

National Drug
Quality Control
Consultancy
Report
September–
November 2004
Ethiopia

Management Sciences for Health
is a nonprofit organization
strengthening health programs worldwide.



This report was made possible through support provided by the U.S. Agency for International Development, under the terms of Cooperative Agreement Number HRN-A-00-00-00016-00. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

James Binka

July 2005

**National Drug Quality Control Consultancy Report
September–November 2004
Ethiopia**

James Binka

July 2005

Rational Pharmaceutical Management Plus
Center for Pharmaceutical Management
Management Sciences for Health
4301 N. Fairfax Drive, Suite 400
Arlington, VA 22203
Phone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmpplus@msh.org

Supported by the U.S. Agency for International
Development

This report was made possible through support provided by the U.S. Agency for International Development, under the terms of cooperative agreement number HRN-A-00-00-00016-00. The opinions expressed herein are those of the author and do not necessarily reflect the views of the U.S. Agency for International Development.

About RPM Plus

The Rational Pharmaceutical Management Plus (RPM Plus) Program, funded by the U.S. Agency for International Development (cooperative agreement HRN-A-00-00-00016-00) works in more than 20 developing countries to provide technical assistance to strengthen drug and health commodity management systems. The program offers technical guidance and assists in strategy development and program implementation both in improving the availability of health commodities—pharmaceuticals, vaccines, supplies, and basic medical equipment—of assured quality for maternal and child health, HIV/AIDS, infectious diseases, and family planning and in promoting the appropriate use of health commodities in the public and private sectors.

Recommended Citation

This document may be reproduced if credit is given to RPM Plus.

Binka, James, January 2005. National Drug Quality Control Consultancy Report, Ethiopia. Submitted to the U.S. Agency for International Development by the Rational Pharmaceutical Management Plus Program. Arlington, VA: Management Sciences for Health.

CONTENTS

ACRONYMS.....	v
INTRODUCTION	1
THE SCHEDULE OF WORK AND ACTION PLAN	3
Major Activities Undertaken	3
Drug Administration and Control Authority	3
Recommendations	10
ANNEX 1.PERSONS CONTACTED.....	13
ANNEX 2. TIME ACTION PLAN	15
ANNEX 3. PHYSICOCHEMICAL EQUIPMENT LIST	21
ANNEX 4. LIST OF INSTRUMENTS IN CONDOM TESTING ROOM	31
ANNEX 5. STAFF STRENGTH AT DQCTL.....	33
ANNEX 6. PHYSICOCHEMICAL NUMBER OF SAMPLES (SEPTEMBER, OCTOBER, AND NOVEMBER 2004)	35
ANNEX 7. CONDOMS SUBMITTED TO DRUG QUALITY CONTROL AND TOXICOLOGY LABORATORY FROM SEPTEMBER TO NOVEMBER 2004.....	37
ANNEX 8. CHART OF STERILITY TESTS BY MONTH (2004)	39
ANNEX 9. ANTIRETROVIRAL DRUGS THAT ARE SUBMITTED TO DRUG QUALITY CONTROL AND TOXICOLOGY LABORATORY	41
ANNEX 10. TOXICOLOGY SAMPLE TYPES	43
ANNEX 11. LIST OF SOPs PREPARED BY PHYSICOCHEMICAL DIVISION	45
ANNEX 12. GUIDELINES FOR PHARMACEUTICAL AND TOXICOLOGICAL ANALYSIS IN THE LABORATORY	47

ACRONYMS

ART	antiretroviral therapy
ARV	antiretroviral
DACA	Drug Administration and Control Authority
DQCTL	Drug Quality Control and Toxicology Laboratory
EHNRI	Ethiopian Health and Nutrition Research Institute
FIP	International Pharmaceutical Federation (Fédération Internationale Pharmaceutique)
FT	Fourier Transform
g	Gram
HPLC	high-performance liquid chromatograph
IR	infrared
μl	Microliter
mg	Milligram
ml	Milliliter
mm	Millimeter
MSH	Management Sciences for Health
PMTCT	prevention of mother-to-child transmission
RPM Plus	Rational Pharmaceutical Management Plus [Program]
SOP	standard operating procedures
TLC	Thin Layer Chromatography
USAID	U.S. Agency for International Development
UV	ultraviolet

INTRODUCTION

Rational Pharmaceutical Management Plus (RPM Plus) Program/Management Sciences for Health (MSH) is collaborating with USAID/Ethiopia in the provision of technical assistance in drug and related commodities management and antiretroviral (ARV) procurement for prevention of mother-to-child transmission (PMTCT) and the President's Emergency Plan for AIDS Relief in Ethiopia.

Under this effort, RPM Plus is assisting in national, regional, district, and health facility-level capacity development for delivery of PMTCT and antiretroviral therapy (ART) services and ensuring access to and rational use of basic PMTCT and ART products through various interventions including training, development of standard operating procedures (SOPs), improving quality assurance of drugs, strengthening of infrastructure and promoting improved commodities procurement, management, and inventory control systems.

Improved quality of essential drugs including ARVs by strengthening quality control during storage, distribution, and use is believed to ensure access to efficacious and safe drugs.

To address the constraints in quality assurance of drugs, RPM Plus is collaborating with the Drug Administration and Control Authority (DACA) in the provision of technical and material assistance. RPM Plus provided technical assistance in conducting a preassessment of the Pharmaceutical Quality Control System in February 2004 by Dr. Thomas Layloff of RPM Plus. As a follow-up to this first initiative, RPM Plus further engaged the services of a quality control consultant, Mr. James Binka, with the scope of work described below. The quality control support to DACA was coordinated by Mr. Gabriel Daniel of RPM Plus. The consultant's assignment included the following tasks—

- Provide on-site training and support in improved pharmaceutical quality control and management system
- Assess the potential of introducing regional level quality monitoring of products using simple and appropriate testing systems
- Participate in pharmaceutical quality assurance lecturing at the School of Pharmacy in Addis Ababa
- Support the strengthening or establishing of drug quality assurance network
- Provide guidance on how to perform different analytical procedures
- Review and design SOPs for critical operations and use of instruments
- Assess the present strengths and weaknesses of (situation analysis) and offer guidance on ways and means to correct weakness and scale up the strengths

- Acquaint the staff with advanced theoretical and practical aspects of the laboratory analysis through training on different analytical techniques; develop, evaluate, and validate analytical methods verification of analytical results and documentation
- Assess various alternatives that contribute to upgrading the laboratory performing tests for the private and other entities for fees

The consultant worked at Drug Quality Control and Toxicological Laboratory (DQCTL) of DACA in Addis Ababa from September 18 to November 30, 2004. The laboratory work involved introduction of alternate validated methods and training of the staff in good manufacturing practice. The management system was improved through a work progress reporting system and also regular meetings and seminars among the technical staff. The facilities at the laboratory were examined and evaluated. Improvement in the water and electricity system has been suggested. Sample receipt and storage were also improved

The existing laboratory operation guidelines were reviewed and the SOP's written. Lecture seminars were given to the students and the staff of School of Pharmacy in Addis Ababa. The consultancy assisted in the review of the master's degree program at the university.

THE SCHEDULE OF WORK AND ACTION PLAN

The schedule of work and action plan as planned for the three-month mission are as indicated in Annex 2.

Major Activities Undertaken

The following pharmaceutically related institutions were visited and work focused on the national laboratory.

1. DACA
2. DQCTL
3. Pharmacure
4. Epharm
5. School of Pharmacy, Addis Ababa
6. Pharmid
7. Drug Research Institute

Drug Administration and Control Authority

DACA, the governmental authority that administers the main laboratory body in the control of drugs and other related substances in Ethiopia, was established under proclamation (no. 176/99), is administered by a board, and is headed by a General Manager. DACA's mission is to ensure the safety, efficacy, and quality of drugs and their proper use. The authority is administratively divided into four main departments—

- Drug Evaluation and Registration
- Planning and Drug Information
- Drug Control and Abuse
- DQCTL

Drug Evaluation and Registration

At present, DACA has registered about 4,500 drug products and 400 ingredients. DACA also has made guidelines for drug registration available to importers and manufacturers of pharmaceuticals and related products including label requirements, which include the manufacturers' name, the date of manufacture, expiry dates, and other pertinent information. Furthermore, DACA requires that like expiry dates of the pharmaceutical products coming to Ethiopian market should not be less than 75 percent of the stated shelf lives of the products.

Planning and Drug Information

This department does the planning for DACA taking inputs from other departments. It is also responsible for developing and monitoring drug-related information for professionals and the public.

Drug Control and Abuse

The Drug Control and Abuse Department undertakes the control of narcotic and psychotropic drugs and their importation, manufacture, and storage. The department provides the necessary statistical data to the United Nations narcotic and psychotropic board.

Drug Quality Control and Toxicology Laboratory

The DQCTL undertakes quality control analysis of pharmaceutical and other related products including surgical materials.

The laboratory is located on the compound of the Ethiopian Health and Nutrition Research Institute (EHNRI). The laboratory has reasonable space for analytical work. The DQCTL consists of four main divisions—

- Physicochemical
- Microbiological
- Toxicological
- Pesticides

Infrastructure and Services at the Laboratory

The infrastructure at the laboratory is reasonable to carry out analytical activities. The housekeeping at the working place needed some attention, but with some interventions and dialogue among the staff, some improvement is evident.

The electrical and water services available at the laboratory needed some repairs and improvement and the authorities at DACA were informed.

The water supply system has no functioning reservoir. The existing reservoir has yet to be connected to the laboratory supply. The water connected to the water distilling plants does not have pre-de-ionizing facility, hence, regular deposition of water insoluble salts on the heating elements does occur. The water to the laboratory comes straight from the underground bore holes.

The laboratory has no power stabilizer for the sensitive and costly equipment such as the high-performance liquid chromatograph (HPLC) and the ultraviolet (UV) and infrared (IR) spectrophotometers.

The rooms where the equipment was installed were not air conditioned. The condom testing room needed controlled air pressure to provide consistent environmental conditions such as the maximum inflation pressure of the condoms.

Laboratory Safety

Fire fighting equipment needs to be installed at strategic places in the laboratory. The laboratory has no sand in buckets or other suitable containers and no fire fighting blankets.

The two external doors could be used as escape exits during fire outbreaks or any other accident that might require laboratory staff to be evacuated.

For accidents affecting the eyes, the laboratory has no eye washers available to be used.

Equipment

DQCTL had a good array of laboratory equipment (see Annex 3 and 4) except some few critical ones—the infrared spectrophotometer, gas chromatograph, and full complement of thin layer chromatograph were not available. There were no thin layer spreaders for preparing the usual 20 cm × 20 cm coated plates. Two nonfunctional gas chromatographs existed for sometime but the agent of the supplier was able to get a spare power supply board for the repair of one of the gas chromatographs just about one week to the end of November 2004. The calibration standard weights for analytical balances were also absent.

Usually the temperature and humidity in the operational rooms at the laboratory should continuously be monitored. No instrumentation was available for the control and monitoring of temperature and humidity.

The equipment in the laboratory lacked the usual regular maintenance and calibration. The log books on the equipment should reflect the records on the maintenance schedule. Initially not all the equipment in the laboratory had log books but at the end of the present mission all the equipment had log books.

The following laboratory equipment has been ordered and letters of credit established—

- One gas chromatograph
- One FT IR spectrophotometer
- Two HPLCs
- One atomic absorption spectrometer

DACA has also taken steps to repair the fixtures of the laboratory building.

Human Resources

DQCTL has staff strength of 23 comprising of four technicians and the rest graduate pharmacists and chemists. The two of the four technicians were employed in the past two months (Annex 5).

Laboratory Management and Operations

The laboratory had an acting head who had about four years of postqualification experience, had done a study tour to Zimbabwe Drug Control Authority, and had visited a private drug control laboratory in South Africa. The head administered the day-to-day affairs of the laboratory and reported directly to the General Manager of DACA.

The laboratory had a weekly management meeting for the heads of the four divisions of the laboratory and some of the senior staff members. The consultant instituted the regular weekly meeting.

Monitoring of Laboratory Activities

No systematic reporting system from the analysts existed. The consultant introduced a reporting procedure.

Each member of staff reported weekly on his or her activities to the head of his or her department. The Head of Division submitted monthly activity report to the Head of DQCTL and he or she in turn reported to the General Manager of DACA.

Training

The laboratory now undertakes both internal and external training to improve the knowledge and operational skills of the staff. Some staff were involved in postgraduate training.

EXTERNAL TRAINING. The external training currently used by DACA consisted of personnel being attached to drug regulatory authorities in other African countries. So far 10 persons have been trained in Zimbabwe and South Africa. Six persons from the laboratory left October 2004 for Zimbabwe. DACA has requested the consultant to help make similar contacts with the drug control authorities in Ghana.

INTERNAL TRAINING. The internal training is on-the-bench training in which the senior analysts train the junior ones. The consultant moved from one individual analyst to another and gave group demonstrations.

POSTGRADUATE TRAINING. Three analysts were currently undergoing postgraduate studies in pharmaceutical analysis. One of the analysts was studying stability-indicating analysis of ARV drugs and antimalarial drugs. Regular discussions were held individually with these students.

Sample Receipts and Certificates of Analysis

Samples were sent from DACA accompanied by forms to the laboratory. At the laboratory, the details on the sample products were entered into a notebook.

The sample receipt format was reviewed and suggestions offered including the need for samples to bear their laboratory numbers as they go to the analysts. The test samples were also to be properly stored for the given shelf lives of the products, plus extra period of about three years. The certificates of analysis of tested samples contained the relevant information such as the analytical results and the methods of analysis used.

However, the documents accompanying samples for analysis from the Drug Evaluation and Registration Department of DACA were considered not sufficient. The synthetic pathway and the process of manufacture with the formulation as indicated in the registration document should be available to the analysts.

Monitoring and Evaluation of Analytical Input and Output

A weekly and monthly monitoring format was introduced to enable management to capture the analytical activities going on in the laboratory. The weekly report was made by the individual analysts to the head of his or her division, and the monthly one was done by the divisional head to the head of the laboratory. The laboratory head collates the annual situation.

Divisions of the Laboratory

PHYSICOCHEMICAL DIVISION. The Physicochemical Division of the DQCTL had four analysts and one technician. The division had most of the analytical equipment under it. Only one functioning HPLC was under the division, and so there was often a queue for use of the equipment by the analysts.

Investigative studies going on were the following—

- Comparative analytical methods for ARV drugs
- Stability-indicating methods for the analysis of ARV drugs
- Analytical screening methods for antimalarial drugs
- The analytical activities of the physicochemical division are as shown in Annex 6

ANALYSIS OF ARV AND RELATED COMPOUNDS. The ARV samples analyzed within the period are as indicated in Annex 9. Some ARV products have been analyzed at the laboratory. The absence of a set of Thin Layer Chromatography (TLC) system and IR spectrophotometer apparatus limits thorough analytical investigation. The IR spectrophotometer will enhance the evaluation of reference working substances and pharmaceutical raw materials. The instruments have already been ordered. Sample tests using TLC small glass plates are being introduced.

MICROBIOLOGICAL DIVISION. The Microbiological Division had four analysts and one technician. The samples handled by the division are as indicated in Annex 11. The routine activities of the division include the following—

- Sterility tests of samples
- Pyrogen tests. Currently rabbits are used, but it is hoped that Limulus test kits will be used in the future to screen the samples and that animal tests will be used for confirmatory tests only.

Outstanding work to be done is the quantitative assay of antibiotics and antiseptics.

TOXICOLOGY DIVISION. The Toxicology Division had four analysts and one technician. The Division performed acute toxicological, skin sensitivity, and cholinesterase tests. The monthly activities of the division are as indicated in Annex 10.

PESTICIDE DIVISION. The Pesticide Division was a relatively new division with one analyst. The equipment of choice for the analysis of the pesticides on the market was the gas chromatograph with electron capture detector. The gas chromatograph at the laboratory was out of order; attempts were being made to repair the equipment.

THE CONDOM TESTING SECTION. The instruments in this section were very comprehensive and operational. However, for bursting tests they gave variable test results, sometimes probably due to changes in ambient temperature and atmospheric pressure. The condom testing room must be air-conditioned, and instruments for monitoring the temperature and pressure must be installed. The number of samples tested for the period is shown in Annex 7.

Guidelines and SOPs

The existing guidelines for the DQCTL were redrafted and a new format for SOPs was written. The SOP is pertinent to activities in each Division.

The list of SOPs is in Annex 11, and the new guidelines are in Annex 12.

Other Pharmaceutical Institutions

School of Pharmacy

The consultant gave a seminar on “Dynamics of Quality Assurance on International and National Scene” to a cross sectional members of the academic staff and the students of the University of Addis Ababa.

The university opened for another academic year in the month of November. The syllabus for the master’s degree program in pharmaceutical analysis, quality assurance, and medicinal chemistry was given to the consultant for review and comments, and the assignment was completed.

Pharmaceutical Industries

Two pharmaceutical industries have been visited so far: the Pharmacure and Epharm.

PHARMACURE. Pharmacure is a high-volume intravenous fluids factory and the factory was designed and built on current good manufacturing practice module. An efficient air handling system had been installed, and the factory had a well-equipped laboratory.

EPHARM. This parastatal factory, established in 1964, produces over 50 pharmaceutical formulations including injectables, capsules, tablets, and ointments.

PHARMID. Pharmid is an independent governmental institution responsible for importing, storing, and distributing pharmaceuticals and other related items for the public and private sectors. Pharmid has good storage areas and inventory control system. The institution may benefit from installation of mini-lab for the purpose of conducting quality screening tests on the products in storage.

Accomplishment of the Consultancy

INTRODUCTION OF WEEKLY MANAGEMENT MEETINGS AND SEMINARS. The introduction of weekly management meetings and seminars improves both the technical and administrative management of the laboratory.

WEEKLY AND MONTHLY REPORTING SYSTEMS. The introduction of a weekly and monthly activities reporting system offers good monitoring tool for the headships to manage the laboratory well.

INTERNAL AND EXTERNAL AUDITING SYSTEMS. The need for internal and external audit systems have been established and persons nominated.

LABORATORY SAFETY TEAM. A team of three persons has been set up to be responsible for the safety issues in the laboratory.

GUIDELINES AND SOPs FOR LABORATORY. The guidelines for the laboratory were completed and a format for writing SOPs was written for the analysts.

ANTIRETROVIRAL, ANTI-AIDS, ANTI-MALARIAL, AND ANTI-TB DRUGS. These four types of drugs have been in the system and some have been analyzed in the laboratory using limited approach. The use of comprehensive approach has been introduced involving the use of TLC, UV, and IR spectrophotometers (on the reference substances), and HPLC.

SCHOOL OF PHARMACY. The School of Pharmacy based at Addis Ababa was visited a couple times during September 2004 to establish a working relationship between the school and the DQCTL of DACA. Among other collaborative activities between the two institutions, the consultant, Mr. James Binka, gave lectures and seminars at the school pharmacy. The lectures started in October and included topics such as Quality Assurance of Pharmaceuticals and Good

Laboratory Practice, Drug Stability, and Development of Analytical Methods. The DQCTL ordered one HPLC for the school.

Seminars and lectures were given to students and faculty members from the school of pharmacy and from other faculties in the Addis Ababa University. The consultant was requested to review the syllabus for the M.Pharm. program, and it was duly done.

INTERNATIONAL NETWORKING. The analysts were encouraged to be associated with a number of international organizations associated with quality control and other drug regulatory issues like the International Pharmaceutical Federation (Fédération Internationale Pharmaceutique, FIP), Association of Official Analysts, and Regional Associations. The Acting Head of the Laboratory joined the FIP.

Recommendations

- Infrastructure

The laboratory infrastructure defects that are mentioned above need to be rectified as soon as possible. The identified defects included some plumbing works on the water reservoir and some sinks in the laboratory. The water coming from the bore holes requires de-ionization to reduce the hardness of the water and prevent the frequent scaling on some of the equipment.

The electrical power supply to the laboratory needs to be stabilized and a standby electrical generator provided.

- Human resources

The internal and the external training programs may continue to upgrade the skills of the staff.

More technicians may be employed because the technicians tend to remain at post longer than the professional pharmacists and others.

- Laboratory management

The laboratory management reporting system introduced needs to be continued. The leadership at the laboratory should ensure that weekly reports from analysts and the monthly reports from heads of the divisions are regularly submitted for evaluation.

- Receipt of samples

Receipt of samples at the laboratory does not usually contain all the required details. Samples for registration should contain the full specifications on the product including the methods of analysis, summary of manufacturing process, and the stability data.

- Sample reception room

There is no dedicated room for customers to submit samples. The front room at the laboratory could be used for customers to submit samples.

- Equipment

The present equipment and those currently ordered may be augmented by ordering differential scanning calorimeter to assist in evaluating pharmaceutical raw materials. The local pharmaceutical companies, which have registered to produce ARV drugs, may need their raw materials tested exhaustively. The possible polymorphic forms may need to be identified and the use of differential scanning calorimeter, IR spectrophotometer, and TLC will be necessary.

- Investigative work on ARV, antimalarial, and anti-TB drugs

The investigative work on ARV, antimalarial, and anti-TB drugs should continue. Impurity-indicating methods (including those that detect degradation of products) should be addressed.

- Regional collaborative work among member states to help solve the upsurge of substandard and counterfeit drugs in the African region may be established. A subregional collaboration among countries such as Ethiopia, Kenya, Tanzania, and Uganda may be started.
- Mini-labs may be established in the regions in Ethiopia to enhance monitoring of substandard drugs in the country. DACA may, therefore, procure the mini-labs for the exercise. The main laboratory may provide the necessary backup training for the pharmacists and technicians in the regional hospitals and health centers.
- Environmental control

The waste products (solid, liquid, and gaseous) from the laboratory should be controlled according to the local and World Bank guidelines. The liquid waste from the laboratory may be directed to a cemented vat and eventually evacuated to a site approved by the Ethiopian Environmental Unit. The solid waste may be also disposed of after consultation with the Environmental Unit.

- Pharmacy school

The postgraduate students for the master's degree program for a degree in pharmaceutical analysis may be attached during the course to some of the pharmaceutical industries and DQCTL. The students may be exposed to the practice and the application of analytical techniques.

ANNEX 1. PERSONS CONTACTED

1. Dr. Negussu Mekonnen, Senior Technical Adviser
2. Mr. Halle Selassie,, General Manager, DACA, Addis Ababa.
3. Mihiret Tekeste,Acting Head, DQCTL.
4. Dr. Mamadou S. Diallo, Chief Pharmacist, African Union, Ethiopia
5. Prof. Tsige Gebre–Mariam, Dean, School of Pharmacy, Addis Ababa
6. Dr. Valero Reggi, Technical Assistant, DACA
7. Gennet Seifu, Quality Control Manager, Pharmacure

ANNEX 2. TIME ACTION PLAN

No	ACTIVITIES	P E R I O D												DATE OF COMPLETION	ACTION BY	REMARKS	
		SEPTEMBER					OCTOBER				NOVEMBER						
		1	2	3	4	5	6	7	8	9	10	11	12				
1	Visits to places related to quality control systems * DACA, Quality Control and Toxicology Laboratory , Pharmacure, Ephraim, Pyramid, Regional Health Centers														End of October	DACA QCT	
2	Infrastructure a. Water leaking through windows b. Leaking sinks c. Emergency outlets and exits d. Temperature humidity in control analytical rooms e. Installation of fire fighting equipments blankets f. Change of metal tops in glassware washing area g. Water tank at roof top h. Voltage stabilizer for sensitive equipment														October 30	DACA	
															October 30	DACA	
															October 30	Department Head and DACA	
															December	"	
															December	"	
															October	"	
															November	"	
															December	"	
																"	
																"	

Annex 2. Time Action Plan

No	ACTIVITIES	P E R I O D												DATE OF COMPLETION	ACTION BY	REMARKS
		SEPTEMBER					OCTOBER				NOVEMBER					
		1	2	3	4	5	6	7	8	9	10	11	12			
4	Laboratory operation and management															
	a. Management meeting															
	i. Weekly		x	x	x	x	x	x	x	x	x	x	x	Continuous	Division Leads	
	ii. Working seminar weekly		x	x	x	x	x	x	x	x	x	x	x	“	Lead by consultant and others	
	iii. Documentation of SOP's quality system												x	Monthly and bimonthly	Safety Leads	
	b. Laboratory safety exercise, fire, etc. Maintenance technician															
	c. Internal audit inspection															
	- External audit inspector Two from outside Two from laboratory												x	Monthly Quarterly	Audit team Audit team	

National Drug Quality Control Consultancy Report

No	ACTIVITIES	P E R I O D												DATE OF COMPLETION	ACTION BY	REMARKS
		SEPTEMBER					OCTOBER				NOVEMBER					
		1	2	3	4	5	6	7	8	9	10	11	12			
	d. <u>Report</u>															
	i. Weekly by analysis	x	x	x	x	x	x	x	x	x	x	x	x	Continuous	Each analysis	
	ii. Work load monthly by Division Head				x				x				x	Every month	Division Head	
	e. Divisional work - Investigative															
	i. Physicochemical analysis of ARV and anti-malarial drugs	x	x	x	x	x	x	x	x	x	x	x	x	Ongoing	Analyst Consultant	
	ii. Microbiology - Pyrogen test - Quantitative									x	x	x	x	Yet to start	Head Consultant	
	iii. Toxicology - to seek to evaluate new samples for teratogenicity & carcinogenicity									x	x	x	x	Start from November on wards	Head of Division and Consultant	Build appropriate animal home
	iii. Pesticide - GC repaired and start analysis									x	x	x	x		Division Head and Consultant	

Annex 2. Time Action Plan

No	ACTIVITIES	P E R I O D												DATE OF COMPLETION	ACTION BY	REMARKS	
		SEPTEMBER					OCTOBER			NOVEMBER							
		1	2	3	4	5	6	7	8	9	10	11	12				
	f. Storage and evaluation of reference substances							x	x						End of November	Storekeeper, Head PC Division, and Consultant	Use infrared speech
	g . Documentation Guidelines, SOPs, quality system, etc.		xx	X	x	x	x	x	x	x							
	h. Regional Health unit Evaluate for Mini lab												x		End of October	Consultant Head	
	i. School of Pharmacy																
	i. Seminars and lectures								x	x	x	x	x		November	Consultant	
	ii. Laboratory supervision for good laboratory practice																
	iii. Evaluation of syllabus for postgraduate students.						x	x	x						October 30	“	

ANNEX 3. PHYSICOCHEMICAL EQUIPMENT LIST

Equipment Name : Avery Berkly (Analytical Balance)
Equipment ID : B₁
Equipment Status : In USE
Equipment Location : BALANCE ROOM- (RM-1)

Equipment Name : Avery Berkly (Analytical Balance)
Equipment ID : B₂
Equipment Status : In USE
Equipment Location : BALANCE ROOM- (RM-1)

Equipment Name : Oertling (Top Load Balance)
Equipment ID : B₃
Equipment Status : Not Installed
Equipment Location : BR (RM-1)

Equipment Name : Oertling (Top Load Balance)
Equipment ID : B₄
Equipment Status : Not Installed
Equipment Location : BR (RM-1)

Equipment Name : Acculab[®]
Equipment ID : B₅
Equipment Status : Not Installed
Equipment Location : BR (RM-1)

Equipment Name : Microbalance (Sartoriouse)
Equipment ID : B₆
Equipment Status : Not Installed
Equipment Location : BR (RM-1)

Equipment Name : Sartoriouse (Analytical Balance)
Equipment ID : B₇
Equipment Status : Not Installed
Equipment Location : BR (RM-1)

Equipment Name : Furnace (Stuart Scientific)
Equipment ID : F₁
Equipment Status : In USE
Equipment Location : RM-6

Equipment Name : Vacuum Oven (Jovan)
Equipment ID : O₁
Equipment Status : In USE
Equipment Location : RM-5

Equipment Name : Vacuum Oven (Precision)
Equipment ID : O₂
Equipment Status : Out of USE
Equipment Location : RM-6

Equipment Name : Air Compressor (Vickers)
Equipment ID : AC₁
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Water Bath (Jovan)
Equipment ID : WB₁
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Water Bath (Gallen Kamp)
Equipment ID : WB₂
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Heating Mantle (P-Selectaq)
Equipment ID : HM₁
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Heating Mantle
Equipment ID : HM₂
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Sieve Shaker
Equipment ID : SS₁
Equipment Status : Out of USE
Equipment Location : RM-2

Equipment Name : Vacuum Pump (R1-4)
Equipment ID : VP₁
Equipment Status : Out of USE
Equipment Location : RM-2

Equipment Name : Vacuum Pump (Telstar)
Equipment ID : VP₂
Equipment Status : In USE
Equipment Location : RM-5

Annex 3. Physicochemical Equipment List

Equipment Name : Suspension Mixer
Equipment ID : SM₁
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Orbital Shaker (Sartorius)
Equipment ID : S₁
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : Ultrasonic Cleaner
Equipment ID : U₁
Equipment Status : In USE
Equipment Location : RM-2

Equipment Name : P^H Meter
Equipment ID :
Equipment Status :
Equipment Location :

Equipment Name : Hardness Tester (Pharma test)
Equipment ID : HT₁
Equipment Status : In USE
Equipment Location : RM-5

Equipment Name : Friability Taste (Pharma test)
Equipment ID : FT₁
Equipment Status : In USE
Equipment Location : RM-5

Equipment Name : Dissolution Taste (Pharma test)
Equipment ID : DT₁
Equipment Status : In USE
Equipment Location : RM-5

Equipment Name : Polarograph (Metroham)
Equipment ID : P₁
Equipment Status : Out of USE
Equipment Location : RM-5

Equipment Name : Microscope (Projection)
Equipment ID : M₁
Equipment Status : In USE
Equipment Location : RM-5

Equipment Name : Karl Fisher Titrator (Aqupal® III)
Equipment ID : KF₁
Equipment Status : In USE
Equipment Location : RM-6

Equipment Name : Magnetic Stirrer with hot plate (Stuart)
Equipment ID : MSH₁
Equipment Status : In USE
Equipment Location : RM-3

Equipment Name : Magnetic Stirrer with hot plate (Stuart)
Equipment ID : MSH₂
Equipment Status : In USE
Equipment Location : RM-3

Equipment Name : Magnetic Stirrer with hot plate (IKA Combimag RCT)
Equipment ID : HSM₃
Equipment Status : In USE
Equipment Location :

Equipment Name : Rotavapour (Heidalpha)
Equipment ID : RV₁
Equipment Status : In USE
Equipment Location : RM-6

Equipment Name : Rotavapour (Büchi)
Equipment ID : RV₂
Equipment Status : In USE
Equipment Location : RM-18

Equipment Name : Solvent Recycling (Büchi)
Equipment ID : SR₁
Equipment Status : In USE
Equipment Location : RM-18

Equipment Name : Solvent Recycling (Büchi)
Equipment ID : SR₂
Equipment Status : In USE
Equipment Location : RM-18

Equipment Name : Fluorimeter (Jenway)
Equipment ID : FM₁
Equipment Status : In USE
Equipment Location : RM-9

Annex 3. Physicochemical Equipment List

Equipment Name : Disintegration Taste
Equipment ID :
Equipment Status :
Equipment Location :

Equipment Name : Water Distiller
Equipment ID :
Equipment Status :
Equipment Location :

Equipment Name : Water Distiller (ISCO)
Equipment ID : WD₁
Equipment Status : Out of USE
Equipment Location :

Equipment Name : IR Spectrophotometer (Pre Unicam)
Equipment ID : IR₁
Equipment Status : Out of USE
Equipment Location : RM-9

Equipment Name : IR Spectrophotometer (BUCK)
Equipment ID : IR₂
Equipment Status : Out of USE
Equipment Location :

Equipment Name : UV Light Source (Foe TLC)
Equipment ID : SP₁
Equipment Status : In USE
Equipment Location : RM-8 (Dark Room)

Equipment Name : UV-Visible Spectrophotometer (Double
beam)(Cecil)
Equipment ID : SP₁
Equipment Status : In USE
Equipment Location : RM-9

Equipment Name : UV-Visible Spectrophotometer (Genesys-5)
Equipment ID : SP₂
Equipment Status : In USE
Equipment Location : RM-9

Equipment Name : UV-Vis spectrophotometer (Genesys-5)
Equipment ID : SP₃
Equipment Status : In USE
Equipment Location : RM-10

Equipment Name : Melting Point Apparatus (Stuart)
Equipment ID : MP₁
Equipment Status : In USE
Equipment Location : RM-9

Equipment Name : Flame photometer (Jenway)
Equipment ID : FP₁
Equipment Status : In USE
Equipment Location : RM-11

Equipment Name : Flame photometer (SEAL)
Equipment ID : FP₂
Equipment Status : In USE
Equipment Location : RM-9

Equipment Name : Polarimeter (ATAGO)
Equipment ID : PM₁
Equipment Status : In USE
Equipment Location : RM-9

Equipment Name : Polarimeter (kavel zeiss)
Equipment ID : PM₂
Equipment Status : In USE
Equipment Location : RM9

Equipment Name : Atomic Absorption Emission Spectrophotometer
(BUCK)
Equipment ID : AA₁
Equipment Status : Out of USE
Equipment Location : RM11

Equipment Name : Gas Chromatograph (BUCK)
Equipment ID : GC₂
Equipment Status : Not Installed
Equipment Location : RM-11

Equipment Name : Gas Chromatograph (TRACER)
Equipment ID : GC₃
Equipment Status : In USE
Equipment Location : RM-10

Equipment Name : HPLC (CECIL)
Equipment ID : H₁
Equipment Status : Out of USE
Equipment Location : RM-10

Equipment Name : HPLC With Components (Shimadzu)
Equipment ID : H₂
Equipment Status : In USE
Equipment Location : RM-10

MICROBIOLOGY EQUIPMENT LIST

Equipment Name : Top loading Autoclave
Equipment ID : M1
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Top Loading Autoclave
Equipment ID : M2
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Binocular Microscope
Equipment ID : M3
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Binocular Microscope
Equipment ID : M4
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Binocular Microscope
Equipment ID : M5
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Lab. Incubator
Equipment Status : M6
Equipment Location : In Use

Equipment Name : Lab. Incubator
Equipment ID : M7
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Lab. Refrigerated Centrifuge
Equipment ID : M8
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Bench Colony Counter
Equipment ID : M9
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Membrane filter holder
Equipment ID : M10
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Membrane filter holder
Equipment ID : M11
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Horizontal Laminar Clean Air Flow Cabinet
Equipment Status : M12
Equipment Location : In Use

Equipment Name : Horizontal Laminar Clean Air Flow Cabinet
Equipment ID : M13
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Spectrometer
Equipment ID : M14
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Lab. Refrigerator
Equipment ID : M15
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Lab. Refrigerator
Equipment ID : M16
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Lab. Refrigerator
Equipment ID : M17
Equipment Status : In Use
Equipment Location : In Use

Annex 3. Physicochemical Equipment List

Equipment Name : Deep Freezer
Equipment ID : M18
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Electro Calliper
Equipment ID : M19
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : PH METER
Equipment ID : M20
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Glassware Washing Machine
Equipment ID : M21
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Glassware Washing Machine
Equipment ID : M22
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Shaking Water Bath
Equipment ID : M23
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Shaking Water Bath
Equipment ID : M24
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Pyrogene Test Processor
Equipment ID : M25
Equipment Status : In Use
Equipment Location : In Use

Equipment Name : Pyrogene Test Processor
Equipment ID : M26
Equipment Status : In Use
Equipment Location : In Use

Equipment Name Bio Safety Cabinet
Equipment ID : M27
Equipment Status : In Use
Equipment Location : In Use

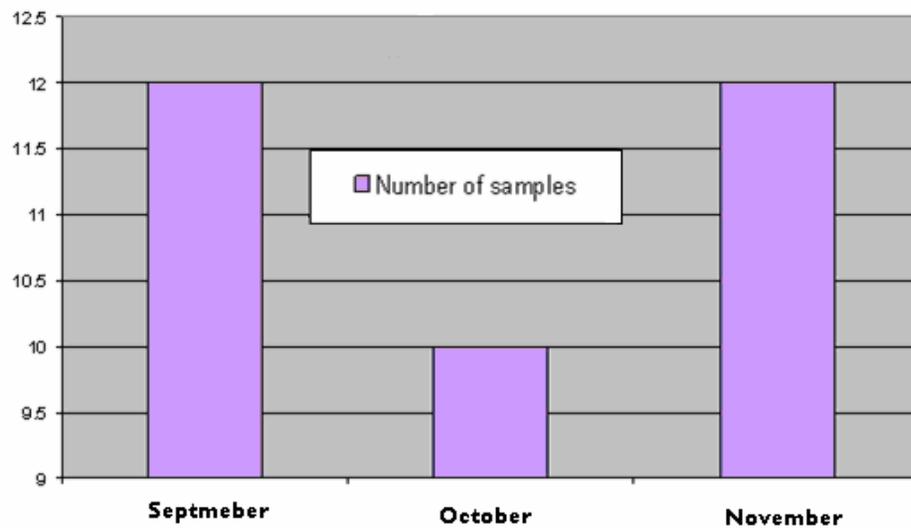
ANNEX 4. LIST OF INSTRUMENTS IN CONDOM TESTING ROOM

Serial Number	Instrument Name	Quantity	Country of Origin	Remark
1	Electrical hole tester	1(with 4 heads)	Sweden	Partly functional
2	Accurate inflation system	6	Sweden	Functional
3	Water vacuum bowl	1	Sweden	Functional
4	Dry vacuum	1	Sweden	Functional
5	Tensile strength tester	1	England	Functional
6	Die cutter	1	Sweden	Functional
7	Mandrel for width determination	1	Sweden	Functional
8	Mandrel for length determination	1	Sweden	Functional
9	Thickness gauge	1	Japan	Functional
10	Water leakage tester	1	Sweden	Functional
11	Drying oven	1	Norway	Functional
12	Air drier	1	Sweden	Functional
13	Air compressor	1	England	Functional

ANNEX 5. STAFF STRENGTH AT DQCTL

Rol 1 No.	NAME	QUALIFICATION	POST QUALIFICATION Experience	TOXICOLOGY
1	Mihret Tekeste			Toxicology
2	Bikila Bayessa	B.Pharm, Certificate Chemical & Microbiological Analysis	5 years in drug quality certificate Chemical & Microbiological Analysis	Microbiology
3	Birhanu Muche	B.pharma		Physicochemical
4	Awot G/Energizer	B.pharma	Certificate in Pharmaceutical analysis	Microbiology
5	Dr. Hailu Mamo	Dr. of Veterinary Medicine (DVM)		Toxicology
6	Seyoum Wolde	B.SC in Chemistry		Toxicology
7	Tekallgen H/Mariam	B. Pharma		Physicochemical
8	Getahew Genete	B. Pharma		Physicochemical
9	Lantider Kassye	B. Pharma		Physicochemical
10	Heran Gelba	B. Pharma		Microbiology
11	H/Michael Mengestu	Diploma in Chemistry		Toxicology
12	Bekele Tefera	B.SC in Chemistry	Certificate in Pharmaceutical analysis	Physicochemical
13	Bonsamo Gobena	B. Pharma, Certificate in Pharmaceutical analysis	Certificate in Pharmaceutical analysis	Toxicology

ANNEX 6. PHYSICOCHEMICAL NUMBER OF SAMPLES (SEPTEMBER, OCTOBER, AND NOVEMBER 2004)



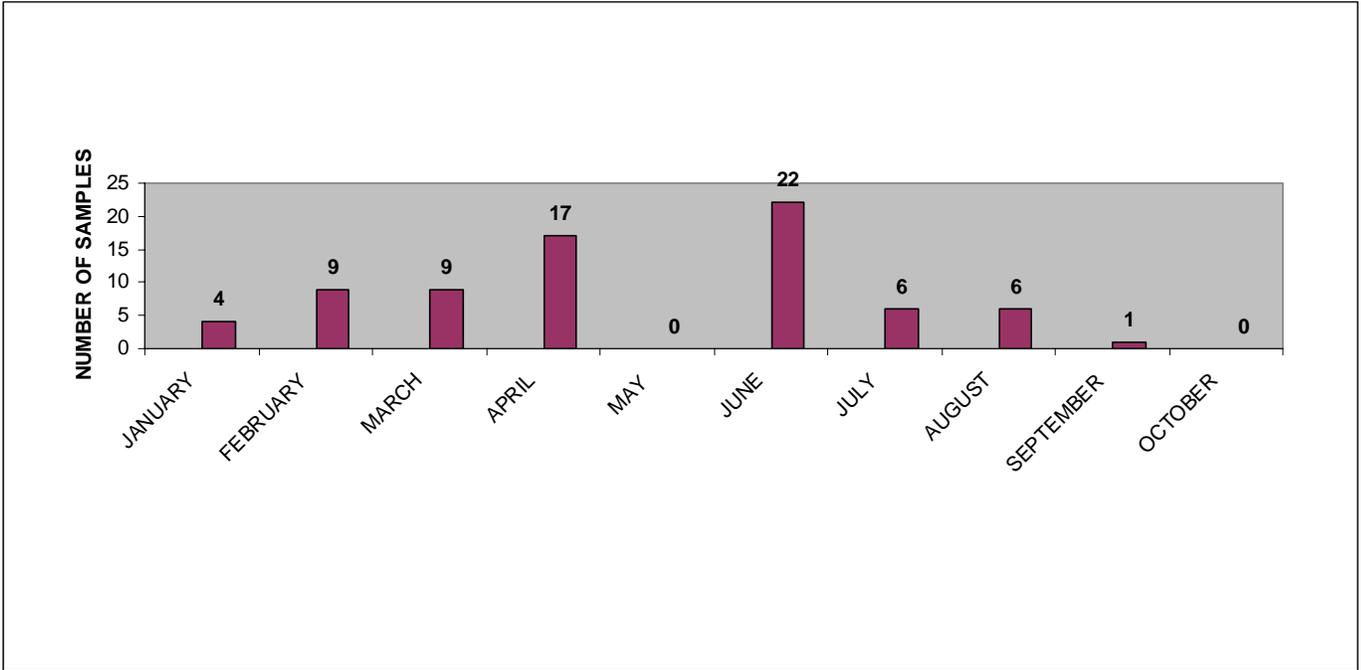
Samples Analyzed by Microbiological Laboratory Division

Serial Number	Date	Name of Product	Active Ingredient	Batch Number	Formulation	Test Recommended	Quantity of Sample Handed	Handed to
1	07/08/1996	TRAMADOL	Tramadoll HCl	11043007	1 ml ampoules	Physicochemical		Awot G/E
2	07/08/1996	Co-trimoxazole	Trimethoprim and sulfamathoxazole	B 4002	Oral suspension	Physicochemical		Awot G/E
3	07/08/1996	AMLOCOR-5	Amlodipine Besilate	1174002	Tablet	Physicochemical		Heran G.
4	07/08/1996	Nifedipine	Same	50363001	Soft capsules	Physicochemical		Physico-chemical
5	05/01/1997	ELICEF-500	Cefalexin	689	Capsules	Physicochemical	40 caps	Heran G.
6	05/01/1997	Listerine	Thymol and alcohol	731545	Liquid for mouthwash	Physicochemical	6 bottles	Awot G/E
7	05/01/1997	EPOMYCIN-125	Erythromycin Ethyl succinate	473	Oral suspension	Physicochemical	14 bottles	Awot G/E
8	05/01/1997	JEIL LIDOCAINE	Lidocaine HCl	2730080	Injectable	Physicochemical	10 vials	Awot G/E
9	05/01/1997	VOLMAX 4 mg	Salbutamol	G3034	Tablet	Physicochemical	42 tabs	Awot G/E
10	08/10/2004	Sensation condom	Lubricated condom	WM04048403	Condom	Physicochemical	8 boxes	Heran G.
11	08/10/2004	Sensation condom	Lubricated condom	WM04048401	Condom	Physicochemical	8 boxes	Awot G/E
12	08/10/2004	Sensation condom	Lubricated condom	WM04045401	Condom	Physicochemical	8 boxes	Awot G/E

ANNEX 7. CONDOMS SUBMITTED TO DRUG QUALITY CONTROL AND TOXICOLOGY LABORATORY FROM SEPTEMBER TO NOVEMBER 2004

No.	Name of the Product	Number of Samples submitted	Date of Submission	Date Reported	Number of Samples not Reported	Remark
1	Sensation condom	8 batches	September 1, 2004	September 13, 2004 September 16, 2004 September 21, 2004	5 samples	It is not fully reported but analyzed.
2	Sensation condom	45 batches	November 3, 2004		Not all the samples are reported	It is not fully analyzed and reported

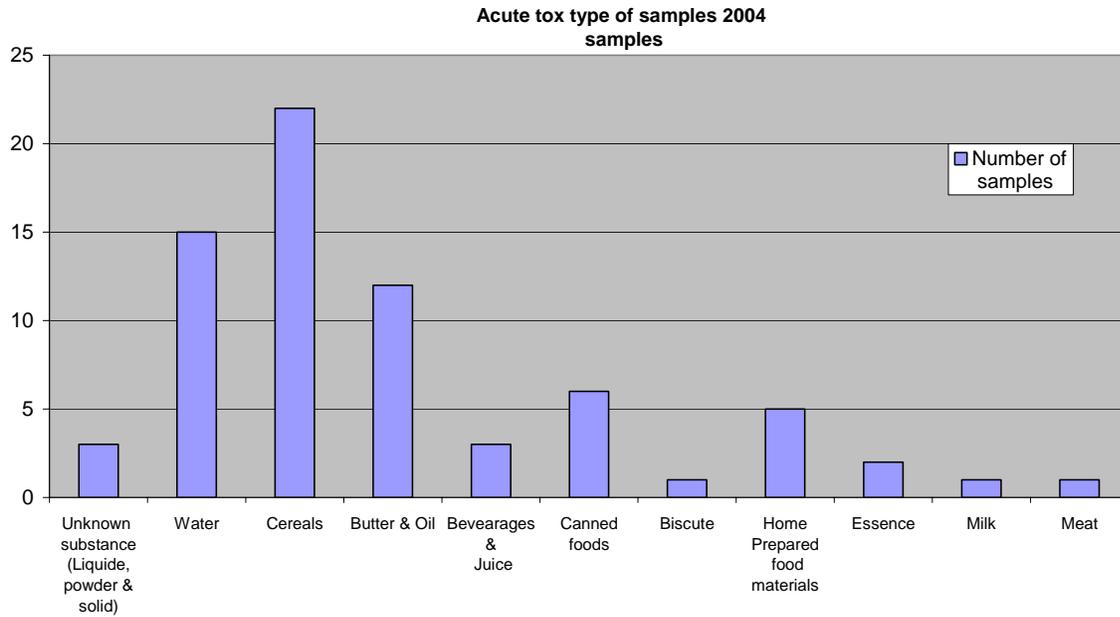
ANNEX 8. CHART OF STERILITY TESTS BY MONTH (2004)



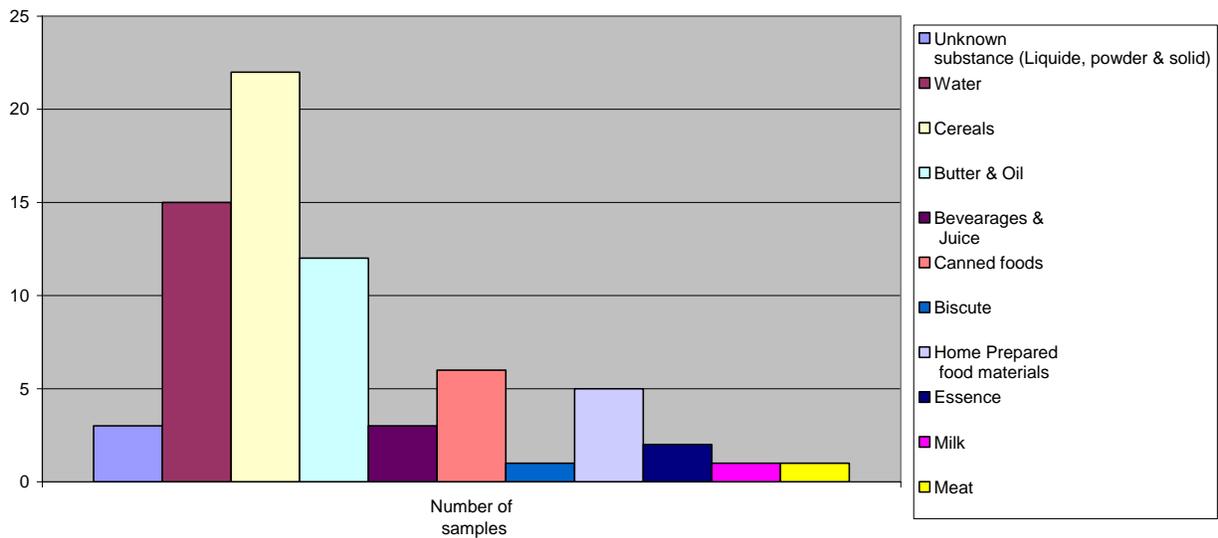
ANNEX 9. ANTIRETROVIRAL DRUGS THAT ARE SUBMITTED TO DRUG QUALITY CONTROL AND TOXICOLOGY LABORATORY

No.	Date Received	Generic Name	Brand Name	Formulation	Manufacturer	Remark
1	2004	Zidovudine	Zidovudine 100 mg		Macleods/India	Failed
2	"	Zidovudine	Zidovudine 300 mg		"	"
3	"	Lamuvudine	Laminac 150 mg		"	Passed
4	"	Lamivudine	Epivir 10 mg/ml	Oral solution	GlaxoSmithKline	"
5	"	Lamivudine	Epivir	Tablet	"	"
6	"	Zidovudine	Retrovir 10 mg/ml	Oral solution	"	"

ANNEX 10. TOXICOLOGY SAMPLE TYPES



(Appendix 7.0)
TOXICOLOGY-Types of samples 2004



ANNEX 11. LIST OF SOPs PREPARED BY PHYSICOCHEMICAL DIVISION

Serial Number	SOP FOR
1	Analytical Balance (AVERY BERKL)
2	Dissolution Tester (PHARMATEST)
3	Flame Photometer (JENWAY)
4	Melting Point Apparatus (STUART)
5	Drying oven with forced ventilation (JOUAN EU)
6	Polarimeter (POLAX-L, ATAGO)
7	Solvent Recycling (BCÜHI)
8	Top Plan Balance
9	Vacuum Oven (EV 50)
10	Accurate Inflation System
11	Electrical Hole Tester
12	Tensile Tester
13	Water Leakage Tester
14	Digital Thickness Gauge
15	Ruler for Width Determination
16	Package Integrity Tester
17	Aging Oven (TERMAKS)
18	Determination of Lubricant Quantity
19	Color Fastness Determination Box
20	Determination of Length (MANDREL)

ANNEX 12. GUIDELINES FOR PHARMACEUTICAL AND TOXICOLOGICAL ANALYSIS IN THE LABORATORY

Background

In Ethiopia, the quality control of drugs and other related products is vested in DACA. The department of DACA responsible for the laboratory quality control activities is DQCTL.

DQCTL has four divisions with the following functions—

- Physicochemical Division—undertakes the physical and chemical analysis of pharmaceutical and related products including medical devices
- Microbiology Division—handles all products requiring microbiological analysis and evaluation. The Division does sterility and pyrogen tests
- Toxicology Division—performs acute toxicity and skin sensitivity tests
- Pesticide Division—is responsible for the analysis and evaluation of pesticide samples submitted to the Laboratory

Objectives

The objectives for the guidelines are—

- To provide information on the operations and services of DQCTL to the clients of the laboratory and the general public
- To serve as a brief to the staff of the laboratory

Clients of the Laboratory

Clients of the laboratory consist mainly of the following:

- Drug Registration and Evaluation Department of DACA.
- Drug Inspection and Abuse Prevention Department of DACA.
- Central Laboratory for the Federal Police
- Manufacturers of pharmaceutical and allied products (such as cosmetics) and the wholesalers and retailers of those products. These identified groups shall channel their requests through DACA.
- State-owned agricultural institutions.
- Any other group of persons or institutions that may be approved by DACA.

Receipt and Handling of Samples

Samples submitted to the laboratory for analysis should be adequate for the analytical procedures, and sufficient amount of the sample for future investigations .

The consultant also recommends that the original containers of samples submitted should not interfere with the integrity of the samples. Toxicological samples will need special precautions to prevent cross contamination, deterioration, or accidental hazardous effect on handlers.

All samples from DACA or any of the identified institutions shall be accompanied by completed Sample Form.

The samples, as submitted by the client, should have proper labels including the following—

- The name of the product (generic name-INN-if available).
- Name of the manufacturer.
- Date of manufacture.
- Expiry date.
- Quantity of unit dosage forms or unit entities per package and number of packages submitted.
- Batch number or any other identification number indicated on the sample.

The sample receiving officer shall give the laboratory registration number to be inscribed on the sample as prescribed. The data on the sample are documented in the sample registration book.

Sample Storage

Samples submitted for analysis shall be kept as indicated on the labels of the samples or as dictated by the nature of the samples. Appropriate storage facilities at requisite temperature and humidity shall be maintained in the laboratory. For registration samples, at least two-thirds of the samples submitted shall be kept for retesting in the future. One-third of the reserved samples shall be kept at least three years after their expiry dates. All other samples may be kept one year after their expiry dates.

Sample Distribution

The sample registration officer distributes the samples to the respective heads or supervisors of divisions. The samples are accompanied by Distribution Forms.

Analysis of Samples

Samples submitted for analysis should be subjected to initial discussion on the properties of the samples with their accompanying directives from DACA or any other approved institution.

Product specifications indicated in pharmacopoeal monographs should be considered as the minimum standards by which the products are examined.

The laboratory should develop in-house validated methods for products that are regularly handled in the laboratory.

All equipment used in analysis should be regularly subjected to routine maintenance and calibration as indicated their respective SOPs. The maintenance and calibration activities should be recorded in the log books of the equipment.

All the laboratory results should be recorded in the analyst workbook and critical readings countersigned by another analyst. When a sample is analyzed by more than one analyst, the analysts shall append their signatures to portions in the workbook or worksheet where they were responsible for the analysis. A laboratory analytical certificate is completed by the analyst and then submitted for checking by the head of division or the supervisor. The certificate is finally approved by the Head of Department and despatched to DACA or the appropriate requesting agent or institution.

Induction Training of Newly Employed Analysts

Training of newly employed analysts shall be in conformity with the SOP for training and shall include the introduction to the use of instruments for analysis, and the various SOPs in the laboratory.

Analytical Techniques

Balances and Weighing

Extremely sensitive apparatus

Results - Depend on precise measuring performance and location

2% RSD on all-over experimental work

Calibration and Verification of Analytical Balances

Once a year - Specialized people

Weekly or daily verification - Record in logbook

Record keeping – Very important

Weights: 3 calibrated

 Range of balance

 Range that is used

 Uncertainty is allowed

Environment

One door to weighing room - Not a passage

Distant from windows, fans, air conditioners, strong turbulence - Convection currents

Keep from direct sunlight and other interfering lights

Prevent it from uneven warming up

Constant temperature: Drift on display

Humidity: 45–60%

Lighting: Distant - Thermal radiation - recommend fluorescent

Weighing Table

Not transmit oscillations and vibrations

Have no deflection when worked on

Made of antimagnetic materials

Protected against static charges

Fastening is not recommended

Do not use for storage of heavy objects

Do not cover with plastic, glass, or metal plates

Selecting of Balance

Know the amount of sample needed and the precision needed

Samples 5 g - Top-load balance

Samples 100 mg – 5 g - Analytical balance

Samples 10 – 100 mg - Semi-micro balance

Balance Operation

Level apparatus - Levelling feet - Spirit level

Turn on 60 minutes before use - Warming up and eliminate 0-point shifting if possible - leave switched on all the time

Self-test will end with readout of 0.000 g

If not, tare the instrument for 0-adjustment

Weighing boats and sample at room temperature: surface layer of moisture

Clean: Dust and other particles

No plastic containers: Static electricity - Container as small as possible - Not going over edge of pan

Humidity < 30–40% do not use glass containers

Hygroscopic substances: dried, limit time while weighing and keep in dessicator

Tare before weighing: Display indicating exactly 0

Use tweezers or tongs for container

Proceed as quickly as possible

Limit time of door opened

Open to place tare container on pan

Position object in middle of pan - Prevent charge-distribution error

Close chamber immediately

Read results when reading has stabilized

After weighing, remove container

Cover weighed sample

Sample away from airflow currents

Do not lean or press on surrounding surfaces

A predetermined mass is seldom weighed (for example, 0.5000 g) because it takes too long.
Instead an approximate mass (about 0.5 g) is weighed accurately (for example, 0.5012 g)

Guidelines When Weighing

General rules for weighing—

Never handle objects to be weighed with the fingers. Use clean paper, tongs or forceps.
Weigh objects at room temperature to avoid air convection currents.
Close balance doors before taking final readings. Air currents will cause balance to be unsteady.
Place weighing boat in the center of the pan

Solids that readily lose or gain weight—

Tare a covered weighing bottle.
Remove cover. Weigh sample.
Place cover back and record sample weight.

Liquid samples (Chamber opening on top)—

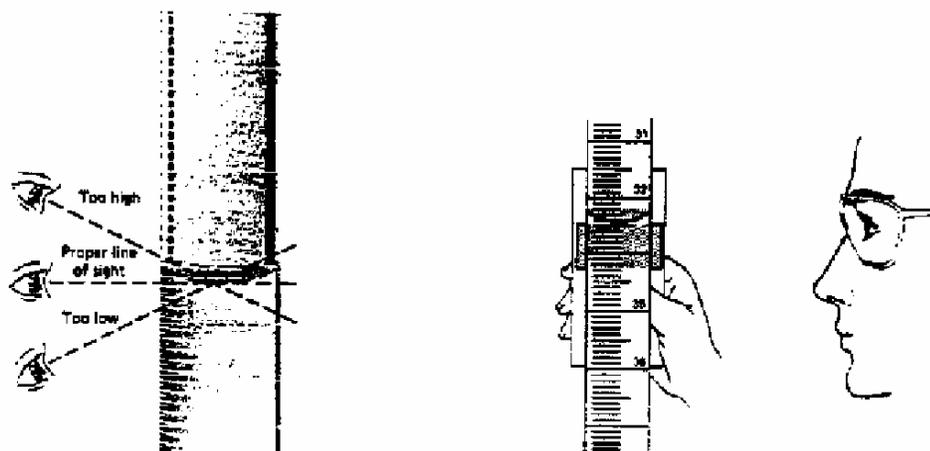
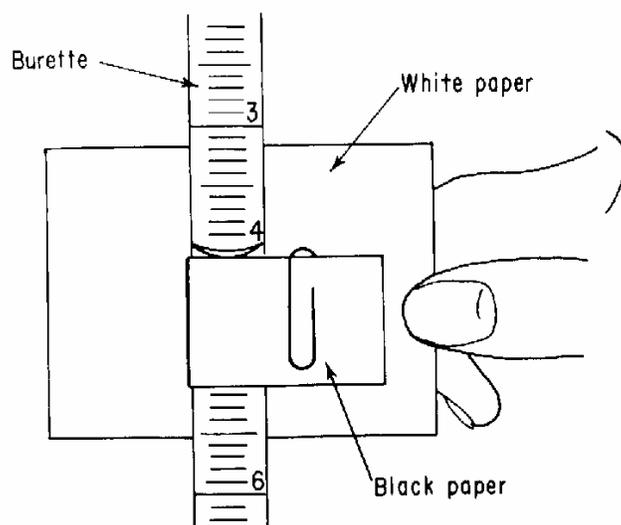
Place excess quantity of liquid in container.
Tare sample, and transfer sample to balance pan.
Negative reading - absolute amount weighed
Add trapping solvent (25% of vessel's volume).
Multicomponent standards - successive taring
Suspensions/syrups - Mass/ml - Picometer
Hint: 20 drops \pm 1ml

Care

Use brush to remove solids.
Clean with soft, dry cloth.
If necessary, clean with diethyl ether.
Close doors after use.
Do not weigh substances that give off corrosive fumes.

Glassware and Volumes

The Meniscus



Note that when reading the meniscus, the eye must be held horizontally with the calibration mark to avoid the error of parallax.

The position of the eye is very important: if the eye is above the meniscus (too high), the volume will be too small. If the eye is underneath the meniscus (too low), the volume will be too great.

Pipettes and Pipetting

Handling of the Pipette

Pipettes should be clean.

Keep the tip of the pipette below the surface of the solution.

Use pipette controller to suck in the volume ± 10 mm above the ring mark

Wipe off the pipette on the outside with clean lab paper.

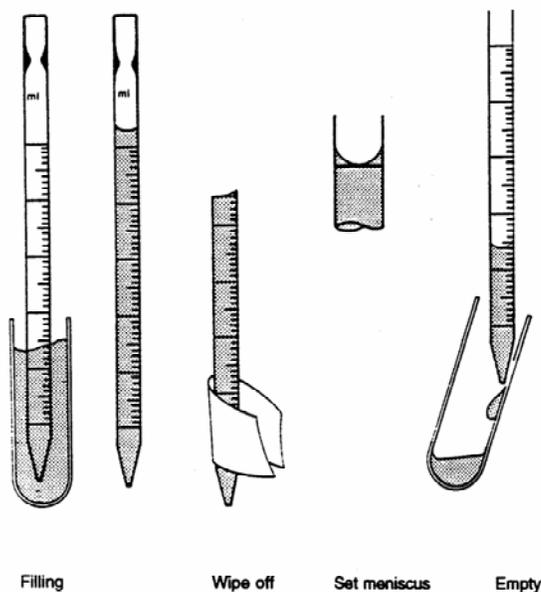
Hold pipette vertical at eye level and set meniscus to ring mark by slowly discharging excess volume.

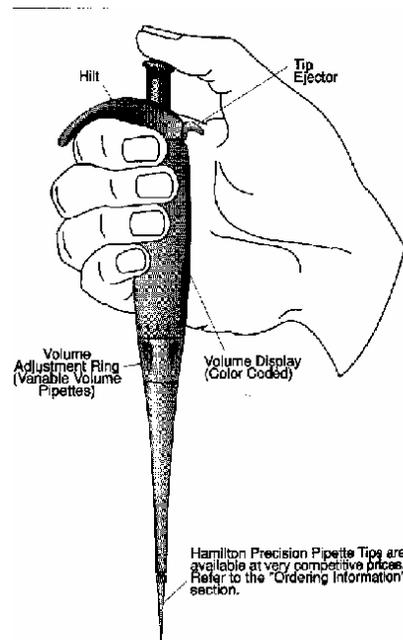
Move the pipette to the flask you want to transfer the liquid to and allow the pipette to drain completely (15–20 seconds).

Remove excess liquid by touching the wall of the flask with the capillary tip.

Important: Do not blow out the pipette.

Micropipettes





Operation

1. Press a disposable tip firmly onto the pipette's lower body assembly.
2. Depress the plunger button to the first stop. Slowly release plunger to aspirate sample.
3. Withdraw tip from sample, touching-off on container side.
4. To dispense, place tip against wall of receiving vessel and depress plunger button to first stop. Pause and depress the second (blow out) stop.
5. Eject tip.

How to set the volume correctly:

1
0
0

100 μ l

0
7
5

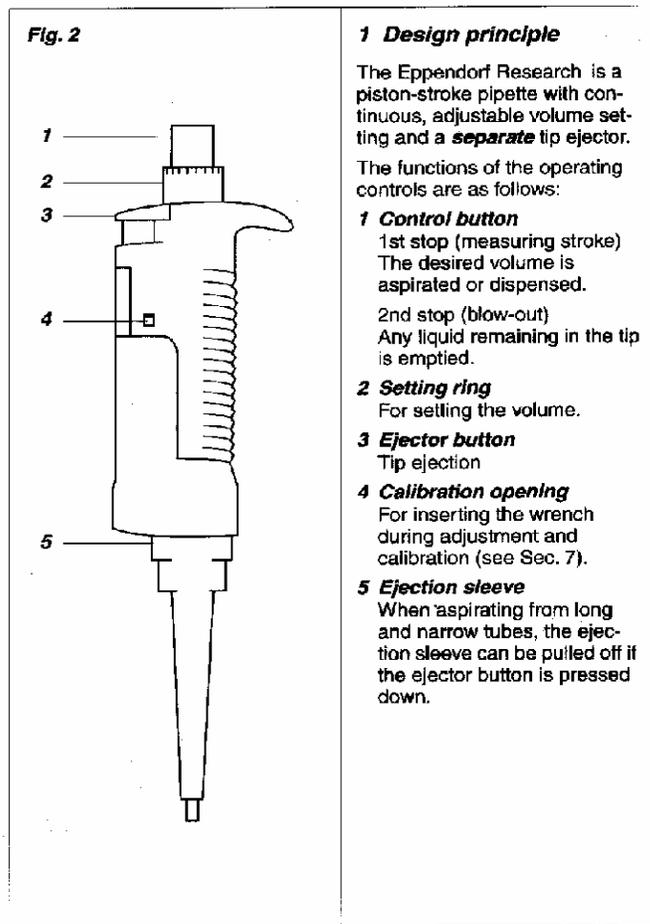
75 μ l

1
0
0
0

1,000
 μ l

0
5
0
0

500 μ l



Handling of Samples

Getting Your Samples Dissolved

Use ultrasonic bath, shaker, heating, or stirring devices.
 Look up solubility in reference works, COA's, MSDS, literature.
 Experiment with different solvents.

Ultrasonic bath:

- Should be filled with water up to two-thirds.
- No hands in the bath while the instrument is turned on.
- Ultrasonic sound will not damage your hearing.

Shaker/mixer:

- This apparatus has different types of settings you can use in the process of dissolving your substance (for example, revolutions per minute, timer).
- Do not forget about mechanical stress.

Filtering

Filtration removes particles from a liquid by passing it through a permeable material such as a membrane filter. The type of membrane filter specified should suit the application and testing procedures as well as the performance and retention qualities required. Membrane filters are used primarily in analytical procedures for filtration. Filtration is the removal of particles from the liquid or gas where the filtrate will be used or analyzed.

To choose the proper type of membrane filter, you must consider the following—

- Determine the particle size to be filtered. Membrane filters are rated according to pore size and will retain all particles equal to, and larger than, their designated pore size.
- Asses the chemical compatibility of the membrane filter with the liquid or gas to be filtered. When using a filter or filter device, you must consider the chemical resistance properties of all parts that come in contact with the fluid.

Other important factors to consider are—

- A hydrophilic or hydrophobic membrane for aqueous solutions or air and gases, respectively
- Temperature of the liquid or gas being filtered
- Desired flow rate
- Desired throughput

Filtration and HPLC (Waters catalogue: Chromatography columns and supplies)

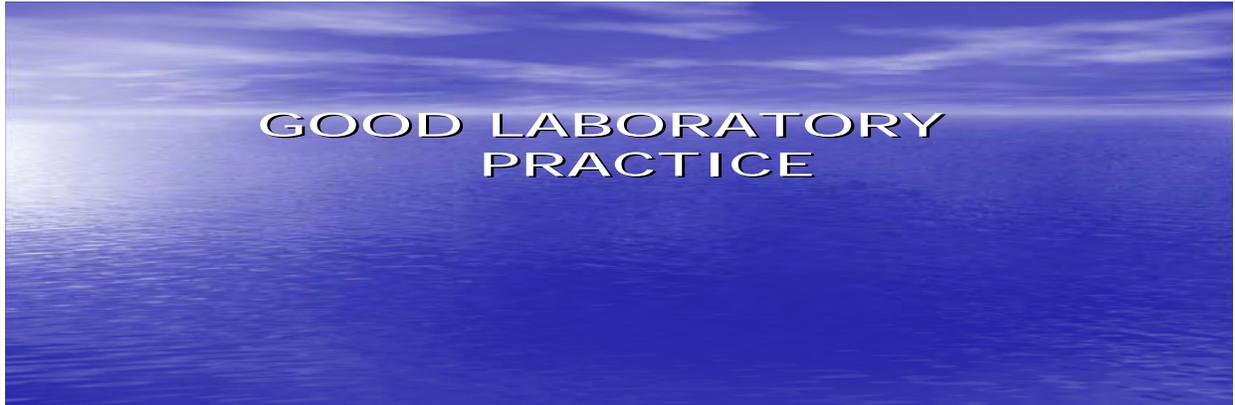
Filtration of HPLC samples and solvents is a preventive maintenance procedure that saves your chromatography laboratory time and money. Filtration provides immediate protection for the components of your HPLC instrumentation by prolonging column life, minimizing down time, and improving both the precision and accuracy of your data. Filtering samples and mobile phase before use decreases downtime by eliminating sample or solvent particles that may contribute to—

- Erratic pressure fluctuations
- Noisy baselines
- Damage to pump pistons and seals, injector valves and plugged injector needles
- Noise in the detector
- Decreased column life time

Membrane choices

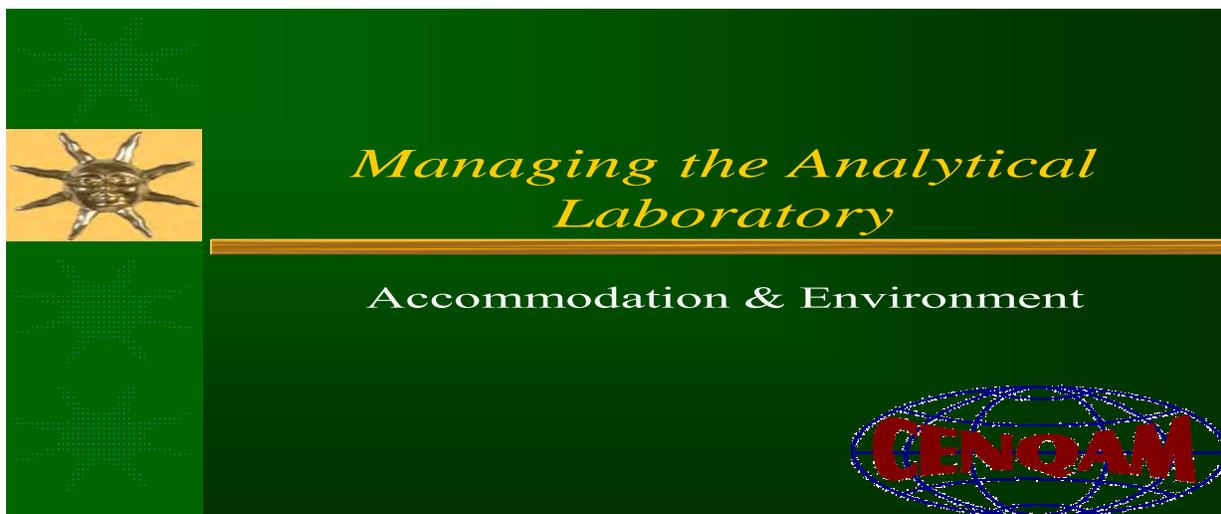
Membrane type—The first step in selecting a filter is to choose a membrane that is chemically compatible with the sample. For aqueous samples it is preferable to use a hydrophilic membrane versus a hydrophobic membrane. With proteinaceous samples, a low protein-binding filter is preferable to hydrophilic filters.

Pore sizes—The filter pore size is usually a personal preference of the operator, but it relates to the column packing material. Since there are many different packing materials, a general guideline is that most people find that the 0.45 μ m filter meets their requirements.



<ul style="list-style-type: none"> • Laboratory policy <ul style="list-style-type: none"> - Quality system 	<ul style="list-style-type: none"> • Good infrastructure <ul style="list-style-type: none"> - Reasonable working space - Efficient service lines <ul style="list-style-type: none"> * Water * Electricity * Air, gas, and other - Ambient control of temperature and humidity 	<ul style="list-style-type: none"> • Resources <ul style="list-style-type: none"> Personnel Qualified and experienced Continuous educational program Good personal hygiene Commitment Good mindset
<ul style="list-style-type: none"> • Equipment <ul style="list-style-type: none"> - Adequate supply - Requirement of <ul style="list-style-type: none"> * First-stage laboratory * Second-stage laboratory * Reference laboratory - Calibration and maintenance schedule 	<ul style="list-style-type: none"> • Laboratory operations <ul style="list-style-type: none"> a. Standard operation manuals b. Reference standard books and monographs c. Methods development <ul style="list-style-type: none"> * Validation of methods d. Calibration and maintenance schemes e. Sampling and receipt of samples - Good storage practice for reference substances and test material f. Documentation <ul style="list-style-type: none"> - Analytical record sheets, log books on Equipment. g. Good environmental control practice <ul style="list-style-type: none"> - Disposal of liquid and gaseous effluents - Disposal of solid wastes—microbiological and animal wastes. - SOPs - Analytical certificate of analysis - Good storage of all analytical records 	

<ul style="list-style-type: none">• Laboratory safety* Appointment of safety committee with a leader* Availability of safety gadgets<ul style="list-style-type: none">- Fire fighting- Handling of poisonousGases and liquids<ul style="list-style-type: none">- Flammables- Emergency exits- Fire drills	<ul style="list-style-type: none">• Networking<ul style="list-style-type: none">- With local and international drug control authorities- Positive contacts with drug manufacturers- Active contact with other medical practitioners and academicians	<ul style="list-style-type: none">• Economics of good laboratory practice<ul style="list-style-type: none">- Evaluate the cost of all materials and services used in analysis- Select the cost effective methods
---	--	---



Credit to Center for Quality Assurance of Medicines)

Managing the Analytical Laboratory

<p><i>Accommodation & Environment</i></p> <ul style="list-style-type: none"> • Introduction • Environment • Work Areas • Laboratory Layout • Design Guidelines • Safety & Housekeeping 	<p><i>Introduction</i></p> <ul style="list-style-type: none"> • Influence test results and analysts • Adequate and Suitable • Control • Safety • Housekeeping 	<p><i>Environment</i></p> <ul style="list-style-type: none"> • Physical Environment • Invalidation of Results • Environmental Conditions • Documented
<p><i>Work Areas</i></p> <ul style="list-style-type: none"> • Separation of incompatible areas • Access Control • Housekeeping • Enough space 	<p><i>Design Guidelines - 1</i></p> <ul style="list-style-type: none"> • Fire Marshall/Building Contractor • Doors • View Panel • Partitions • Fire Extinguisher • Emergency Lighting • Aisles 	<p><i>Design Guidelines – 2</i></p> <ul style="list-style-type: none"> • Fume Hoods • Gas shut off • Safety showers/Eyewashers • Ergonomics • Shelves/Cabinets • Air Vents • Contaminant exhaust

<p><i>Design Guidelines - 3</i></p> <ul style="list-style-type: none"> • Negative pressure • Electrical outlets • Signs • Acid corrosive storage • Solvent storage • Flooring • Break areas • Radioactive materials 	<p>LABORATORY SAFETY <i>Why?</i></p> <p>IT IS LAW!!!!</p> <p><i>Issues</i></p> <ul style="list-style-type: none"> • Personnel • Environment • Equipment • Emergency Procedures • Chemicals/Materials 	<p><i>General</i></p> <ul style="list-style-type: none"> • Be Aware <ul style="list-style-type: none"> – Unsafe conditions & actions – Label everything – Protection – Storage of chemicals – Interactions – Signs
<p><i>Personnel</i></p> <ul style="list-style-type: none"> • Personal Protection • Hygiene • Trained • Ethics 	<p><i>Personal Protection (1)</i></p> <ul style="list-style-type: none"> • Eye Protection <ul style="list-style-type: none"> –Type & condition –Glasses –Contact Lenses • Protective Clothing <ul style="list-style-type: none"> –Lab Coat –Aprons 	<p><i>Personal Protection (2)</i></p> <ul style="list-style-type: none"> • Hand Protection • Foot Protection • Hearing Protection • Head Protection • Respiratory Protection
<p><i>Hygiene</i></p> <ul style="list-style-type: none"> • Wash hands • Washing of clothing • Eating/Drinking in lab • Storage of food • Hair/Clothing/Jewelry 	<p><i>Training</i></p> <ul style="list-style-type: none"> • Law • Safety Manual • In House training • First Aid • Fire Drill 	<p><i>Ethics</i></p> <ul style="list-style-type: none"> • NO SMOKING!!!!!! • Mouth Pipette • Keep children/pets out • Be considerate • Don't fool around! • Never work alone
<p><i>Environment</i></p> <ul style="list-style-type: none"> • Housekeeping • Safety Equipment • Waste Disposal • Pollution • Lighting 	<p><i>Housekeeping (1)</i></p> <ul style="list-style-type: none"> • Maintenance • Keep Exits & Aisles Clear • Keep lab clean • Inspect equipment before use • Never leave experiments unattended • Keep floor dry 	<p><i>Housekeeping (2)</i></p> <ul style="list-style-type: none"> • Label equipment • Drains & Traps • Gas cylinders • Electricity • Static Electricity

<p><i>Safety Equipment</i></p> <ul style="list-style-type: none"> • Fume Hoods • Storage Cabinets • Storage Containers • Refrigerators • Eyewash Stations • Safety Showers • First Aid Kits • Fire Safety Equipment • Glove Bag • Megaphone • Spilling Station 	<p><i>Waste Disposal (1)</i></p> <ul style="list-style-type: none"> • Types of waste <ul style="list-style-type: none"> –Broken glass –Chemicals –Gas Cylinders –Batteries –Oil and filters –Fluorescent lamps –Microbiological –Animals –Blood products –Pathological –Sharps 	<p><i>Waste Disposal (2)</i></p> <ul style="list-style-type: none"> • Sanitary • Storm Sewer • Containers <ul style="list-style-type: none"> –Labelled
<p><i>Equipment</i></p> <ul style="list-style-type: none"> • Glassware • Heating Devices • Vacuum Systems • Centrifuges • UV Lamps • Lasers • Separating Funnels • Cooling Baths 	<p><i>Emergency Procedures</i></p> <ul style="list-style-type: none"> • First Aid <ul style="list-style-type: none"> –Wounds –Burns –Ingestion/Inhalation of Chemicals • CPR Training • Handling of Spills • Fire Safety 	<p><i>Chemicals</i></p> <ul style="list-style-type: none"> • Properties <ul style="list-style-type: none"> –Flammability –Corrosivity –Reactivity –Toxicity –Incompatibilities –Oxidizers
<p><i>Materials</i></p> <ul style="list-style-type: none"> • Carcinogens • Mutagens & Teratogens • Biohazards & Infectious Waste • Radioactive Materials & Radiation-producing equipment • Compressed Gases • Cryogenic Materials • Asbestos-containing Materials 		