



Sunset in Wailea, Maui



How Small Labs Effectively Comply with the TNI Standard

Assessment Forum

Environmental Measurement Symposium NEMC 2016

Cari Sumabat
Maui County Department of Water Supply
Water Quality Lab
Maui, Hawaii



Nilda Cox
Eurofins Eaton Analytical
Monrovia, California





Maui County Department of Water Supply (MDWS) Water Quality Lab Introduction

■ Overview

- Small Lab – 10 FTEs
- 3/31/2008 - NELAP Accredited (Chem DW)
- 2008 - Compliant with 2003 NELAC Std
- 2010 - NELAP Accredited (Chem and Micro DW)
- 2011 - Compliant with 2009 TNI Standard
- Effective Compliance Indicators
 - July 13-14, 2016 – Last NELAP OSA – By Oregon Assessor's Closing Conference
 - No Findings
 - 2 Recommendations
 - Best Small Lab
 - Top 5% (Small and Large Labs)
 - Proficient Analysts
 - Best SOPs/Checklists
 - Binders – So well organized documentation
 - Good Document Control
 - Good systems in place





Maui County Department of Water Supply (MDWS) Water Quality Lab Introduction

- Overview (Cont.)
 - Effective Compliance Indicators (Continued)
 - July 11-12, 2016 – FSMO Accredited – Last 2014 FSMO OSA By L-A-B
 - Assessors Closing Conference
 - Good Assessment
 - 3 Simple Findings
 - Findings Easily Fixed
 - Good Record Keeping
 - Good Thing, not an Easy Thing To Do
 - Award
 - County of Maui Departmental Team of the Year
 - 10/14/2008

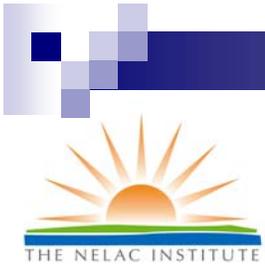


Overview of Maui County Department of Water Supply

- Water System
 - 154,000 people served
 - 12 separate water systems: Molokai (3), Maui (9)
 - Priorities: water quantity, water quality, productivity

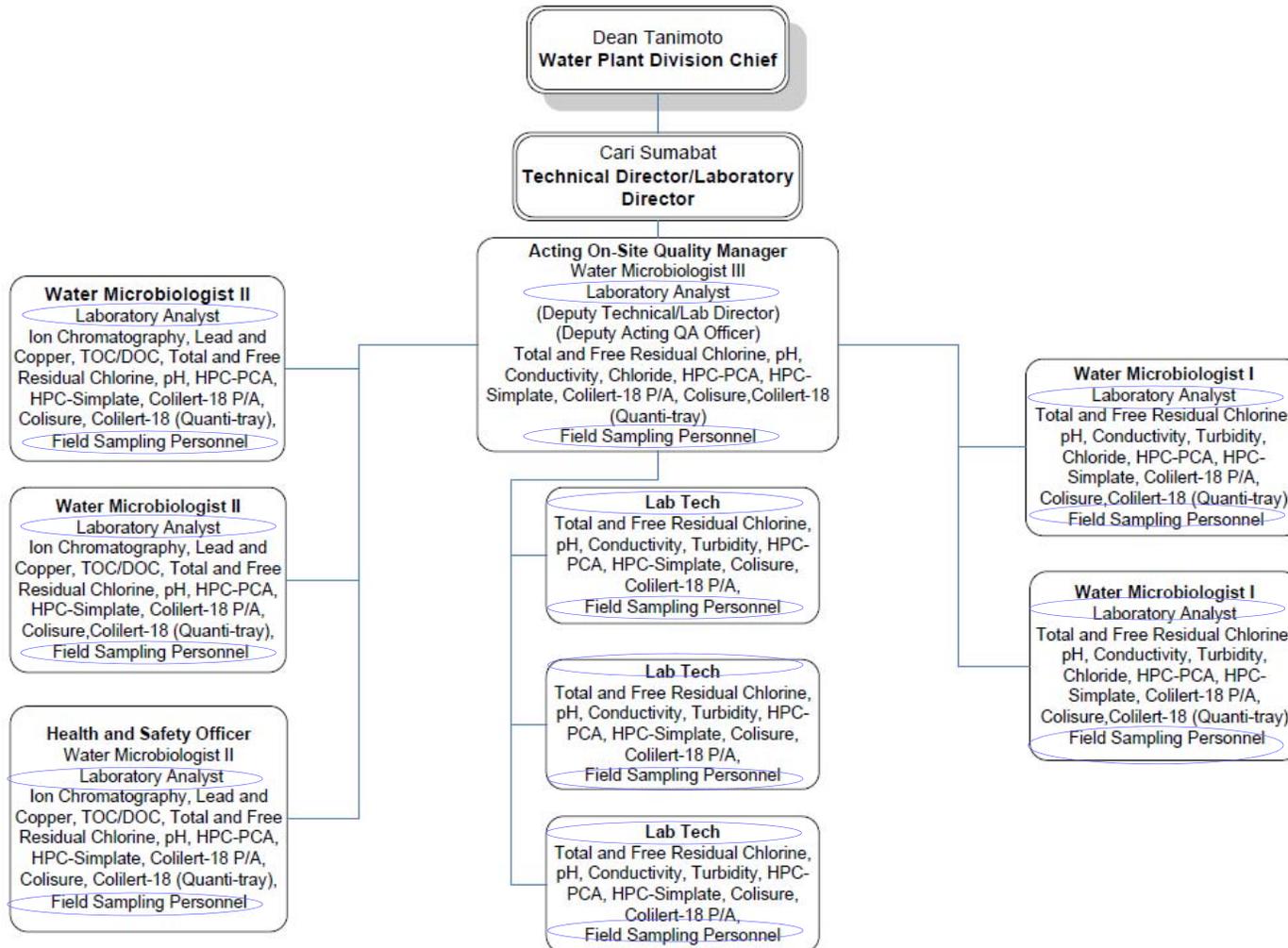
- Water Department
 - 220 professional and support staff
 - Four membrane and two conventional SWTPs

- Laboratory and Sampling
 - 10 FTEs
 - GFAA, TOC, Colorimetric/HACH, IC, pH, Cl₂, Turbidity
 - \$200,000 per year in outsourced analytical costs
 - 13,171 Samples Tested In-house



Maui County Department of Water Supply

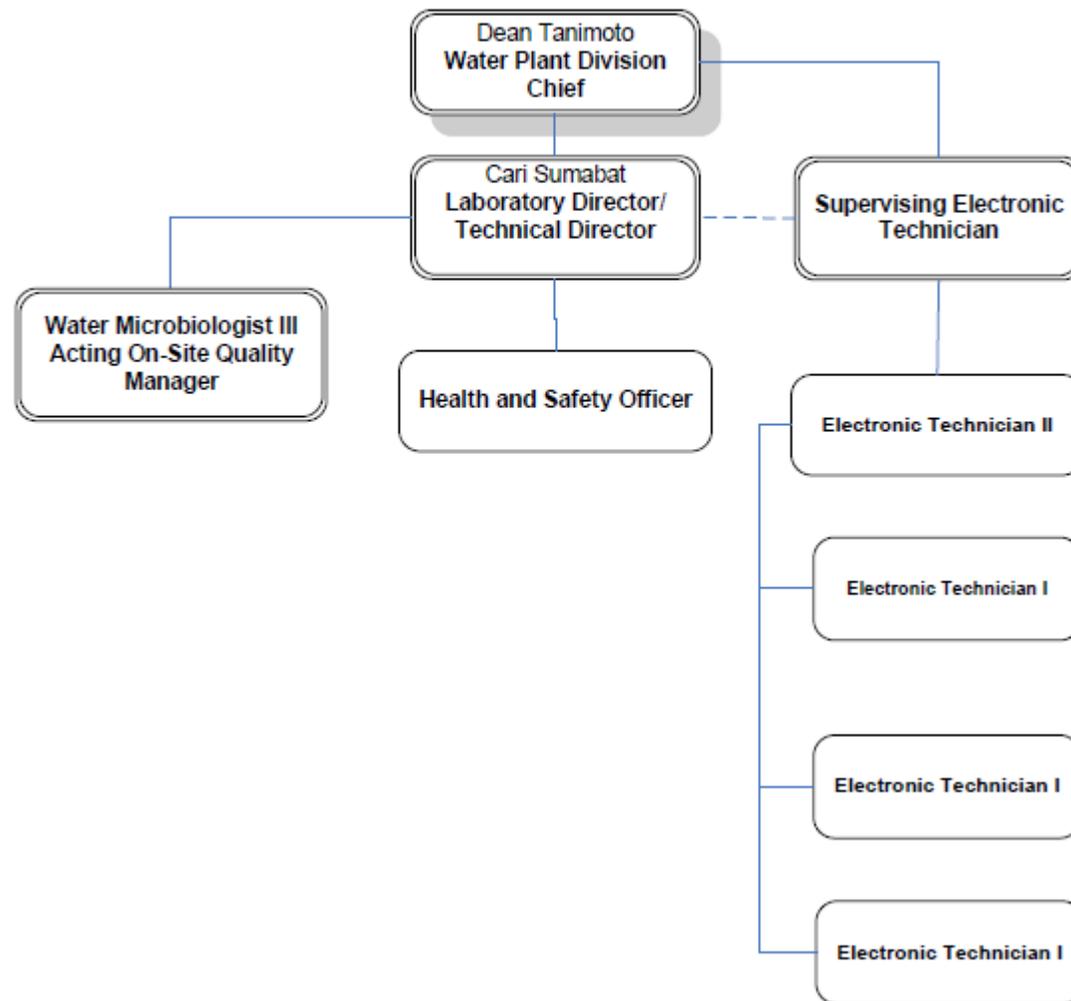
Water Quality Laboratory – 2016 NELAP/State Accredited Microbiology and Chemistry Tests

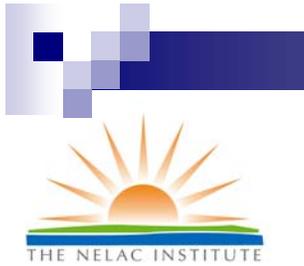




Maui County Department of Water Supply

SCADA Telemetry Group





OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4009



Department of Water Supply, County of Maui

EPA CODE: HI00023

614 Palapala Drive

Certificate: 4009 - 005

Kahului, HI 96732

Issue Date: 3/29/2016 Expiration Date: 3/28/2017

As of 3/29/2016 this list supercedes all previous lists for this certificate number.

MATRIX	Reference	Code	Analyte	Code	Description
Drinking Water	EPA 180.1			10011402	Turbidity - Nephelometric
		2055	Turbidity		
	EPA 200.9 2.2			10015404	Metals by Graphite Atomic Absorption
		1055	Copper		
		1075	Lead		
	EPA 300.0 2.1			10053200	Methods for the Determination of Inorganic Substances in Environmental Samples
		1575	Chloride		
		1730	Fluoride		
		1810	Nitrate as N		
		1840	Nitrite as N		
		1870	Orthophosphate as P		
		2000	Sulfate		
	SimPlate®			60032602	Chromogenic/Fluorogenic Quantitative (SimPlate®): Heterotrophic Bacteria
		2555	Heterotrophic plate count		
	SM 2130 B 20th ED			20042404	Turbidity by Nephelometric Determination
		2055	Turbidity		
	SM 2510 B 20th ED			20048208	Conductivity by Probe
		1610	Conductivity		
	SM 3113 B 19th ED			20058406	Metals by Graphite Furnace Atomic Absorption
		1055	Copper		
		1075	Lead		
SM 4500-CI D 20th ED			20079601	Chlorine by Potentiometry	
	1575	Chloride			
SM 4500-CI G 20th ED			20081203	Residual Chlorine by DPD Colorimetric Determination	
	1580	Chlorine			
	1945	Residual free chlorine			
	1940	Total residual chlorine			
SM 4500-H+ B 20th ED			20104807	pH by Probe	
	1900	pH			
SM 5310 B 20th ED			20137400	Total Organic Carbon by Combustion Infra-red Method	
	1710	Dissolved organic carbon (DOC)			
	2040	Total organic carbon			



OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

ORELAP ID: 4009



Department of Water Supply, County of Maui

EPA CODE: HI00023

614 Palapala Drive

Certificate: 4009 - 005

Kahului, HI 96732

Issue Date: 3/29/2016 Expiration Date: 3/28/2017

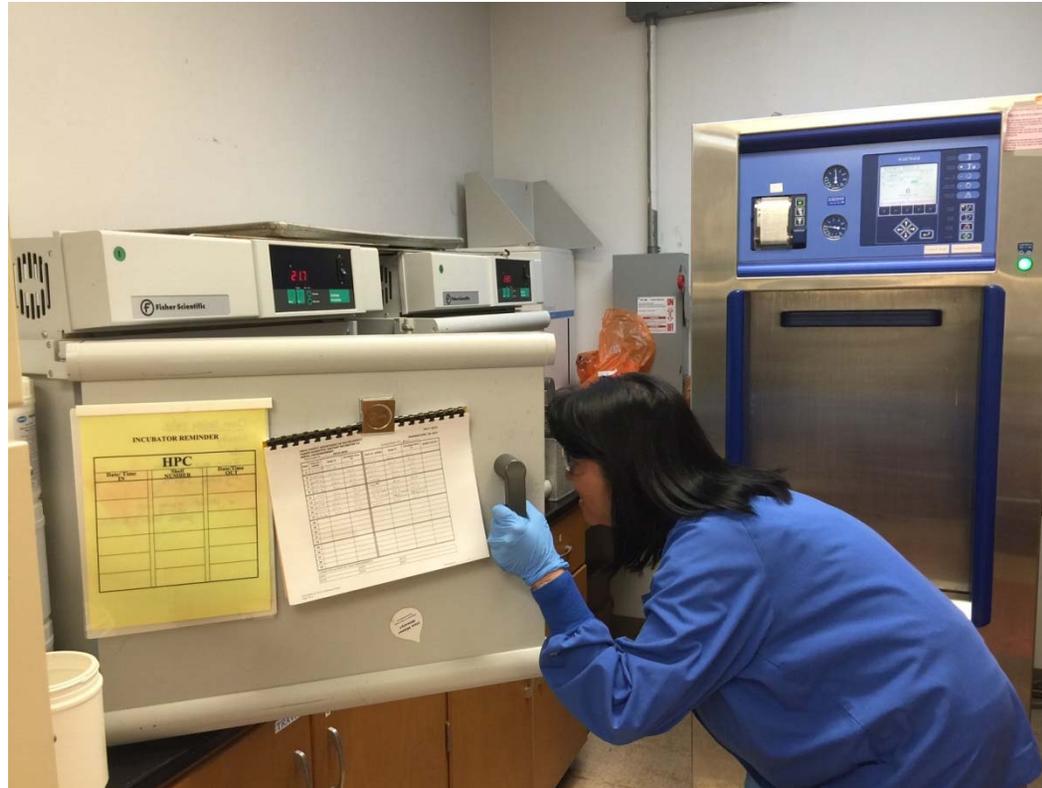
As of 3/29/2016 this list supercedes all previous lists for this certificate number.

MATRIX	Reference	Code	Analyte	Code	Description
Drinking Water	SM 9215 B (PCA) 20th ED			20181208	Heterotrophic Plate Count Pour Plate (plate count agar): Heterotrophic Bacteria
		2555	Heterotrophic plate count		
	SM 9215 E SimPlate®			20185302	Fluorogenic Quantitative (SimPlate®): Heterotrophic Bacteria
		2555	Heterotrophic plate count		
	SM 9223 B (Colilert®-18 Quanti-Tray®) 20th ED	2525	Escherichia coli	20213201	Chromogenic/Fluorogenic Quantitative (Colilert®-18): Total Coliform and E. coli
		2500	Total coliforms		
	SM 9223 B (Colilert®-18) 20th ED	2525	Escherichia coli	20214204	Chromogenic/Fluorogenic Qualitative (Colilert®-18): Total Coliform and E. coli
		2500	Total coliforms		
	SM 9223 B (Colisure®) 20th ED	2525	Escherichia coli	20231407	Total Coliforms & E. Coli by Qualitative Chromofluorogenic P/A (Colisure)
		2500	Total coliforms		



MDWS DOH Microbiology Certification

- DOH Micro Certification History
 - 09/10/1991 to PRESENT





Objectives

- Why Maui, a Small Lab, Applied for NELAP Accreditation in 2007
- Level of Effort/Challenges During Initial Implementation
- Tools Used to Minimize Challenges
- Changes in Approach after Initial Implementation
- Consistent Implementation with the Standards
- Effective Compliance
- Monitor Compliance
- Share with other Small Labs the Benefits of NELAP Accreditation



Maui's Needs – 3 Stakeholders And Project Approach; 9/2006 -2/2007

- Management
 - Maximize productivity with limited staff (10 FTES)
 - Expand Chemistry Testing Capabilities

- Lab
 - Heighten customer service and response time
 - Improve Competence and Lab Credibility by State Lab Certification

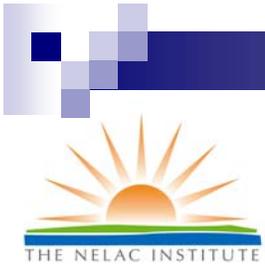
- Analyst
 - Increase knowledge and control of quality systems by Demonstration of Capability, Trainings and Lab Certification
 - Hire EEA to assist lab to meet needs, develop methods, and implement Project Plan
 - Apply for State Chemistry Certification



Implementation Schedule: For Chemistry DOH Certification (09/07/2006 – 02/2007)

	Goals	S	O	N	D	J	F	M	A	M	J	J
1	Maui to authorize project budget (rev 9/7/06)	■										
2	Analysts Training (Furnace and AA- Pb, Cu, Mg, K, Turbidity, pH, alkalinity, conductivity)	■										
3	Draft QA/QC summaries, Sample Sequence for other methods		■									
4	Onsite Visit → GFAA (2 days); Others (1 day); Field Collection		■									
5*	EEA submit to Maui the Draft of the *QA Plan and Draft SOPs				■							
6	Practice MDL/DOC 2006				■							
7	Onsite QA Plan training/ SOP Training Finalize Training Records					■						
8	Review Raw Data IDC / Implement Corrective Action if Needed					■						
9	Maui to review Draft QA plan and SOPs					■						
10	Complete analysts IDC/MDL/Internal QC/PT					■	■					
11	Perform 2007 MDL/DOC					■	■					
12	Finalize QA Plan and SOPs						■					
13	Internal PT						■					
14	Perform external PT							■	■			
15	Send Application for Certification and DOH								■			
16	DOH Audit									■	■	
17	Submit Corrective Action report to DOH audit findings											■

*QA Manual NELAC Template



GFAA Training 10/2006





Monitoring Progress 01/2007

“You will like it.
It will be fun!”



“You want me
to do WHAT?!”



MDWS NELAP Certification History

	Event	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	Expand Chem Capabilities for DOH Certification Application	9/2006 – 8/2007										
2	Applied for Initial NELAP-CA Accreditation (Chemistry) – State will recognize NELAP		9/2007 – (3/31/2008 OSA) (5 months prep)									
3	Initial Accreditation - CA NELAP			3/31/2008 - 3/2009								
4	DOH Chemistry state certification- (Recognizing NELAP Accreditation)			6/3/2008 - 3/31/2009 ----- Present								
5	Renewal of NELAP Chemistry - CA				4/2009 - 3/2010							
6	Renewal of CA NELAP Chemistry and added Microbiology					4/2010 - 4/2011						
7	Oregon (P) NELAP Lab Accreditation							2012 -----Present 7/2016 Last OSA				
8	Applied FSMO NEFAP Accreditation									5/2014 - 7/2014 (OSA) (3 months prep)		
9	Initial FSMO Accreditation									9/2014 - 10/2014		
10	FSMO Accreditation by L-A-B (AB)									2014 -----Present 7/2016 Last OSA		



Challenges

- Key Executive Management Support
- Staff Turnover – New Hires
- Buy In
 - Management and
 - Staff
- Limited Resources
- Management of Documentation
 - Extra QCs
 - MDLs
 - DOCs
 - 2nd PTs
 - Data Integrity
 - Error Corrections
- Trainings Start Up – Overwhelming
- From zero DOH to NELAP certification



Tools and Templates

- TNI Technical Assistance Committee and Small Labs Advocacy Group
 - QM Template
 - Guidance for Small Labs Handbook
 - TNI Training Programs
 - Online
 - Webinars
 - Webcasts
 - TNI Expert Committees
 - TNI Updates and Implementation
 - TNI Standards and SIRs



Tools and Templates (Cont.)

- PT Vendor
 - PT electronic data entry
 - PT Performance
- State's and AB's Website
 - Accreditation Process
 - Method Checklists
 - DI/Ethics Trainings
- EPA
 - Website
 - CFR Regulations
 - EPA DW Manual
 - EPA Methods for DW
 - Ethics/DIP Reports
 - Approved SM References for DW



Example
COC



MICROBIOLOGY CHAIN OF CUSTODY RECORD
Department of Water Supply

614 Palapala Drive
Kahului, Hawaii 96732
Phone : (808)270-7550
Fax: (808)270-6133

See reverse side to verify bottle, preservative and volume requirement for each analysis

TO BE COMPLETED BY SAMPLER:

COMPANY: Maui County Department of Water Supply				SAMPLE DATE: 04-18-2016					
SAMPLER PRINTED NAME AND SIGNATURE: Travis Banat				COMPLIANCE SAMPLES <input checked="" type="checkbox"/>					
TITLE: Lab Tech				NON COMPLIANCE SAMPLES <input type="checkbox"/>					
				REGULATION (CIRCLE ONE): <u>SDWA/TCR</u> SDWA/GWR					
DWS SAMPLE ID #	STATE ID NUMBER	SITE NAME OR LOCATION	SAMPLE COLLECTION TIME	Total Coliform Colisure	E coli Colisure	HPC-SimPlate	Number of Sample Bottles Collected	Weather Conditions (circle all that applies)	SAMPLER COMMENTS
28600	212-242	Papahi Loop Hyd 764	0834	✓	✓	✓	1	sunny overcast calm	
28601	field dup	Papahi Loop Hyd 764	0834			✓	1	sunny overcast calm	
28602	212-250	S Kamehameha Ave Hyd 775	0900	✓	✓	✓	1	sunny overcast calm	
28603	212-341	Kuu Aloha Street Hyd 648	0924	✓	✓	✓	1	sunny overcast calm	
28604	212-245	Puu Makani St Hyd 703	0948	✓	✓	✓	1	sunny overcast calm	
28605	212-344	Palama Drive Hyd 299	1019	✓	✓	✓	1	sunny overcast calm	
28606	212-347	Holua Drive Hyd 249	1325	✓	✓	✓	1	sunny overcast calm	
28607	212-402	Kaao Circle Hyd 190	1240	✓	✓	✓	1	sunny overcast calm	
28608	212-405	Kono Place Hyd 171	1300	✓	✓	✓	1	sunny overcast calm	
28609	212-002	Lihikai School	1045	✓	✓	✓	1	sunny overcast calm	
28610	212-217	Onehee Ave Hyd 226	1344	✓	✓	✓	1	sunny overcast calm	
<p>*MATRIX TYPE (CHECK ONE) <input checked="" type="checkbox"/> CFW=Chlor(am)inated Finished Water <input type="checkbox"/> RGW=Raw Ground Water <input type="checkbox"/> RSW=Raw Surface Water <input type="checkbox"/> FW=Other Finished Water</p>									
<p>SAMPLE TYPE (CHECK ONE): <input checked="" type="checkbox"/> GRAB <input type="checkbox"/> COMPOSITE</p>									
SIGNATURE		PRINT NAME		DATE		TIME			
RELINQUISHED BY: [Signature]		Travis Banat		04-18-2016		PR 18'16 14:00			
RECEIVED BY: [Signature]		Alli Harding		4/18/16		1359			
RELINQUISHED BY:									
RECEIVED BY:									
Refer to field log sheets for sample Cl ₂ and pH data									
MDWS LABORATORY USE ONLY:									
Idexx Vessel ID: MICRO1542					PROJECT CODE:				
Expiration Date: 10-04-2018					LABORATORY REPORT #				
Date QC Done on Vessels: 11-27-2015					NCAR ID:				



Example COC (cont.)



MICROBIOLOGY CHAIN OF CUSTODY RECORD Department of Water Supply

614 Palapala Drive
Kahului, Hawaii 96732
Phone : (808)270-7550
Fax: (808)270-6133

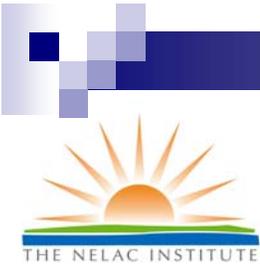
MDWS LABORATORY USE ONLY: REQUIREMENTS FOR CONTAINERS, PRESERVATIVES, SAMPLE VOLUME AND HOLD TIMES

ANALYTE/METHOD	CONTAINER TYPE	SAMPLE VOLUME	STORAGE & PRESERVATIVE	HOLD TIME
Heterotrophic Plate Count (Pour Plate)/ SM 9215B	Sterile/ Plastic	100 mL	<10°C, Idexx Bottle*	8 Hours
Heterotrophic Plate Count SimPlate/ SM 9215E; Idexx SimPlate 2000	Sterile/ Plastic	100 mL	<10°C, Idexx Bottle*	8 Hours
Total Coliform & E coli by Colisure (P-A)/ SM 9223	Sterile/ Plastic	100 mL	<10°C, Idexx Bottle*	30 Hours (drinking water); 8 Hours (source water)
Total Coliform & E coli by Colilert-18 (P-A)/ SM 9223	Sterile /Plastic	100 mL	<10°C, Idexx Bottle*	30 Hours (drinking water); 8 Hours (source water)
Total Coliform & E coli by Colilert-18 (QuantTray)/ SM 9223	Sterile/ Plastic	100 mL	<10°C, Idexx Bottle*	30 Hours (drinking water); 8 Hours (source water)

*Idexx Bottles contain 10-35 mg sodium thiosulfate, sufficient to neutralize 15-50 mg/L Cl₂

Thermometer ID: <u>ERTCO 3930</u>	Correction Factor: <u>+0.1</u>
Initial Temperature: <u>2.0</u> °C	Corrected Initial Temp: <u>2.1</u> °C
Final Temperature: <u>6.5</u> °C	Corrected Final Temp: <u>6.6</u> °C
Circle one: Blue Ice <input checked="" type="checkbox"/> Crushed Ice <input type="checkbox"/> FROZEN <input checked="" type="checkbox"/> PARTIALLY FROZEN <input type="checkbox"/> THAWED	
Method of Shipment? <input checked="" type="checkbox"/> HAND CARRIED <input type="checkbox"/> COURIER AIRBILL #	
Custody seal intact?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A
Samples received same date of collection?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Were all bottles sealed in bags?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Were all bottle labels complete?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Did all bottle labels agree with custody papers?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Were custody papers filled out correctly?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Was sufficient amount of samples collected for tests?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Were correct containers used?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Did all bottles arrive in good condition?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A
Did sample containers have < 2.5 cm headspace?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> N/A
Did samples arrive frozen?	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> N/A
Was Laboratory Supervisor informed of problems?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A
LOGIN COMMENTS (Please record description of any sample abnormalities, including departures from normal or specified conditions: 	

Samples checked in by (Print/Sign) W. Harding / WH Date: 4/18/16 Time: 1406
 Data entered on Daily Bacti Batch Sheet by (Print/Sign) W. Harding / WH Date: 4/18/16 Time: 1417



Example Benchsheet

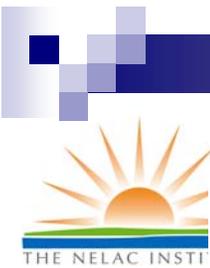
Maui County - Department of Water Supply
LEAD by Graphite Furnace Atomic Absorption, Agilent SpectraAA 220
SM3113B, 19th Ed.(1995) EPA 200.9, Rev 2.2(1994) 200.2, Rev 2.8(1994) SOP ID:Chem 04 Rev 4.0

Date of Analysis: 05-12-16
 Analyst (Print Name): Matthew Linder
 Analyst Signature: *Matthew Linder*

Analysis Start Time: 0959
 Analysis End Time: 1552

Argon tank R#: 51580
 Matrix Modifier: MET1696
 Agilent SN: MY13050004
 NCAR ID:

Run ID	Sample ID	Date/Time Collected	Mean Conc. (ppb)	%RSD/%RPD	%R	QC Limits
ISC	MET 1689			1.10		RSD<5.00%
Initial Cal Zero	MET 1684			5.00		
Standard 1-5.00ppb	MET 1691			2.00		RSD<10.0%
Standard 2-15.0ppb	MET 1691			0.70		RSD<10.0%
Standard 3-30.0ppb	MET 1691			0.90		RSD<10.0%
		Calibration r ² :		0.9995		Acceptance ≥0.995
Initial Cal blank	MET 1684		0.092	69.1		<1/2MRL and >1/2 MRL R1
IPC/ICV	MET 1689	15.0ppb, Primary source	15.7	0.8	104.67	R=±5.00% (14.2-15.8ppb)
LCS/LFB	MET 1692	15.0ppb, 2nd source	16.0	0.5	106.67	Undigested R=±10% (13.5-16.5ppb)
	MET				0	Digested R=±15% (12.8-17.2ppb)
Continuing Cal Blank	MET 1684		0.178	28.9		<1/2MRL and >1/2 MRL R1
RDL	MET 1690	5.00ppb, Primary source	5.42	0.2	108.40	Undigested R=±50.0% (2.50-7.50ppb) Method R=±10.0% (4.50-5.50ppb) SOP
	MET				0	Digested R=±50.0% (2.50-7.50ppb) Method R=±10.0% (4.50-5.50ppb) SOP
LRB	MET 1684		0.149	46.4		<1/2MRL and >1/2 MRL R1
1- ERA PT WS-237	2016041906	05-09-16 0753	62.2	2.1		RPD<10.0% DF=4
2- Pookela Well	2016011405	01-14-16 0849	0.252	20.5		RPD<10.0% R1
3-						RPD<10.0%
4-						RPD<10.0%
5-						RPD<10.0%
6-						RPD<10.0%
7-						RPD<10.0%
10-						RPD<10.0%
LFM 1	MET 1693 2016011405	15.0ppb, 2nd source	13.8	7.9	90.32	R=±30% (10.5-19.5ppb) Method R=±10% (13.5-16.5ppb) SOP
LFM 1 Duplicate	MET 1694 2016011405	15.0ppb, 2nd source	14.3	0.3	93.65	R=±30% (10.5-19.5ppb) Method R=±10% (13.5-16.5ppb) SOP
					RPD= 3.5%	RPD<10.0%
IPC/CCV	MET 1689	15.0ppb, Primary source			0	R=±10% (13.5-16.5ppb)
Cal Blank	MET 1684					<1/2MRL and >1/2 MRL
11-						RPD<10.0%
12-						RPD<10.0%
13-						RPD<10.0%
14-						RPD<10.0%
15-						RPD<10.0%
16-						RPD<10.0%
17-						RPD<10.0%
18-						RPD<10.0%
19-						RPD<10.0%
20-						RPD<10.0%
LFM 2		15.0ppb, 2nd source			0.0	R=±30% (10.5-19.5ppb) Method R=±10% (13.5-16.5ppb) SOP
LFM 2 Duplicate		15.0ppb, 2nd source			0.0	R=±30% (10.5-19.5ppb) Method R=±10% (13.5-16.5ppb) SOP
					RPD= #DIV/0!	RPD<10.0%
Closing IPC/CCV	MET 16104	25.0ppb, Primary source	24.0	1.0	96.00	R=±10.0% (22.5-27.5ppb) Method R=±5.00% (23.8-26.2ppb) SOP
RPC	MET 1689	15.0ppb, Primary source			100.67	R=±10.0% (13.5-16.5ppb) Method R=±5.00% (14.2-15.8ppb) SOP
						CCV1 & RPC RPD = 3.9%
Closing Cal Blank	MET 1684		0.479	31.4		<1/2MRL and >1/2 MRL R1

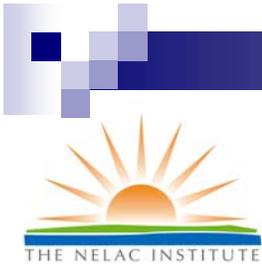


DATA R

Example Benchsheet (Cont.)

Maui County - Department of Water Supply

Project Description: ERA PT Pb			Analysis: Metals by Graphite Furnace Atomic Absorption							
Analyst: MLid			Analysis Date: 05-12-14		Method: SM 3113B, 19th Edition (1995) EPA Method 200.9, Rev 2.2 (1994) & 200.2, Rev 2.8 (1994)					
Primary Review: MLider			Review Date: 05-13-16		SOP ID: Chem 04 Revision 4.0					
Secondary Review: Humano			Date: 05-16-16		Analyte: LEAD					
Final Review: Comment			Date: 05-17-16		Primary Review:		Secondary Review:		Flagging Criteria	Corrective Action
QC Parameter	Frequency	QC Limits	Pass	Fail	Pass	Fail	Flagging Criteria	Corrective Action		
Acidify Sample	Every Sample	Must be acidified within one week after sample collection	✓		✓					
pH Check	Every Sample	pH < 2.0 16 hrs after acidification	✓		✓			Add more acid if ≥ 2 pH		
Turbidity Check	Every Sample	Check minimum 16 hrs after acidifying, < 1.00 NTU	✓		✓			Digest Samples > 1 NTU		
ISC	After warm-up before Calibration. 5 replicates.	RSD < 5.00%	✓		✓			Identify source of problem and correct		
Calibration	Performed daily. Prep fresh standards daily. Analyze each in triplicate. 3113B4c	Triplicate RSD < 10.0% r = > 0.995	✓		✓			Repeat if calibration verification criteria is not satisfied. 3020B2a. Dilute & reanalyze if abs, conc or peak area of sample > top standard. 3113B 4d1.		
Initial Cal Blank	Immediately following calibration	< 1/2 MRL & > -1/2 MRL RPD < 10%	✓		✓			Reanalyze if fails. Discontinue if 2nd analysis fails. Identify source of problem and correct.		
IPC/ICV, 15.0ppb, Primary source	One/batch before any samples run. Mid std	R = 95.0-105%	✓		✓			Identify source of problem and correct.		
LCS/LFB-Initial Cal Verification, 15.0ppb, 2nd source	Run immediately following calibration. Mid std.	Undigested R = 90.0-110% Digested R = 85.0-115%	✓		✓			Reanalyze if fails. Discontinue if 2nd analysis fails.		
Continuing Cal Blank	Every batch of 10 samples and at beginning & end.	< 1/2 MRL & > -1/2 MRL RPD < 10%	✓		✓			Reanalyze if fails. Discontinue if 2nd analysis fails. Identify source of problem and correct.		
RDL/MRL Check, 5.0ppb, Primary source		Method Undigested R = 50.0-150%	✓		✓					
		SOP R = 90.0-110%	✓		✓					
		Method Digested R = 50.0-150%	NA		NA					
		SOP R = 90.0-110%	NA		NA					
LRB	One method blank for every batch of 20 or fewer samples. 3020B 3.a.	< 1/2 MRL & > -1/2 MRL RPD < 10%	✓		✓			Data suspect if > 1.00ppb. Do immediate corrective action. 3020B 3.a.		
Samples 1-10	All samples. 3113B4d	RPD < 10.0%	✓		✓					
LFM/MS, Spike 15.0ppb, 2nd source	One per ten samples	Method R = 70.0-130% SOP R = 90.0-110%	✓		✓			If lab performance in control, matrix or solution related.		
LFM dup/MSD, Spike 15.0ppb, 2nd source	One per ten samples	RPD < 10.0%	✓		✓					
		Method R = 70.0-130% SOP R = 90.0-110%	✓		✓					



Example Benchsheet (Cont.)

DATA REVIEW

Maui County -Department of Water Supply

Project Description: <i>WS-231</i> <i>ERA PT PL</i>		Analysis: Metals by Graphite Furnace Atomic Absorption				
Analyst: <i>Mleid</i>		Analysis Date: <i>05-12-16</i>				
Primary Review: <i>Mleid</i>		Method: SM 3113B, 19th Edition (1995) EPA Method 200.9, Rev 2.2 (1994) & 200.2, Rev 2.8 (1994)				
Secondary Review: <i>Humano</i>		Review Date: <i>05-13-16</i>				
Final Review: <i>Comdent</i>		Date: <i>05-16-16</i>				
		SOP ID: Chem 04 Revision 4.0				
		Analyte: LEAD				
QC Parameter	Frequency	QC Limits	Primary Review: Pass Fail	Secondary Review: Pass Fail	Flagging Criteria	Corrective Action
IPC/CCV-15.0ppb, Primary source	After first 10 samples of run. Mid std.	Method R=90.0-110%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Stop analysis if outside 90-110%R and initiate corrective action. 3020B2.b
Cal Blank	Every ten samples.	<1/2 MRL & >-1/2 MRL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Reanalyze if fails. Discontinue if 2nd analysis fails. Identify source of problem and correct.
Samples 11-20		RPD <10.0%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
LFM2/MS2, Spike 15.0ppb, 2nd source	One per ten samples	Method R=70.0-130%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		If lab performance in control, matrix or solution related.
LFM2 dup/MSD2, Spike 15.0ppb, 2nd source	One per ten samples	SOP R=90.0-110%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
IPC/CCV-Closing, 25.0ppb, Primary source	At end of run. High Stnd.	Method R=90.0-110%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Stop analysis if outside 90-110%R and initiate corrective action. 3020B2.b
Run Precision Check(RPC), 15.0ppb, Primary source	At end of run.	SOP R=95.0-105%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Closing Cal Blank	At end of run	Method R=90.0-110%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Reanalyze if fails. Discontinue if 2nd analysis fails. Identify source of problem and correct.
		RPD <10%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
MDL	Annually, new operator, analytical performance change 3-5 day period, use pooled data for several analysts. 3020B1b		<i>In progress</i>			Due: <i>03-25-16</i>
IDOC	New analyst, new instrument, periodically, annually. 3020 B1a		<i>In progress</i>			Due: <i>03-25-16</i>
Instrument Detection Limit (IDL)	Annually	Avg ±3SD	<i>In progress</i>			Due: <i>03-27-16</i>
LDR	Annually. Bracket range of interest.	R=90.0-110%	<i>In progress</i>			Due: <i>03-12-16</i>
Hold Time	6 months if properly preserved (pH < 2)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Precision	Verify analyst precision at beginning of each analytical run by making triplicate analysis. 3113B7	See Calibration standards, run in triplicate.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Run Precision	Every Run.	RPD <5.00 % CCV1 & RPC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Standard/reagent traceability		With each batch	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Identify and correct problem



Traceability

SOP ID: Chem 04 R#: MET16 101
 Reagent/Standard DIC 2-Pb Made By: MLL
 Matrix: MET1684 Storage Condition: Room Temperature
 Date Prepped: 05-12-16 Date Expires: 05-12-16

Component	Initial Volume	Initial Concentration	Final Volume	Final Concentration	Stock Std R#
Pb	0.150 mL	1.00 ppm	10.0 mL	15.0 ppb	MET1688

Comments: _____ Stock Standard Expiration Date: 11-30-16

SOP ID: Chem 04 R#: MET16 102
 Reagent/Standard DIC 3-Pb Made By: MLL
 Matrix: MET1684 Storage Condition: Room Temperature
 Date Prepped: 05-12-16 Date Expires: 05-12-16

Component	Initial Volume	Initial Concentration	Final Volume	Final Concentration	Stock Std R#
Pb	0.150 mL	1.00 ppm	10.0 mL	15.0 ppb	MET1688

Comments: _____ Stock Standard Expiration Date: 11-30-16

SOP ID: Chem 04 R#: MET16 103
 Reagent/Standard DIC-4 Pb Made By: MLL
 Matrix: MET1684 Storage Condition: Room Temperature
 Date Prepped: 05-12-16 Date Expires: 05-12-16

Component	Initial Volume	Initial Concentration	Final Volume	Final Concentration	Stock Std R#
Pb	0.150 mL	1.00 ppm	10.0 mL	15.0 ppb	MET1688

Comments: _____ Stock Standard Expiration Date: 11-30-16

SOP ID: Chem 04 R#: MET16 104
 Reagent/Standard Pb - Working Std Made By: MLL
 Matrix: MET1684 Storage Condition: Room Temperature
 Date Prepped: 05-12-16 Date Expires: 05-12-16

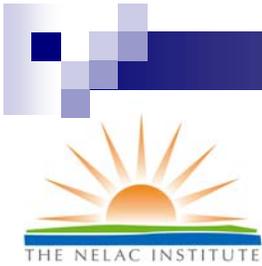
Component	Initial Volume	Initial Concentration	Final Volume	Final Concentration	Stock Std R#
Pb	0.250 mL	1.00 ppm	10.0 mL	25.0 ppb	MET1688

Comments: _____ Stock Standard Expiration Date: 11-05-16



Monitoring Compliance for Consistent Implementation: TNI Management and Technical Standards

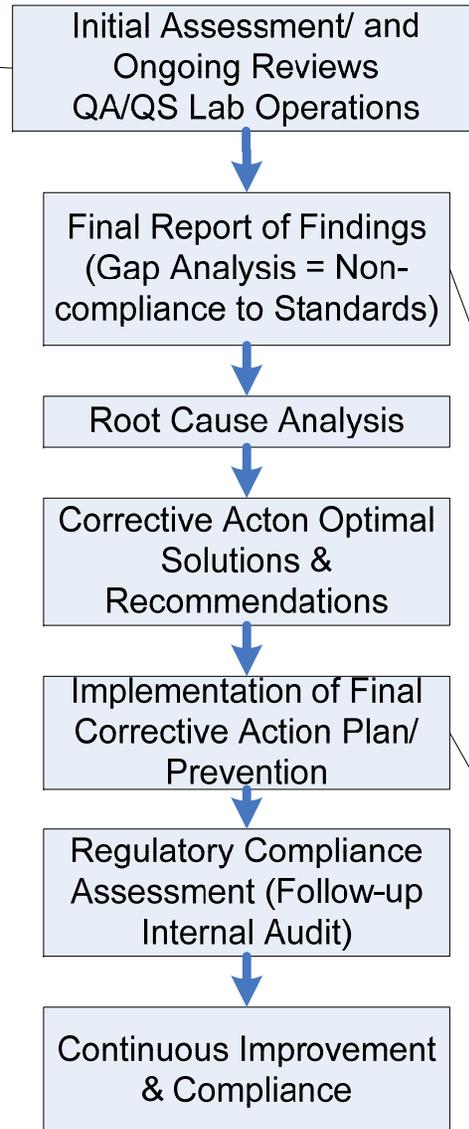
- Ongoing Review and Findings
 - Annual Management Review (AMR)
 - Internal Audits
 - Data Package Reviews
 - SOPs Review and Revisions
 - QM Review and Revisions
 - Training Records
 - Competency Trainings
 - QAO and Technical Director - QM
 - QM and SOPs – Upcoming TNI Standards for Lab and FSMO
 - Ethics/Data Integrity Program
 - Manual Integration
 - Regulatory Trainings
 - Prevention of “NOVs”
 - CFR 141 – SDWA
 - EPA Manual 5th Ed – Drinking Water
 - RTCR
 - UCMR4
 - LT2



Assist in the Root Cause Analysis and Corrective Action Implementation

Lab Accreditation

- USEPA SDWA
- NELAP/ISO 17025



1. Quality Manual
2. Methods/SOP
3. PT Programs
4. Personnel Qualification
5. Training Requirements
6. Instrumentation Calibration Maintenance
7. Documentation Requirement
8. Corrective Action Procedures
9. Final Reports
10. QC Deliverables
11. Code of Ethics/Data Integrity Program
12. Other Regulations Impacting Environmental Labs (DOT, IATA)

- SOP Update
- QM Update
- PT Program Update
- Personnel Training
- Bench Practice Update
- "On the Job" Training



Implementation Changes → Efficient Operations

Before Initial NELAP Accreditation	After NELAP Initial Accreditation
Analysts/Technicians are also samplers	No Change
Analysts are assigned multi-methods	No Change
Minimum/per Method ≥ 2 Analysts	No Change
Analyst to Keep Track of Assigned Instruments	No Change
QA Officer Tracks Analysts' MDL/DOC	No Change
Analyst MDLs and DOCs	MDL/DOCs are run at the same schedule
Training for Traceability Level 4 Data Package, MDL, IDOC, for each Analyst	MDL/DOC Summaries Only
Trainings NELAP	Trainings NELAP and FSMO
Teamwork	Competency Increased – Teamwork Stronger



Benefits of Obtaining NELAP Accreditation

- Improved Data Quality
 - Improved Lab Quality Practices
 - Improved Documentation and Traceability
 - Approved
 - Vendors
 - Subcontractor
 - PT Provider
 - Calibration and Maintenance
 - Increased PT Requirements (2x per year)
 - Control of Nonconforming work
- Demonstrated Competency
 - ISO 17025 Stds – General Requirements for Testing Labs
 - Lab Org Charts
 - Analysts IDOCs/MDLs



Benefits of Obtaining NELAP Accreditation (Cont.)

- Generate Lab Data of Known and Documented Quality
 - At All Times
 - Routinely
 - Consistently
- Increased Confidence that Data is True and Authentic
 - Reliable, Legally Defensible Data
 - Data Integrity Program
 - Prevention/Potential Occurrence of Fraud
 - Inappropriate Practices
- TNI-AB Oversight
 - OSA – every 2 years
 - 2 PT Studies per year
- **Formal Reciprocity/States Recognition**



MDWS Benefits

- **Productivity**
 - Getting more without adding staff or instrument cost

- **Ownership**
 - Developing a structured and sustainable quality system and culture

- **Compliance**
 - Gaining greater control of quality management at a lower overall cost



QUESTIONS?

Cari Sumabat
Maui County Department of Water Supply
Water Quality Lab
Cari.Sumabat@co.maui.hi.us
808-270-7344

Nilda Cox
Eurofins Eaton Analytical
NildaCox@eurofinsus.com
626-386-1170