

# Medicines Quality Monitoring with the Minilab<sup>®</sup> and Hands-on Compendial Analytical Techniques Training

Addis Ababa, Ethiopia  
May 27-June 7, 2013

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## *Trip Report*

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## **Promoting the Quality of Medicines Program**

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PROMOTING THE QUALITY OF MEDICINES

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## **Executive Summary**

PQM staff conducted two separate technical trainings for Food, Medicine and Health Care Administration and Control Authority (FMHACA) branch lab staff and for analysts in the Product Quality Assessment Directorate (PQAD) laboratory in Ethiopia. Staff members from the five branch labs and the Central Lab that have responsibility for Addis Ababa Bole International Airport and other ports were trained on medicine quality monitoring using the Minilab<sup>®</sup>. The training provided participants with hands-on experience performing and interpreting Thin-Layer Chromatography (TLC) and detailed visual inspection of medicines and packaging.

The PQM team also provided newly hired PQAD analysts with training in Good Laboratory Practices (GLP), laboratory safety, and practical hands-on training on commonly used compendial analytical techniques. The team also provided training on review of analytical data.

In addition, the PQM team also worked with more experienced PQAD analysts to resolve an analytical challenge the lab was experiencing.

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### **About PQM**

The Promoting the Quality of Medicines (PQM) program, funded by the U.S. Agency for International Development (USAID), is the successor of the Drug Quality and Information (DQI) program implemented by the United States Pharmacopeia (USP). PQM is USAID’s response to the growing challenge posed by the proliferation of counterfeit and substandard medicines. By providing technical assistance to developing countries, PQM helps build local capacity in medicine quality assurance systems, increase the supply of quality medicines to priority USAID health programs, and ensure the quality and safety of medicines globally. This document does not necessarily represent the views or opinions of USAID or the United States Government. It may be reproduced if credit is given to PQM and USP.

## **ACKNOWLEDGEMENTS**

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- The training participants for their high level of interest and for their feedback regarding the training
- Dr. Gunawardena Dissanayake, PMI Team Leader/Malaria Advisor, and Ms. Hiwot Takar, PMI Advisor for their support of this program
- Mr. Mengistab Aragay, Deputy Director General of FMHACA, and Mr. Bikila Bayissa, Director of PQAD, for hosting the training
- USP Ethiopia Office staff for their assistance with logistical arrangements in Ethiopia
- PQM administrative staff and editors for their assistance with logistical arrangements and for editing the trip report
- Mr. Anthony Boni and Dr. Maria Miralles at USAID/Washington for their support and advice

## ACRONYMS

FMHACA	Food, Medicine and Health Care Administration and Control Authority
FT-IR	Fourier Transform Infrared Spectroscopy
GC	Gas Chromatography
GC-MS	Gas Chromatography-Mass Spectrometry
GLP	Good Laboratory Practices
HPLC	High Performance Liquid Chromatography
HPTLC	High Performance Thin-Layer Chromatography
KF	Karl Fisher Titration (Water Determination)
ISO	International Organization for Standardization
LC-MS	Liquid Chromatography-Mass Spectrometry
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	President's Malaria Initiative
PMS	Post-Marketing Surveillance
PQAD	Product Quality Assessment Directorate
PQM	Promoting the Quality of Medicines program
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System
SOP	Standard Operating Procedure
TLC	Thin-Layer Chromatography
MQM	Medicine Quality Monitoring
USAID	United States Agency for International Development
USP	United States Pharmacopeia
UV-Vis	Ultraviolet-Visible Spectroscopy

## **Background**

The U.S. Agency for International Development (USAID) and U.S. Pharmacopeia (USP) have been providing technical assistance to Ethiopia since 2005, first through the USP Drug Quality and Information (DQI) program and, currently, through the Promoting the Quality of Medicines (PQM) program.

As part of this program, PQM receives funding from the President's Malaria Initiative (PMI) to provide technical, strategic, and operational support to strengthen antimalarial medicines quality assurance in Ethiopia. A post-marketing surveillance (PMS) program to monitor the quality of antimalarial medicines has been established, and PQM has supported the program by providing training to technical staff on sampling, testing of medicine samples, evaluation of medicine quality, and other activities.

PQM also receives funding from the President's Emergency Plan for AIDS Relief (PEPFAR) through USAID/Ethiopia to strengthen the capacity of the Ethiopian Food, Medicine and Health Care Administration and Control Authority (FMHACA). The Product Quality and Assessment Directorate (PQAD) laboratory of FMHACA, through the technical support provided by PQM, obtained ISO 17025 accreditation in 2011.

## **Purpose of Trip**

The objectives of this trip were to:

- Provide training in Medicine Quality Monitoring (MQM) with the Minilab<sup>®</sup> for personnel from the five FMHACA branch labs and the Central Lab that have responsibility for Addis Ababa Bole International Airport and other ports
- Provide newly-hired PQAD analysts with practical training on commonly-used compendial analytical techniques, Good Laboratory Practices (GLP), and laboratory safety
- Work with more experienced PQAD analysts to resolve analytical testing problems and other issues and also provide training on review of analytical data

## **Source of Funding**

These activities were funded by USAID/Ethiopia, through the PMI program.

## **Overview of Activities**

### ***Opening Meeting – Monday, May 27, 2013***

Participants: Dr. Daniel Bempong (PQM), Mr. Sanford Bradby (PQM), and Mr. Bikila Bayissa (PQAD)

The PQAD director welcomed the PQM staff and briefed them on activities in the lab, including the recent move to the new building, and future plans. He mentioned that PQAD now plans to have two separate labs – one for testing medicines and the other for food testing. Each lab will have its own microbiology unit.

Regarding the training, the director explained that personnel from the five FMHACA branch labs and the central lab will be taking the first training on MQM, whereas participants for the second training on compendial analytical techniques will consist of analysts from PQAD and staff from the branch labs. Mr. Bikila explained that most of the staff are pharmacists and have some exposure to techniques like titration, UV, pH, and disintegration, but they do not have experience working in the lab. Mr. Bikila also

requested the PQM team’s help in resolving an outstanding issue with HPLC assay of an artemether injection sample. The sample in question passed the assay requirements when tested with the UV procedure in the WHO International Pharmacopeia monograph for this item but fails terribly when tested with the HPLC assay procedure in the monograph. The team promised to work with the analysts to investigate the analytical challenge presented (See Annex 4: Memo to PQAD Director).

The training activities are summarized in the tables below. *Note:* acronyms used in the chart are explained in the Acronyms section of this report, included on page 5.

### 1. Medicine Quality Monitoring with the Minilab<sup>®</sup>

Item	Description
Specific Objectives/ Expected Outcomes	Participants were expected to: <ul style="list-style-type: none"> <li>• Use the screening test methodology covered in the training to monitor the quality of antimalarial medicines</li> <li>• Apply the necessary safety precautions when using chemical reagents</li> <li>• Have proper understanding and application of the various volumetric transfer techniques</li> <li>• Identify quality problems regarding antimalarial medicines and determine the next course of action</li> <li>• Play a vital role in assuring the quality of antimalarial medicines in Ethiopia</li> </ul>
Venue/Location	PQAD laboratory of FMHACA, Addis Ababa, Ethiopia
Organizer	PQM
Trainers and Facilitators	Dr. Daniel Bempong, PQM; Mr. Sanford Bradby, PQM; Mr. Zelalem Mamo, USP Ethiopia
Agenda	See Agenda in <i>Annex 1</i> for detailed information
Trainees	10 technical staff from FMHACA branch labs (See List of Participants in <i>Annex 2</i> for detailed information)
Opening Meeting	Mr. Bikila Bayissa, Director, PQAD
Modules	<ul style="list-style-type: none"> <li>• Minilab<sup>®</sup> Safety Training</li> <li>• The Three-Level Approach for Quality Control of Medicines</li> <li>• Volumetric Techniques in the Laboratory</li> <li>• Hands-on Minilab<sup>®</sup> Testing of Antimalarial Medicines</li> </ul>
Closing	Certificates were presented to the participants
Training Evaluation	A summary of participant evaluations is provided in <i>Annex 3</i>
Participant Remarks	In response to the question “What did you like best about the course?” most participants mentioned the hands-on TLC session and the presentation on the three-level approach for quality control of medicines.
Participant Recommendations	<ul style="list-style-type: none"> <li>• Provide Minilabs<sup>®</sup> to all branch labs</li> <li>• Include additional dosage forms (e.g. injectables and topical creams)</li> <li>• Include other medicines in training (e.g. antibiotics)</li> </ul>

## 2. Compendial Analytical Techniques

Item	Description
Specific Objectives/ Expected Outcomes	Participants were expected to: <ul style="list-style-type: none"> <li>• Perform gradient HPLC procedures according to pharmacopeial standards and apply the knowledge to evaluate the quality of lumefantrine and artemether tablets</li> <li>• Perform dissolution testing according to compendial standards and have a firm understanding of dissolution performance verification testing</li> <li>• Have a practical understanding of the testing of medicines using UV-Vis spectrophotometry</li> <li>• Perform accurate determination of water content of pharmaceutical products using the Karl Fischer titration method</li> <li>• Determine metal impurities using atomic absorption spectroscopy procedures</li> <li>• Document laboratory data in accordance with GLP</li> </ul>
Venue/Location	PQAD laboratory of FMHACA, Addis Ababa, Ethiopia
Organizer	PQM
Trainers and Facilitators	Dr. Daniel Bempong, PQM; Mr. Sanford Bradby, PQM; Mr. Zelalem Mamo, USP Ethiopia
Agenda	See Agenda in <i>Annex 1</i> for detailed information
Trainees	16 technical staff from the PQAD Laboratory and FMHACA branch laboratories (See List of Participants in <i>Annex 2</i> for detailed information)
Opening Meeting	Mr. Bikila Bayissa, Director, PQAD
Modules	<ul style="list-style-type: none"> <li>• Good Documentation Practices</li> <li>• HPLC Basics and Compendial Applications</li> <li>• Dissolution – Theory and Practice</li> <li>• UV-Vis Spectrophotometry</li> <li>• Karl Fisher Water Determination</li> <li>• Applications of Atomic Absorption Spectrophotometry</li> <li>• Reviewing Analytical Data – What to Look for</li> </ul>
Closing	Certificates were presented to the participants
Training Evaluation	A summary of participant evaluations is provided in <i>Annex 3</i>
Participant Remarks	Participants indicated that they benefited from the topics covered during the training, particularly the practical hands-on sessions. In response to the question “What did you like best about the course?” most participants, in addition to the hands-on lab components, also mentioned the lectures and the participatory nature of the training.
Participant Recommendations	<ul style="list-style-type: none"> <li>• Increase duration of the training</li> <li>• Increase time for hands-on practical session</li> <li>• Continue capacity building, especially for branch labs</li> <li>• Provide training in the following techniques: GC, GC-MS, LC-MS, FT-IR, AA practicals, HPTLC, and preventive maintenance</li> </ul>

## **Debrief Meeting with USAID PMI Team – Thursday, June 6, 2013**

*Participants:* Ms. Hiwot Takar (PMI Advisor), Dr. Gunawardena Dissanayake (PMI Team Leader/Malaria Advisor), Dr. Daniel Bempong, Mr. Sanford Bradby, and Mr. Eshetu Wondemagegnehu (Chief of Party, USP/Ethiopia)

### *Discussion Summary*

- 1) Dr. Bempong provided an update on the two technical training activities provided during the visit to support PMS of antimalarials. He outlined the analytical techniques and related topics covered during the trainings, indicating the emphasis had been on hands-on lab training rather than lecture presentations.
- 2) Ms. Takar inquired if there is a “pre-assessment” and a “post-assessment” as a way to determine the impact of the training. The PQM team explained there are plans to incorporate such assessments in future training. Currently, the training evaluation forms request participants to indicate their level of expertise in each of the training modules before and after the training.
- 3) Dr. Dissanayake inquired about actions taken by FMHACA in response to previous PMS data. Mr. Wondemagegnehu stated that there have been positive moves in that direction as well as an ongoing awareness campaign being held by FMHACA.
- 4) In response to a question from the PMI team regarding additional areas that can be supported by USAID/PMI, PQM staff mentioned the following:
  - Supporting all branch labs with Minilabs<sup>®</sup> and key analytical testing equipment
  - Expanding MQM activities beyond antimalarials to cover medicines for other disease categories, such as anti-tuberculosis medicines and antiretrovirals
  - ISO 17025 accreditation for PQAD in additional physicochemical tests, and accreditation in other areas like microbiological testing, food testing, and condom testing (Ms. Hiwot mentioned that an efficacy studies unit is needed, and the lab may want to consider adding such a unit in the future)

## **Closing Meeting – Friday, June 7, 2013**

*Participants:* Mr. Mengistab Aragay (Deputy Director General, FMHACA), Dr. Daniel Bempong, Mr. Sanford Bradby, and Mr. Zelalem Mamo

The PQM team and Mr. Mengistab Aragay congratulated the participants for successfully completing the training, expressed satisfaction with their performance and interest, and encouraged them to bring what they learned in the training to their daily work.

### **Next Steps**

- PQM will visit PQAD to help ensure that re-accreditation is extended to the new lab (visit occurred in July 2013)
- PQM will organize a microbiology training (tentatively planned for September 2013)

### **Conclusion**

The trip was successful and the objectives for the two training activities were fully met. The feedback from participants was also positive.

**Medicine Quality Monitoring with the Minilab<sup>®</sup>**  
**Agenda**

**May 27-29, 2013**

Daily training will start at 9:00 a.m. and conclude at 5:00 p.m.

Morning coffee break: 10:30–10:45 a.m.

Lunch: 12:30–1:30 p.m.

Afternoon coffee break: 3:00–3:15p.m.

Day	Activities
Monday May 27, 2013	<ul style="list-style-type: none"> <li>• <b>Opening meeting:</b> <ul style="list-style-type: none"> <li>○ Introductions</li> <li>○ Review agenda, training objectives, and expected outcomes</li> </ul> </li> <li>• <b>Presentations:</b> <ul style="list-style-type: none"> <li>○ Minilab Safety Training</li> <li>○ The Three Level Approach for Quality Control of Medicines</li> <li>○ Volumetric Techniques in the Laboratory</li> </ul> </li> <li>• <b>Demo</b> <ul style="list-style-type: none"> <li>○ Using the Minilab</li> </ul> </li> </ul>
Tuesday May 28, 2013	<ul style="list-style-type: none"> <li>• <b>Hands-on: Minilab Testing</b> <ul style="list-style-type: none"> <li>○ Chloroquine phosphate product</li> <li>○ Artemether and Lumefantrine tablets</li> <li>○ Quinine Sulfate product</li> <li>○ Discussion of results</li> </ul> </li> </ul>
Wednesday May 29, 2013	<ul style="list-style-type: none"> <li>• <b>Hands-on: Minilab Testing</b> <ul style="list-style-type: none"> <li>○ Primaquine phosphate tablets</li> <li>○ Mefloquine HCl tablets</li> <li>○ Discussion of results</li> <li>○ Q&amp;A Session</li> </ul> </li> <li>• <b>Closing</b> <ul style="list-style-type: none"> <li>○ Wrap-up training and complete evaluation sheets</li> <li>○ Presentation of Certificates</li> </ul> </li> </ul>

## COMPENDIAL ANALYTICAL TECHNIQUES TRAINING

### Agenda

**May 30–June 7, 2013**

Daily training will start at 9:00 a.m. and conclude at 5:00 p.m.

Morning coffee break: 10:30 - 10:45a.m

Lunch: 12:30 - 1:30 pm

Afternoon coffee break: 3:00 - 3:15p.m

Day	Activities
Thursday May 30, 2013	<ul style="list-style-type: none"> <li>• <b>Opening meeting:</b> <ul style="list-style-type: none"> <li>○ Introductions</li> <li>○ Review agenda, training objectives, and expected outcomes</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Presentations:</b> <ul style="list-style-type: none"> <li>○ Good Documentation Practices</li> <li>○ HPLC Basics and Compendial Applications</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>○ Review of the HPLC Assay Procedure in the Artemether and Lumefantrine Tablets monograph</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Hands-on: HPLC Assay – Artemether and Lumefantrine Tablets</b> <ul style="list-style-type: none"> <li>○ Set up system</li> <li>○ Prepare mobile phase and standard solutions, and equilibrate column</li> </ul> </li> </ul>
Friday May 31, 2013	<ul style="list-style-type: none"> <li>• <b>Hands-on: HPLC Assay – Artemether and Lumefantrine Tablets</b></li> </ul>
	<ul style="list-style-type: none"> <li>○ Prepare Standard &amp; Sample solutions</li> <li>○ Perform System suitability check</li> </ul>
	<ul style="list-style-type: none"> <li>○ Perform sample assay</li> </ul>
	<ul style="list-style-type: none"> <li>○ Perform assay calculations</li> </ul>
	<ul style="list-style-type: none"> <li>○ Discuss results</li> </ul>
Monday June 3, 2013	<ul style="list-style-type: none"> <li>• <b>Presentations:</b> <ul style="list-style-type: none"> <li>○ Dissolution – Theory and Practice</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>○ UV-Vis Spectrophotometry</li> <li>○ Review of the Lumefantrine Dissolution</li> </ul>
	<ul style="list-style-type: none"> <li>○ Test Procedure – Artemether and Lumefantrine Tablets monograph</li> </ul>
Tuesday June 4, 2013	<ul style="list-style-type: none"> <li>• <b>Hands-on: Dissolution of Lumefantrine in Artemether and Lumefantrine Tablets</b> <ul style="list-style-type: none"> <li>○ Prepare Dissolution Medium</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Hands-on:</b> Dissolution of Lumefantrine in Artemether and Lumefantrine Tablets</li> </ul>
	<ul style="list-style-type: none"> <li>○ Perform dissolution test</li> <li>○ Make UV measurements</li> </ul>
	<ul style="list-style-type: none"> <li>○ Perform dissolution calculations</li> <li>○ Discuss results</li> </ul>
Wednesday June 5, 2013	<ul style="list-style-type: none"> <li>• <b>Presentation:</b> <ul style="list-style-type: none"> <li>○ Karl Fischer (KF) Water Determination</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Hands-on:</b> Amodiaquine HCl RS <ul style="list-style-type: none"> <li>○ Perform KF titration on RS</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>○ Calculate the water content of the RS</li> <li>○ Discuss the use of the KF data in assay determinations</li> </ul>
	<ul style="list-style-type: none"> <li>○ Determinations</li> </ul>
Thursday June 6, 2013	<ul style="list-style-type: none"> <li>• <b>Presentation:</b> <ul style="list-style-type: none"> <li>○ Applications of Atomic Absorption Spectroscopy</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Hands-on:</b> Atomic Absorption Spectroscopy <ul style="list-style-type: none"> <li>○ Practice testing with AAS</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• USAID Meeting</li> </ul>
Friday June 7, 2013	<ul style="list-style-type: none"> <li>• <b>Presentation:</b> <ul style="list-style-type: none"> <li>○ Reviewing Analytical Data – Key things to look for</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Closing Meeting</b> <ul style="list-style-type: none"> <li>○ Wrap up training and complete evaluation sheets</li> <li>○ Presentation of Certificates</li> </ul> </li> </ul>

## Lists of Participants

### 1: Medicine Quality Monitoring with the Minilab Training — May 27-29, 2013

Ser No	Name	Office
1	Nega Gulle	Southern Branch FMHACA
2	Tilahun Shiferee	Northern Branch FMHACA
3	Alemayehu Dejene	Eastern Branch FMHACA
4	Adugna Girmay	Northern Branch
5	Fekadu Nimana	Southern Branch
6	Mohammed Oumer	Northwest Branch
7	Bethel Tadesse	East Branch
8	Meron Herouy	Central Branch
9	Heiaw Haileselassie	Northern Branch
10	Bekalu Arega	Western Branch

### 2: Compendial Analytical Techniques Training — May 30-June 7, 2013

Ser No	Name	Office
1	Alemayehu Dejene	Eastern Branch FMHACA
2	Fekadu Nimana	Southern Branch
3	Mohammed Oumer	North west branch
4	Meron Herouy	Central Branch
5	Heiaw Haileselassie	Northern Branch
6	Bekalu Arega	Western Branch
7	Assefa Takele	PQAD
8	Tamerat Tesfaye	PQAD
9	Yigezu Mebratu	PQAD
10	Kemal Hussien	PQAD
11	Solomon Getachew	PQAD
12	Teferi Mantegaftot	PQAD
13	Atlaw Abate	PQAD
14	Kebede Fufa	PQAD
15	Mesfin Mezemir	PQAD
16	Mohammedamin Jemal	PQAD

**Participant Evaluations**

Thank you for participating in the PQM training. In an effort to enhance our course offerings, we are seeking your feedback about your experience with this training. Please complete this brief questionnaire. Thank you very much for your time.

**Medicine Quality Monitoring with the Minilab**

Your Name: *(Optional)*

**1. Overall Evaluation of the Course**

Using a scale from **1** through **5**, where **1 = Disagree Strongly** and **5 = Agree Strongly**, please circle one number to indicate the extent to which you agree or disagree with each statement below.

STATEMENT	DISAGREE STRONGLY ←————→ AGREE STRONGLY					NOT APPLICABLE
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
My expectations/personal objectives have been met	1			2	7	
The training material helped me understand the course better					10	
There were enough practical exercises to facilitate understanding of the course					10	
The instructor(s) were effective in presenting the material				4	6	
The instructor(s) allowed an appropriate level of participation				2	8	
I am satisfied with the overall content and topics covered				1	9	
The training will make a difference in the way I do my work				1	9	
Support for logistics - accommodation, registration, etc., was adequate			2	1	6	

## 2. Self Assessment of Impact of Training

Please review the following list of knowledge and skills statements and circle the number that best represents your knowledge and skills **before** then **after** this training.

**Rating scale 1 through 5 where 1 = Low Skills and 5 = High Skills**

BEFORE TRAINING					KNOWLEDGE AND SKILLS RELATED TO:	AFTER TRAINING				
1	2	3	4	5		1	2	3	4	5
3	2	2			Minilab Safety Presentation				5	2
2	1	3	1		The 3-Level Approach for QC of Medicines Presentation				4	3
1	2		2	1	Volumetric Techniques in the Lab Presentation				3	4
4	1		1	1	Hands-on Product Testing with Minilab				2	5
<b>10</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>14</b>

## 3. Other Comments/Suggestions:

- I. What did you like best about the course?
  - The practical TLC session (4 responses)
  - The 3-level approach
- II. What did you like least about the course?
  - Nothing (3 responses)
- III. What are your recommendations/suggestions for improvement of the course?
  - Include additional dosage forms like injectables, topical creams, cosmetics
  - Include antibiotic samples not only antimalarials
  - Make Minilab kit available to all branch labs (2 responses)
  - Use Ethiopian trainers
- IV. What additional topics would you like to see covered in the course?
  - Titration
  - Training in QC techniques used at the 3<sup>rd</sup> level

**Compendial Analytical Techniques**

Your Name: *(Optional)*

**1. Overall Evaluation of the Course**

Using a scale from **1** through **5**, where **1 = Disagree Strongly** and **5 = Agree Strongly**, please circle one number to indicate the extent to which you agree or disagree with each statement below.

STATEMENT	DISAGREE STRONGLY	←————→			AGREE STRONGLY	NOT APPLICABLE
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
My expectations/personal objectives have been met				9	6	
The training material helped me understand the course better				3	13	
There were enough practical exercises to facilitate understanding of the course		1	1	6	7	
The instructor(s) were effective in presenting the material				3	12	
The instructor(s) allowed an appropriate level of participation				5	10	
I am satisfied with the overall content and topics covered				7	8	
The training will make a difference in the way I do my work			1	3	11	
Support for logistics - accommodation, registration, etc., was adequate	4	2	2	3	3	1

## 2. Self Assessment of Impact of Training

Please review the following list of knowledge and skills statements and circle the number that best represents your knowledge and skills **before** then **after** this training.

**Rating scale 1 through 5 where 1 = Low Skills and 5 = High Skills**

BEFORE TRAINING					KNOWLEDGE AND SKILLS RELATED TO:	AFTER TRAINING				
1	2	3	4	5		1	2	3	4	5
	1	7	5	1	Good Documentation Practices				3	10
1	2	5	6	1	HPLC Basics and Compendial Applications				8	6
	1	8	5		Dissolution Testing				6	8
	1	5	8		UV-Vis Spectrophotometry – Compendial Application				6	8
5	2	6	2		Karl Fisher Water Determination			4	8	3
5	6	1	1		Atomic Absorption Spectroscopy – Compendial Applications	2	2	5	2	
2	1	4	7		Reviewing Analytical Data - Discussion				4	10
<b>13</b>	<b>14</b>	<b>36</b>	<b>34</b>	<b>2</b>	<b>TOTAL</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>37</b>	<b>45</b>

## 3. Other Comments/Suggestions:

### I. What did you like best about the course?

- Practical hands-on sessions (7 responses)
- All topics (2 responses)
- Karl Fisher (2responses)
- Presentations (Lecture) section
- Training was participatory
- Instructors were on time
- Training material

### II. What did you like least about the course?

- Nothing (4 responses)
- Waiting time for supplies and reagents to be delivered from the store (6 responses)

- Was too intensive and went into coffee breaks or time on schedule not strictly adhered to
- Not everyone got the chance to perform the KF water determination
- No hands-on lab for AA

III. What are your recommendations/suggestions for improvement of the course?

- Increase time for hands-on practical session
- Continue capacity building especially for branch labs

IV. What additional topics would you like to see covered in the course?

- GC (7 responses)
- GC-MS (7 responses)
- LC-MS (2 responses)
- Equipment preventive maintenance (4)
- IR (2)
- AA practicals (4)
- Others: TLC, HPTLC, Lab safety, GLP, ISO training for branch labs

MEMO TO PQAD DIRECTOR

June 10, 2013

### **Comments & Recommendations Regarding Artemether Injection Sample Assay Data Variability**

As requested by the Lab director, training participants performed the UV and HPLC assay procedures in the WHO International Pharmacopeia monograph for Artemether Injection using the provided sample, under the supervision of the PQM team. The PQM team's observations/suggestions are summarized below.

#### **1. Filtration**

The artemether injection assay procedure does not require filtration, but we realized the participants filtered both standard and sample solutions for the HPLC assay, for no apparent reason. It is our recommendation that standard solutions, in general, should not be filtered. If filtration is needed, the solvent should rather be filtered before using it to prepare the standard solution. In cases where filtration of sample preparations is warranted, a filter check is required the first time any filter brand is used.

#### **2. Sample Transfer**

The Artemether Injection sample appears to be viscous and a more accurate procedure for transferring volumes of the sample for assay will be to use a "TC" or "to contain" pipette which requires rinsing the pipette as part of the transfer procedure. It appears there is currently no "TC" pipette in the lab and using a "to deliver" or "TD" pipette could be a source of error in the assay.

The participants mentioned they have used the specific gravity (sg) of arachis oil to do a gravimetric transfer in the past, but it is not clear how close the sg of artemether injection is to that of arachis oil.

#### **3. HPLC Assay Sample Preparations**

A careful observation of the sample preparations shows that, initially, an unstable emulsion is formed, and within a short time, the arachis oil separates from the rest of the emulsion. The artemether appears to be distributed between these two layers, and the peak response observed in the chromatogram depends on which of the two layers the sampling needle pulls the sample from.

It was clear from the appearance of the solutions in the HPLC vials that the sample preparation procedure is not suitable for this product. The HPLC procedure cannot be used for this sample unless another validated sample preparation procedure is introduced. Due to the above observations, assay decisions for the artemether injection product may have to be made based on the results of the UV assay.