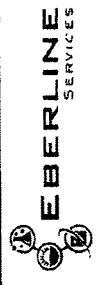


**RICHMOND, CA LABORATORY**  
**Chain of Custody**

CLIENT <u>State of Hawaii - Dept. of Health</u> ADDRESS <u>591 Ala Moana Blvd.</u> <u>Honolulu, HI 96813</u> PROJECT <u>Water Sampling</u>		Purchase Order No. <u>Credit Card</u> PARAMETERS		TAT (in days) <u>21</u>	
SAMPLERS SIGNATURE: 		SAMPLE TYPE OR MATRIX <u>Dirty water</u>		OBSERVATIONS, COMMENTS, VOLUMES, SPECIAL OR ADDITIONAL TEST	
SAMPLE NO	DATE	TIME	LOCATION	# CONTAINERS	
<u>2</u>	<u>4/18</u>	<u>11:30am</u>	<u>Waianai, HI</u>	<u>1</u>	
1) RELINQUISHED BY / DATE: <u>Adam Teeter</u> <u>4/21/11</u> COMPANY: <u>Hawaii - DOH</u>				Total No. of Containers: <u>1</u>	
2) RECEIVED BY / DATE: COMPANY:				Method of Shipment: <u>Fed Ex</u>	
3) RELINQUISHED BY / DATE: COMPANY:				SPECIAL SHIPMENT, HANDLING, STORAGE REQUIREMENTS, OR POSSIBLE HAZARDS	
4) RECEIVED BY / DATE: COMPANY:					
5) RELINQUISHED BY / DATE: <u>Fed Ex</u>					
6) RECEIVED BY / DATE: <u>Flex Return</u> <u>4/22/11 10:00</u> COMPANY: <u>EBERLINE</u>					
7) RELINQUISHED BY / DATE: COMPANY:					
8) RECEIVED BY / DATE: COMPANY:					

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**RICHMOND, CA LABORATORY**  
Chain of Custody

CLIENT <u>State of Hawaii - Dept. of Health</u> ADDRESS <u>591 Ala Moana Blvd.</u> <u>Honolulu, HI 96813</u> PROJECT <u>Water Sampling</u>		Purchase Order No. <u>Credit Card</u> PARAMETERS		TAT (in days) <u>21</u>
SAMPLER'S SIGNATURE: <u>[Signature]</u> (GEOFFREY LAW) SAMPLE NO. <u>V3</u> DATE <u>4/18</u> TIME <u>poohs</u> LOCATION <u>Maunaloa, HI</u>		SAMPLE TYPE OR MATRIX <u>Drinking water</u>		OBSERVATIONS, COMMENTS, VOLUMES, SPECIAL OR ADDITIONAL TEST
# CONTAINERS <u>1</u>		Total No. of Containers: <u>1</u>		Method of Shipment: <u>FedEx</u>
1) RELINQUISHED BY / DATE: <u>Adam Tekeal</u> <u>4/21/11</u> COMPANY: <u>Hawaii - DOH</u>		3) RELINQUISHED BY / DATE: COMPANY:		SPECIAL SHIPMENT, HANDLING, STORAGE REQUIREMENTS, OR POSSIBLE HAZARDS
2) RECEIVED BY / DATE: COMPANY:		4) RECEIVED BY / DATE: COMPANY:		
5) RELINQUISHED BY / DATE: <u>FED EX</u>		6) RECEIVED BY / DATE: <u>Alex Kellogg</u> <u>4/25/11 10:00</u> COMPANY: <u>EBERLINE</u>		SPECIAL SHIPMENT, HANDLING, STORAGE REQUIREMENTS, OR POSSIBLE HAZARDS
COMPANY:		7) RELINQUISHED BY / DATE: COMPANY:		
COMPANY:		8) RECEIVED BY / DATE: COMPANY:		SPECIAL SHIPMENT, HANDLING, STORAGE REQUIREMENTS, OR POSSIBLE HAZARDS

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### RICHMOND, CA LABORATORY Chain of Custody

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CLIENT <u>State of Hawaii - Dept. of Health</u> ADDRESS <u>591 Ala Moana Blvd.</u> <u>Honolulu, HI 96813</u> PROJECT <u>Water Sampling</u>		Purchase Order No. <u>Credit Card</u> PARAMETERS			TAT (in days) <u>21</u> OBSERVATIONS, COMMENTS, VOLUMES, SPECIAL OR ADDITIONAL TEST	
SAMPLERS SIGNATURE: <u>[Signature]</u>		# CONTAINERS <u>1</u>				
SAMPLE NO	DATE	TIME	LOCATION	SAMPLE TYPE OR MATRIX	Total No. of Containers: <u>1</u> Method of Shipment: <u>Fed Ex</u> SPECIAL SHIPMENT, HANDLING, STORAGE REQUIREMENTS, OR POSSIBLE HAZARDS	
4	4/19	13:30	Hanama'ulo, HI	Drinking water		
1) RELINQUISHED BY / DATE: <u>Adam Teetzel</u> <u>4/21/11</u> COMPANY: <u>Hawaii - DOH</u>				3) RELINQUISHED BY / DATE: COMPANY:		
5) RELINQUISHED BY / DATE: <u>Fed Ex</u> COMPANY:				4) RECEIVED BY / DATE: COMPANY:		
2) RECEIVED BY / DATE: COMPANY:				7) RELINQUISHED BY / DATE: COMPANY:		
6) RECEIVED BY / DATE: <u>Alex Kelland</u> <u>4/22/11 10:00</u> COMPANY: <u>EBERLINE</u>				8) RECEIVED BY / DATE: COMPANY:		

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# RICHMOND, CA LABORATORY

## SAMPLE RECEIPT CHECKLIST

Client: STATE OF HAWAII City HONOLULU State HI

Date/Time received 4/25/11 10:00 CoC No. N/A

Container I.D. No. 4 Boxes Requested TAT (Days) N/A P.O. Received Yes [ ] No [ ]

### INSPECTION

1. Custody seals on shipping container intact? Yes [ ] No [ ] N/A [  ]
2. Custody seals on shipping container dated & signed? Yes [ ] No [ ] N/A [  ]
3. Custody seals on sample containers intact? Yes [ ] No [ ] N/A [  ]
4. Custody seals on sample containers dated & signed? Yes [ ] No [ ] N/A [  ]
5. Packing material is: Wet [ ] Dry [ ] N/A [  ]
6. Number of samples in shipping container: 4 Sample Matrix WATER
7. Number of containers per sample: 1 (Or see CoC         )
8. Samples are in correct container Yes [  ] No [ ]
9. Paperwork agrees with samples? Yes [  ] No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [  ]
11. Samples are: In good condition [  ] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [  ] pH 6 Preservative
13. Describe any anomalies:  
\_\_\_\_\_  
\_\_\_\_\_
14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date
15. Inspected by JR Date: 4/25/11 Time: 11:20

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
<u>All samples &lt; 60</u>							

Ion Chamber Ser. No. \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. 100482

Calibration date \_\_\_\_\_  
 Calibration date \_\_\_\_\_  
 Calibration date 24 Sep 2010