National Immunization Program

Effective Vaccine Management Training

Standard Operating Procedure

2015

Participants Handbook

Nepal Government
Ministry of Health Department of Health Services
Child Health Division, Logistics Management Division and National Health Training Center
Teku Kathmandu
2072

Foreword

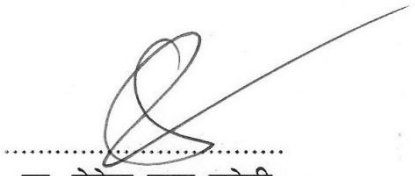
Immunization Service in Nepal was started in year 2035 B.S in the name of expanded programme on Immunization after elimination of epidemic smallpox. Currently immunization services has played a vital role in reducing morbidity rate, disability rate and mortality rate of both mother and children. On one hand maintaining the quality of immunization services is challenging work for us while at the other hand providing immunization services to hundred percent targeted children is also necessary. Likewise, there is necessity of completing the technical process in stepwise manner from vaccine production period to the consumer while receiving the services.

Only after completing the basic standards of Effective Vaccine Management quality of immunization service provided by us can be assured. Every child has right to receive quality immunization services.

The standard operating procedure was prepared with the objective to correctly implement the standards of Effective Vaccine Management at central, regional, district levelup to immunization center and to enhance the quality of cold chain management while providing services as well as to train the health workers.Context book and handbook distributed during training to all level staff involved in vaccine management will help them in completing work after t training. This book is useful for those who wish to gain knowledge and information on effective vaccine management. I am hopeful that all the workers involved in vaccine management from central level vaccine store to immunization center will implement their respective work according to this handbook and contribute in providing quality immunization services. The standard of standard operating procedure by world health organization was translated in Nepali language for the development of training package to provide training to health worker.

I heartily thank WHO, UNICEF and Lifeline Nepal for their great support in preparing this guide for the leadership of Department of health service, Child Health Division, Logistics Management Division and national training center.

Especially, my sincere gratitude goes to UNICEF for its technical and financial support for this work.



डा. सेनेन्द्र राज उप्रेती
महानिर्देशक
स्वास्थ्य सेवा विभाग

Acknowledgement

It is well recognized that how health service was delivered or made available effectively in ratio with investment among the general public in Second Long term health Plan(1997AD to 2017 BS). Nepal Health Sector Implementation Plan (NHSP – IP 2004-2009) was prepared by Ministry of health and Population Government of Nepal based on SLTHP and has reduced the morbidity and mortality rate.

Immunization Service in Nepal was started in year 2035 B.S in the name of expanded programme on Immunization after elimination of epidemic smallpox. Currently immunization serviceshas played a vital role in reducing the morbidity and mortality rate in maternal and child health.

Training Package (Trainer's Guide and Participant handbook) was developed on the basis of Standard Operating Procedure. The objective of this manual is to provide training to related staff and to provide services in strengthening coldchain management. contextually this curriculum was developed as first publication for EVM strengthening and simplification.

We would like to extend our deepest appericationto WHO, UNICEF and Lifeline Nepal for their guidance and concerned supervision as well as for providing necessary informations in preparation of this book with regular coordination of Health Division and apporipriate leadership of Logistics Management Division. All sincere thanks goes to Chief of Immunization Section:Mr. Mukund Raj Gautam, Cold chain Vaccine distribution section of LMD Coordinator:Mr. Bade Babu Thapa, EPI Supervisor Officer: Om Prasad Upadhyaya, National Health Training Centre Public Oficer:Mr. Bijaya Kranti Shakya and Life Line CEO: Mr. Sushil Karki and all those individuals who continuously supported us.

Finally, very thankful to Dr. Jagat Narayan Giri, WHO, Mr. Shiva Subedi/UNICEF as well as Mr. Udev Maharjan from Lifeline Nepal for their great support in preparing this guide and hopefully a high standard of Effective Vaccine Management will be implemented.

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डा. भिम सिंह तिंकरी	अच्यूत लामिछाने	डा. कृष्ण प्रसाद पौडेल
निर्देशक	निर्देशक	निर्देशक
आपूर्ति व्यवस्था महाशाखा	राष्ट्रिय स्वास्थ्य तालीम केन्द्र	बाल स्वास्थ्य महाशाखा

Publication/History

This SOP manual is prepared in a view to make it more familier and simple among the participants.

It gives detail informations of the role and responsibility of the central, regional and district level representatives and divisions.

SOP amended by WHO in 2011 AD was translated from English to Nepali and the main subject under it were kept in English.

Annex and Checklist are made available in footnote for English reader for their convimience . Likewise; SOP related indicator, symbol and picture are transtlated in Nepali so that theme remains the same.

This manual can be revised and amended if any new technology is adapted for new vaccines and coldchain equipments according to the time, country's need and policies.

People Involved in Standard Operating Procedure

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People involment in development of Training Package for SOP

1. Mukund Raj Gautam, Chief, Immunisation Section, Coordinator
2. Bade Babu Thapa, Chief, Coldchain and Vacceine management, Member
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5. Shiva Subedi, UNICEF, Member
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Dr. Yashvardhan Pradhan, Former Director General, Department of Health Service and Immunisation Specialist, Lifeline Nepal

Content

Introduction and Overview Of Participants Handbook

Introduction:

After the eradication of Small Pox, the Expanded Program on ImmunizationinNepalstarted in 1979 (2035 B.C.). Immunization reduces maternal and child morbidity, mortality and disability occurring from vaccine preventable diseases. There is no doubt that we should continue to give vaccination services in effective way and maintain quality to make the programme more productive and successful.On one hand, it is necessary to vaccinate 100% targeted children while at the other hand quality of vaccine need to be maintained from the site of manufacture to the site of administration to the children.

We should follow the basic criteria of the effective vaccine management to ensure the quality in vaccination.Quality vaccine service is the right of every child.The Effective Vaccine Management initiative provides materials and tools needed in central, regional, district level to monitor and assess Cold Chain Management and helps to improve their supply chain performance through Standard Operating Procedure.

Who needs this participants handbook?

Based on the Standard Operating Procedure this participant handbook is developedfor store keepers and cold chain assistant of District Health/Public Health Office, responsible staff working in Regional Medical Store and Central Store for Vacccine Management to use in their work place.

It focuses and strengthens the knowledge, skills and attitudes of central, regional and district level vaccine storage personnels.

Why do you need this handbook?

Participant handbookis designed for the responsible personnels of central, regional or district level or Chief of Health facilties to utilize knowledge and skills of vaccine storage management.

If above mentioned work activity is done within scheduled time then the adequate quality vaccine and materials are supplied that givesprogressive result on the health of mother and child of Nepal.

How do you use this handbook?

The participant handbook of Effective Vaccine Management is based on the major component of quality management for the systematic and effective vaccine service. Every child deserves the quality immunization services.This book helps to implement basic procedures of EffectiveVaccine Management at central level, regional level and district level appropriately, making quality management of coldchain and providingeffective immunization services. Read this bookcarefully, adapt it and finally apply in vaccine storage.

Each chapter of this book describes the correct procedures in vaccine storing management effectively.

- The detailed standards and policies needed to deliver the overall objective of Effective Vaccine Management.
- Specific overall tasks that have to be routinely performed in Effective Vaccine Management.
- Detailed instructions describing how to carry out these tasks with examples.

Overview of Chapters in this Handbook

Participants handbook is divided into 23 parts that intend to provide detailed guidance on procedure for:

- Clearing vaccines and other products through customs
- Vaccine Arrival Procedure
- Products Arrival Procedure
- Correct storage temperatures for vaccines and diluents at fixed locations
- Monitoring vaccine storage temperatures at fixed storage locations
- Checking the accuracy of temperature monitoring devices
- Vaccinestorage and water packs in cold rooms and freezer rooms
- Safe working in cold rooms and freezer rooms
- Looking after store buildings
- Looking after cold rooms and freezer rooms
- Looking after standby generators
- Looking after voltage regulators
- Managing diluents in the supply chain
- Conducting a physical count
- Safe disposal of expired or damaged vaccine and diluents
- Storing vaccine and water/cool packs in refrigerators and freezers
- Loading and operating refrigerated vehicles
- Monitoring temperature exposure during vaccine transport
- Packing vaccine and diluents for transport, using cold boxes
- Using Vaccine Vial Monitors
- When and how to conduct the Shake Test
- Conditioning froze icepacks
- Storing goods in the dry stores.

Course Design

Introduction:

After the eradication of Small Pox, the Expanded Program on ImmunizationinNepalstarted in 1979 (2035 B.C.). Immunization reduces maternal and child morbidity, mortality and disability occurring from vaccine preventable diseases. There is no doubt that we should continue to give vaccination services in effective way and maintain quality to make the programme more productive and successful.On one hand, it is necessary to vaccinate 100% targeted children while at the other hand quality of vaccine need to be maintained from the site of manufacture to the site of administration to the children.

We should follow the basic criteria of the effective vaccine management to ensure the quality in vaccination. Quality vaccine service is the right of every child. The Effective Vaccine Management initiative provides materials and tools needed in central, regional, district level to monitor and assess Cold Chain Management and helps to improve their supply chain performance through Standard Operating Procedure.

In this contrext, based on Standard Operating Procedure, to provide training to storekeeper and cold chain assistant of district Health/Public Health, those involved in vaccine management from Regional Medical Store as well as all those involved in central vaccine storage and management, this participant handbook is preparedwith the objective to give training to the health workers .

Method/Process of training

This compentency based training is to be conducted on adult learning principles. This training has adopted participatory approach which enables the participants to become competent in knowledge, skills and practice. Participants get opportunities to learn skills through practice/exercise. Trainers observe and support them during practice/exercise with clear instructions, and correct them immediately.Trainers also observe and provide constructive feedback as the participants perform the skills according to the learning guide. To make learning process lively and to ensure active participation, participants will be encouraged to share their past experiences and knowledge and skills that they have. Apporiate and necessary taining resources and materials in the training will be used in a proper and effective manner.

Parts of Training Package

The parts of training package are mentioned below:

Reference Manual: Standard Operating Procedure includes the essential informations needed to the trainers. These materials will be benefitted to trainers, participants or other relevant individuals.

Participant's Hand Book: It can be used at the time of training or in working place. It consists of course syllabus, daily schedule of skilled learning , guideline of exercises, different forms, notebook, participant's form.

Visual materials: Materials used by the trainers to make participant's learning more effective include newsprint, flipchart, meta cards.

Trainer's Guide: This is a framework to the trainers to conduct training. It consists of course syllabus, daily work schedule, trainer's guide, learning, exercise practices, exercise forms, answer sheet of tables, midterm evaluation and answer schedule, objectives of every sessions, procedures and methods of sessions, evaluation process, training evaluation questionnaire.

Evaluation: Training evaluation is a work measure for how much knowledge, skill and attitude is gained by the participants according to the preset objectives. The participants become qualified on the bases of the following points**:**

- **Knowledge-** Score at least 85% in the Mid Term Evaluation training questionnaire.
-
- **Skills-P**erform skills satisfactorily according to learning guide during exercise (observed and assessed by trainers using checklists)
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- **Attitude-**Participant's active participation and involvement in training through observation and verbal commitment to apply the gained knowledge and skills at workarea.

Course Syllabus: This 5 day workshop in central, regional and districts level on the effective vaccine management is to enhance the knowledge, skills and attitudes of responsible personnals. Course syllabus is divided into 28 parts.

- Introductory activitiy
- Introduction and overview of Effective Vaccine Management
- Clearing vaccines and other products through customs
  - Vaccine arrival procedure
  - Products arrival procedure
  - Correct storage temperatures for vaccines and diluents at fixed locations
  - Monitoring vaccine storage temperatures at fixed storage locations
  - Checking the accuracy of tempreture monitoring devices
  - Storing vaccines and water packs in cold rooms and freezer rooms
  - Safe working in cold rooms and freezer rooms
  - Looking after store buildings
  - Looking after cold rooms and freezer rooms
  - Looking after standby generators
  - Looking after voltage generators
  - Managing diluents in the supply chain
  - Conducting a physical count
  - Safe disposal of expired or damaged vaccine and diluents
  - Storing vaccine and water/cool packs in refrigerators and freezers
  - Loading and operating refrigerated vehicles
  - Monitoring temperature exposure during vaccine transport
  - Packing vaccine and dilutes for transport, using cold boxes
  - Using vaccine vial monitors

- When and how to conduct the Shake test
- Conditioning froze icepacks
- Storing goods in the dry stores
- Role and responisibility of persons working in Effective Vaccine Management
- Mid Evaluation Term
- Summary

Course Goal

To provide quality and effective immunization services to the targeted group by following the basic standards of effective vaccine management and to increase the knowledge, skills and attidute of health workers involved in vaccine storage.

Learning Objectives:

By the end of the sessions, the participants will be able to perform following activities:

- Describes the procedures for clearing vaccines and other products through customs.
- How to check an incoming vaccine shipment so as to ensure that the vaccine is in good condition and has been supplied with all relevant paperwork before it is accepted inthe national vaccine supply chain.
- Describes how to check incoming shipments of syringes, safety boxes, refrigerators, cold boxes, vaccine carriers, temperature monitoring devices and non vaccine products so as to ensure that the products are in good condition and have been supplied with all relevant paperwork before they are accepted in the national supply chain.
- States the procedures for monitoring vaccine storage temperatures at fixed storage locations throughout the vaccine supply chain.
- Responsible personnal knows how to operate and interprete the temperature monitoring, carry out periodic temperature reviews, daily temperaturerecords and summarize based on practices.
- Describes and practices how to carry out an accuracy check and what action to take if the device is found to be inaccurate, at least how many times we need to check temperature monitoring devices used in the vaccine stores and refrigerated van.
- Describes the correct procedures of storing vaccines in cold rooms and freezer rooms.
- Sets out the safety rules for protection from any risks using warm clothes by every person who have access to cold rooms or freezer rooms.
- Daily, weekly, monthly, annually and five-yearly tasks needed to ensure that the store building(s) are kept fully operational. It also covers emergency maintenance procedures.

- States how to use vaccine refrigerators, temperature monitoring devices and alarm; and when to perform routine repairing and maintenance and respond to emergency maintenance.

- Describes routine and emergency maintenance of diesel standby generator.

- How to carry out routine check up of the three-phase voltage regulators that are connected to the cold rooms and freezer rooms and also to check whether the single-phase voltage regulators connected to individual vaccine refrigerators and freezers are working or not.

- Describes how diluent stocks should be managed throughout the supply chain to ensure vaccine and diluent stocks matchand health workers are always able to reconstitute freeze-dried vaccine with the correct diluents.

- How to carry out physical stock count and how to reconcile any errors found in the stock records including the vaccines and the diluents making the stock records and running balances accurate and complete.

- To identify expired or damaged vaccines and diluents and separate them from others and correct procedures to be followed to account for the loss of the vaccines and the management and disposal of damaged and expired vaccine safely.

- Describes procedures for storing vaccines in refrigerators and freezer rooms.

- Describe precaution and procedures while loading and unloading refrigerated vechicles, during stops, overnight stops, transmit or any other travel events.

- Procedures for vaccine deliveries in cold boxes and vaccine carriers and to vaccine deliveries sent by refrigerated vehicle and how to read freeze indicators, how to pack them with a vaccine shipment and how to record freeze indicator and VVM status on the Requisition and Issue Voucher form.

- Describes how vaccines should be packed into cold boxes in order to minimize the risk of damage during transport.

- Responsible for handling vaccines at all levels of the supply chain and knows how to read, interpret VVM colour changes and how to act correctly when a colour change is observed.

- Explains when to do the Shake Test and what to do if vaccine has been damaged by freezing.

- Describes how icepack conditioning should be carried out and when conditioned icepacks should be used at the correct temperature throughout the journey,When frozen icepacks are used to line cold boxes or vaccine carriers that contain freeze-sensitive vaccines and knows that they must always be ‘conditioned’ beforehand to minimize the risk of damage to the vaccine.

- Understands the procedures of safe storage of all products within the temperature and humidity levels specified for the product type. Also knows that diluents, syringes and other products with a limited shelf life are located in Earliest-Expiry-First-Out (EEFO) order and expired or damaged products marked for disposal are kept separate from useable stock.

Learning Methods:

- Interactions / Individual presentation
- Group Discussion
- Individual and group work
- Frame game
- Case study
- Demonstration
- Exposer visit in different sites

Learning Materials:

These materials are prepared for the training.

- Reference manual
- Participant's Handbook

Selection Criteria of Participants:

The participants for the training are as follows:

- Regional, sub regional and district level employees involved in vaccine storage.

Resourse person:

- Director, Section Chief, related officers or specialists and regional or district level Chiefs.

Evaluation Methods:

- Mid- Term Questionaire
- Participant's reflection on EVM training form -for participantsto evaluate training.

Training Duration:

- For regional level - 5 days with everyday 3-6 sessions, in total 23 sessions whereas for others training conduct according to training schedule.
- Participants and Trainers:
- Participant: 18-20 each batch
- Trainer: 3 in each batch.

Daily Work Schedule (Central Level)

First Day		Second Day	
Time	**Activity**	**Time**	**Activity**
9:30-10:00	Registration and Opening Session (30 min)	9:30- 10:00	Registration, Review of the previous day (30 min)
10:00-10:45	Introduction Session (45 min)	10:00-10:30	Part 4 - Correct storage temperatures for vaccines and diluents at fixed locations. (30 min)
10:45-11:20	Purpose of the training /Review (35 min)	10:30-12:00	Part 5 - Monitoring vaccine storage temperatures at fixed storage locations (85 min) Tea (10 min)
11:20-11:30	Tea (10 min)	12:00-12:30	Part 6- Checking the accuracy of temperature monitoring devices (35min)
11:30-13:00	Part 1 - Process of separating vaccine with others materials (95min)	12:30-13:00	Refreshment (30 min)
13:00-13:30	Refreshment (30 min)	13:00-14:45	Part 7 - Storing vaccines and water packs in cold rooms and freezer (105 min)
13:30-15:30	Part 2 - Vaccine Arrival procedure (130 min)	14:45-16:15	Part 8 - Safe working in cold rooms and freezers rooms (85min)
15:30-15:45	Tea (10 min)	16:15-16:30	Tea (10 min)
15:45-17:30	Part 3 - Products arrival procedure (110 min)	16:30-17:15	Part 9 - Looking after store buildings (45 min)
17:30-	Facilitator’s review and discussion (15 min)	17:15-	Facilitator’s review and discussion(15 min)

Third Day		Forth Day	
Time	**Activity**	**Time**	**Activity**
9:30-10:00	Registration/ Review of the previous day (30 min)	9:30-10:00	Registration, Review of the previous day (30 min)
10:00-10:45	Part 10 - Looking after cold rooms and freezer rooms(45 min)	10:00-11:30	Part 17 - Loading and operating refrigerated vechicles. (90 min)
10:45-12:30	Part 11 - Looking after stand by generators (100 min) Tea (10min)	11:30-11:45	Tea (15 min)
12:30-13:00	Part 12 - Looking after voltage regulators (30min)	11:45-12:45	Part 18 - Monitoring temperature exposure during vaccine transport (60 min)
13:00-13:30	Refreshment(30 min)	12:45-13:15	Refreshment (30 min)
13:30-14:10	Part 13- Managing diluents in the supply chain (40 min)	13:15-14:30	Part 19 - Packing vaccine and diluents for transport, using cold boxes (75min)
14:10-15:15	Part 14 - Conducting the physical count (65min)	14:30-15:15	Part 20 - Using vaccine vial monitors (45 min)
15:15-16:15	Part 15- Safe disposal of expired or damaged vaccine and diluents (60 min)	15:55-15:30	Tea (15 min)
16:15-16:30	Tea (15 min)	15:30-17:00	Part 21 - When and how to conduct the Shake Test (90min)
16:30-17:30	Part 16 - Storing vaccine and water/cool packs in refrigerators and freezers (60 min)	17:00-	Facilitator’s review and discussion(15 min)
17:30	Facilitator’s review and discussion (15 min)		

Fifth Day	
Time	**Activity**
9:30-10:00	Registration/ Review of the previous day(30 min)
10:00-10:45	Part 22 - Conditioning froze icepacks (45 min)
10:30-11:00	Tea (15 min)
11:00-11:30	Part 23 - Storing goods in the dry stores (30 min)
11:30-12:45	Role and responsibility of persons working in effective vaccine management (45min)
12:45-13:15	Refreshment (30 min)
13:15-14:00	Mid-Term Evaluation Test (45 min)
14:00-14:15	Conclusion of the training (15min)
14:15-14:30	Closing and tea (15 min)
14:30-	Administrative work

Daily Work Schedule (Regional Level)

First Day		Second Day	
Time	**Activity**	**Time**	**Activity**
9:30-10:00	Registration/ Opening session (30 min)	9:30-10:00	Attendence, Review of the previous day (30 min)
10:00-10:45	Introduction (45 min)	10:00-10:45	Part 9 Looking after store buildings (45 min)
11:20-11:30	Tea (10 min)	11:00-11:45	Part 10 Looking after cold rooms and freezer rooms (45 min)
11:30-12:00	Part 4 Correct storage temperatures for vaccines and diluents at fixed locations (30min)	11:45-13:30	Part 11 Looking after stand by generators (100min)
12:00-13:30	Part 5 Monitoring vaccine storage temperatures at fixed storage locations (90 min)	13:30-14:00	Refreshment (30 min)
13:30-14:00	Refreshment (30 min)	14:00-14:30	Part 12 Looking after voltage regulators (30min)
14:00-14:30	Part 6 Checking the accuracy of temperature monitoring devices (30 min)	14:30-15:20	Part 13 Managing diluents in the supply chain (50 min)
14:30-16:15	Part 7 Storing vaccines and water packs in cold rooms and freezer (105 min)	15:20-15:30	Tea (10 min)
16:15-17:00	Part 8 Safe working in cold rooms and freezers rooms (75min)	15:30-16:30	Part 14 Conducting the physical count (60min)
17:00	Review of the day , discussion (15 min)	16:30-	Review of the Day, discussion (15 min)

Third Day		Forth Day	
Time	**Activity**	**Time**	**Activity**
9:30-10:00	Attendence, Review of the previous day (30 min)	9:30-10:00	Attendence/ Review of the previous day (30 min)
10:00-11:00	Part 15 Safe disposal of expired or damaged vaccine and diluents (60 min)	10:00-10:45	Part 21 When and how to conduct the Shake Test (45 min)
11:00-11:10	Tea (10 min)	10:45-11:00	Tea (15 min)
11:15-12:15	Part 16 Storing vaccine and water/cool packs in refrigerators and freezers (60 min)	11:00-11:45	Part 22 Conditioning froze icepacks (45 min)
12:15-13:30	Part 17 Loading and operating refrigerated vechicles. (95 min)	11:45-12:15	Part 23 Storing goods in the dry stores (30 min)
13:30-14:00	Refreshment (30 min)	12:15-13:00	Responsibility of persons working in effective vaccine management (45min)
14:00-15:00	Part 18 Monitoring temperature exposure during vaccine transport (60 min)	13:00-13:30	Refreshment (30 min)
15:00-15:15	Tea (15 min)	13:30-14:15	Mid- term Evaluation Test (45 min)
15:15-16:00	Part 20 Using vaccine vial monitors (45 min)	14:15-14:30	Summary of training (15min)
16:00-17:00	Part 21 When and how to conduct the Shake Test (105min)	14:30-14:45	Closing and tea (15 min)
17:00	Facilitator’s review and discussion (15 min)	14:45-	Administrative work

Daily Work Schedule (District Level)

First Day		Second Day	
Time	**Activity**	**Time**	**Activity**
9:30-10:00	Registration/ Opening session (30 min)	9:30-10:30	Attendence, Review of the previous day (30 min)
10:00-10:45	Self Introduction (45 min)	10:00-10:45	Contd.Safe working in cold rooms and freezer rooms (45min)
10:45-11:20	Introduction of training and flashback review (35 min)	10:45-10:55	Tea (10 min)
11:20-11:30	Tea (10 min)	10:55-11:45	Part 9 Looking after store buildings (45 min)
11:30-12:00	Part 4 Correct storage temperatures for vaccines and diluents at fixed locations (30min)	11:45-12:30	Part 10 Looking after cold rooms and freezer rooms (45 min)
12:00-13:30	Part 5 Monitoring vaccine storage temperatures at fixed storage locations (95 min)	12:30-13:00	Part 11 Looking after stand by generators (30min)
13:30-14:00	Refreshment (30 min)	13:00-13:30	Refreshment (30 min)
14:00-14:30	Part 6 Checking the accuracy of temperature monitoring devices (30 min)	13:30-14:45	Part 11 Looking after stand by generators (45min)
14:30-16:15	Part 7 Storing vaccines and water packs in cold rooms and freezer (105 min)	14:45-15:15	Part 12 Looking after voltage regulators (30 min)
16:15-16:45	Part 8 Safe working in cold rooms and freezers rooms (30 min)	15:15-16:00	Part 13 Managing diluents in the supply chain (45 min)
16.45-17:00	Facilitator's review and discussion (15 min)	16:00-16:10	Tea (10 min)
		16:10-16:55	Part 14 conducting the physical count (45 min)
		16:55-17:00	Facilitator's review and discussion (15 min)

Time	Third Day Activity	Time	Forth Day Activity
9:30-10:00	Attendence, Review of the previous day (30 min)	9:30-10:00	Attendence, Review of the previous day (30 min)
10:00-11:00	Part 15 Safe disposal of expired or damaged vaccine and diluents (60 min)	10:00-10:45	Part 22 Conditioning froze icepacks (45 min)
11:00-11:30	Part 16 Storing vaccine and water/cool packs in refrigerators and freezers (30 min)	10:45-11:15	Part 23 Storing goods in the dry stores (30 min)
11:30-11:45	Tea (15 min)	11:15-11:30	Tea (15 min)
11:45-12:45	Part 18 Monitoring temperature exposure during vaccine transport (60 min)	11:30-12:45	Responsibility of persons working in effective vaccine management (45 min)
12:45-13:15	Refreshment (30 min)	12:45-13:15	Refreshment (30 min)
13:15-14:45	Part 19Packing vaccine and diluents for transport, using cold boxes (80 min)	13:15-14:00	Mid-Term Evaluation Test (45 min)
14:45-15:30	Part 20 Using vaccine vial monitors (45 min)	14:00-14:15	Summary of training (15 min)
15:30-15:45	Tea (15 min)	14:15-14:30	Closing and tea (15 min)
15:45-17:15	Part 21 When and how to conduct the Shake Test (105 min)	14:30-	Administrative work
17:15	Facilitator doing review and discussion of the day (15 min)		

Daily Work Schedule (below district)

First Day		Second Day	
Time	**Activity**	**Time**	**Activity**
9:30-10:00	Registration/ Opening session (30 min)	9:30-10:00	Attendence, Review of the previous day (30 min)
10:00-10:45	Self Introduction (45 min)	10:00-10:45	Part 13 Managing diluents in the supply chain (40 min)
10:45-11:20	Introduction of training and flashback review (35 min)	10:45-11:00	Tea (10 min)
11:20-11:30	Tea (10 min)	11:00-12:00	Part 14 conducting the physical count (60 min)
11:30-12:00	Part 4 Correct storage temperatures for vaccines and diluents at fixed locations (30min)	12:00-13:00	Part 15 Safe disposal of expired or damaged vaccine and diluents (60 min)
12:00-13:30	Part 5 Monitoring vaccine storage temperatures at fixed storage locations (95 min)	13:00-13:30	Refreshment (30 min)
13:30-14:00	Refreshment (30 min)	13:30-14:30	Part 16 Storing vaccine and water/cool packs in refrigerators and freezers (60 min)
14:00-14:30	Part 6 Checking the accuracy of temperature monitoring devices (30 min)	14:30-15:30	Part 18 Monitoring temperature exposure during vaccine transport (60 min)
14:30-16:15	Part 11 Looking after stand by generators (100 min)	15:30-15:45	Tea (10 min)
16:15-16:45	Part 12 Looking after voltage regulators (30 min)	15:45-16:30	Part 22 Conditioning froze icepacks (45 min)
17:00	Facilitator’s review and discussion (15 min)	16:30-	Facilitator’s review and discussion (15 min)

Third Day	
Time	**Activity**
9:30-10:00	Attendence, Review of the previous day (30 min)
10:00-10:30	Part 23 Storing goods in the dry stores (30 min)
10:30-10:45	Tea (15 min)
10:45-11:30	Responsibility of persons working in effective vaccine management (45min)
11:30-12:00	Mid- Term Evaluation Test (45 min)
12:00-12:15	Summary of training (15min)
12:15-13:00	Closing and tea (45 min)
13:00-	Administrative work

Training on EffectiveVaccine Management
Attendance Sheet

Name of Training Centre : …….

Training Date:……. Batch No…….

S.No	Name	Designation	District	Name of the Health Facility	Signature				
					Day 1	Day 2	Day 3	Day 4	Day 5
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

S.No	Name	Designation	District	Name of the Health Facility	Signature				
					Day 1	Day 2	Day 3	Day 4	Day 5
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									

Course Design for Effective Vaccine Management of Standard Operating Procedure

Objectives: By the end of the training participants will be able to apply their learning on Effective Vaccine Management of Standard Operating Procedure in their organization.

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
1	Introduction activity	By the end of the session participants can • Logistics of training • Target, objectives and methods of training • Prepare group norms of training	45 min	• Welcome and introduction • Management of training • Objectives/ target of training • Daily time schedule • Training Methods • Group norms	• Mini lectures • Discussion	Question/ Answer
2	Introduction and review of effective vaccine management of Standard Operating Procedure	By the end of the session participants can describe: • Concept of effective vaccine management training • Major points of effective vaccine management training	35 min	• Short definition of effectivevaccine management programne • Major points of training	• Mini lectures • Discussions	Question/ Answer
3	Part 1: Clearing Vaccines and otherproducts through customs	By the end of the session participants can: • List out the responsible personnel or representative for custom clearance of vaccine and other products. • Describe about the policies and objectives. • Identify and list associated materials and equipments. • Describe the proceduresfor clearing vaccines and other products through customs.	95 min	• Preparatory task for vaccines customs clearance. • Administrative/ product management • Responsibility of vaccine handling personnel. • Custom clearance of syring, safety boxes and other products • Supervision of shipment • Report the problems • Monitoring • Orientation Training	• Mini lectures • Brain • Stroming • Discussions • Presentation •	Question/ Answer List of related materials and equipments

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
4	Part 2: Vaccine arrival procedures	By the end of the session participants will be able to describe how to: • Check advance notice documentation and prepare for the arrival. • Collect vaccine from the Tribhuvan International Airport. • Inspect the shipment. • Stock the shipment. • Report problems. • Follow up action. • Procedures for vaccine purchased from other sources.	130 min	• Check advance notice documentation and prepare for the arrival. • Collect vaccine from the Tribhuvan International • Airport. • Inspect the shipment. • Stock the shipment. • Report problems. • Follow up action. Procedures for vaccine purchased from other sources. • Check advance notice documentation and prepare for the arrival. • Collect vaccine from the Tribhuvan International Airport. • Inspect the shipment. • Stock the shipment. • Follow up actions • Record Keeping •	• Mini lectures • Brain • Stroming • Discussions • Presentation	Question/ Answer
5	Part 3: Products Arrival Procedures	By the end of the session participants will be able to describe: • Responsible personnel to check advance docunmentation and prepare for the arrival, its procedures and methods. • Responsible personnel to collect shipment from the port, its procedures and methods. • Responsible personnel to inspect the shipment, its procedures and methods.	110Min	• Check advance notice documentation and prepare for the arrival • Collect the shipment from • supply agency • Inspect the shipments • Stock and distribute the • shipment	• Mini lectures • Brain Stroming • Discussions •	Question/ Answer

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
		• Responsible individual to stock and distribute the shipment, its procedures and methods.. • Responsible person to report the problems, how to identify the problems, its procedures and methods. • Responsible person to implement the suggestions as well as its procedures and methods. • Procedures for products purchased from other sources. • Procedures for record keeping.		• Report problems • Follow up action Procedure for vaccine purchased from other sources • Check advance notice documentation and prepare for the arrival • collect the shipment from • supply agency • Inspect the shipments • Stock and distribute the Shipment • Report problems • Follow up action • Record keeping •		
6	Part 4: Correct storage temperatures for vaccines and diluents at fixed location	By the end of the session participants will be able to describe • How to store vaccines in vaccine freezer at correct temperature by responsible person and its procedures.	30 min	• Store vaccine in vaccine • freezers • Storing vaccine in emergency • Storing diluents	• Mini lectures • Brain • Stroming • Discussions • Presentation • Exercise	Question/ Answer
7	Part 5: Monitoring vaccine storage temperatures at fixed storage locations.	By the end of the session participants will be able to describe • How to store vaccines in vaccine freezer by responsible person at right temperature and procedures.	95 min	• Level wise temperature monitoring equipments • Where to place temperature • monitoring equipments • Read a dial or stem • thermometer • How to maintain the temperature record charts and reports	• Mini lectures • Brain • Stroming • Discussions • Presentation • Exercise	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
				• What to do if temperatureare out of range? • Daily tasks • Weekly tasks • Monthly tasks • End of the year tasks • Record keeping		
8	Part 6: Checking the accuracy of Temperature monitoringdevices	By the end of the session participants will be able to describe: • How to check theaccuracy of the device and its required equipment and procedures.	35 min	• Calibrated Theromometer • MULTilog • Alcohol stem Theromometer and Bi-metallic dial theromometer • Disposable electronic temperature monitoring devices	• Mini lectures • Brain • Stroming • Discussions • Presentation • Exercise	Question/ Answer Presentation
9	Part 7: Storing vaccines and water packs in cold rooms and freezer rooms	By the end of the session participants will be able to describe: • Responsible person for inspection of safe storage area in cold room racks for vaccine storage, its procedures and methods. • Cold rooms: Responsible person for inspection of the safe storage areas in lower surface of cold rooms, required procedures and methods. • Cold rooms and freezer rooms: Responsible person, required procedures and methods to mark the pallets placed in cold rooms and freezers. • Responsible person, required procedures and methods for storing vaccines in the racks.	105 min	• Generals procedures • Check the cold room racks for safe storage • Cold Room: Check the lower surface of cold room for safe storage • Cold rooms and freezer rooms: Mark the area where pallet is placed in cold room and freezer • Store vaccine in rack • Store vaccine in pallet. • Freezing ice pack and water pack. • Store vaccine in WIC (+2° to +8°C) • Store vaccine in WIF (-15° C to 25°C)	• Mini lectures • Brain • Stroming • Discussions • Presentation • Exercise •	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
		• Responsible person, required procedures and methods for storing vaccines in the pallets. • Responsible person, required procedures and methods for freezing ice packs/ water packs. • Store vaccine in WIC (at +2°C to +8°C) and its procedures. • Store vaccine in WIF (at -15°C to -25°C) and its procedures.				
10	Part 8:Safe working in cold rooms and freezer rooms	By the end of the session participants will be able to describe:: • Daily, weekly tasks. • Basic safety measures and required procedures. • Procedures and methods required for Individual safety.	85 min	• Training • Basic safety measures • Individual safety.	• Mini lectures • Role play • Exercise: Group work • Presentation	Question/ Answer Presentation
11	Part 9:Looking after store building	By the end of the session participants will be able to describe:: • Daily, weekly, monthly and annual tasks of store building. • Procedure for emergencies maintainance of the store building	45 min	• Daily tasks • Weekly tasks • Monthly tasks • Annual tasks • Emergency maintainance •	• Individual exercise • Group review	Question/ Answer Presentation
12	Part 10:Looking after cold rooms and freezer rooms	By the end of the session participants will be able to describe: • Responsiblepersonnell, required procedures and methods for daily, weekly, monthly and annual maintainance of cold rooms and freezer rooms. • Procedures for emergency mantainance.	45min	• Daily tasks • Weekly tasks • Monthly tasks • Annual tasks • Emergency maintainance •	• Mini lectures • Exercise: Group work • Presentation	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
13	Part 11:Looking after standby generators	By the end of the session participants will be able to describe: • Responsible personnel, required procedures and methods for mechanical inspections, routine servicing and emergency repairs of generator in daily, weekly, monthly, and yearly basis. • The procedure to follow the specific guidance for troubleshooting checklists	100 min	• Regular routine • mainantainance/ record-keeping • Weekly inspection • Weekly/ monthly engine inspection • Alternate inspection • Monthly generator room cleaning • After every 125 hours running • After every 250 hours running • After every 500 hours running • Annual tasks • After every 5 year(start from 2014) • Emergency maintainance • Trouble shooting: Electrogard unit • Additional requirement for generator maintainance.	• Mini lectures • Exercise: Individual and group	Question/ Answer
14	Part 12: Looking after voltage stabilizers	By the end of the session participants will be able to describe: • Responsible personnel, required procedures and methods for routine check up of the voltage stabilizer. • How to carry out routine checks on the three phases voltage regulators that are connected to cold rooms and freezer rooms. • How to check whether the single phase voltage regulators connected to individual vaccine refrigerators and freezers are working or not with its procedures and methods. • Troubleshooting of Electrogard units	30 min	• Training Manual • Daily inspection • Three phase voltage regulators for cold rooms and freezer rooms • Single-phase refrigerator and freezer voltage regulators • Troubleshooting voltage stabilizers unit • Additional requirement for voltage stabilizer	• Mini lectures • Exercise: Individual and group	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
15	Part 13:Managing diluents in supply chain	By the end of the session participants will be able to describe: • Procedure and methods for maintaining stock record of diluents received and proper distribution of diluents. • Procedures for correct storage of diluents, at cental, regional levels and health facility level.	40min	• Record the received diluents in the stock records. • Record outgoing diluents in the dispatch records. • Issue diluents correctly. • Pack and transport diluents correctly. • Store diluents correctly at central and regional levels. • Store diluents correctly at health facility level.	• Mini lectures • Exercise: Individual and group	Question/ Answer Presentation
16	Part14: Conducting a physical count	By the end of the session participants will be able to describe: • Procedures and methods for systematic physical stock count. • Regular physical check procedures for plan, prepare and conduct the count.	60 min	• Procedure to count • Plan the count • Prepare for the count • Conduct the count • First count • Second count • Reconciliation • Ancillary supplies count	• Mini lectures • Exercise: Individual and group	Question/ Answer Presentation
17	Part 15:Safe disposal of expired or damaged vaccine and diluents	By the end of the session participants will be able to understand: • Procedure for disposal of expired vaccines and diluents.	60 min	• Expired vaccines and diluents • Central Vaccine store • Management of physically damagedvaccine and diluents. • Heat exposure • Exposure to freezing • Frozen Shake Test Control samples • Final disposal procedures	• Mini lectures • Exercise: Individual and group	Question/ Answer Presentation
18	Part 16:Storing vaccine and water/cool packs in refrigerators	By the end of the session participants will be able to : • Clearly identify and access to Earlist Expiry-First-Out (EEFO) order of vaccines, its procedures and methods	60 min	• General procedures • Storing vaccines and ice packs in ice-lined refrigerator • Storing vaccine and ice packs in top opening refrigerator.	• Mini lectures • Exercise: Individual and group	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
	and freezers	and distribute them accordingly. • How to store freeze-sensitive vaccines in areas where there is no risk of freezing. • Describe the storage procedures that allow cold air to flow freely around the stock. • Separate the labelled vaccine that cannot be used from refrigerator for disposal from remaining stock.		• Storing vaccine and ice packs in front- opening refrigerator • Store vaccine on chest freezer • Freezing and storing ice packs		
19	Part 17:Loading and operating refrigerated vechicles	By the end of the session participants can do: • Preparatory tasks for the refrigerated compartment. • Procedures and methods to pre cool the refrigerated compartment. • Procedures and methods for packing the vaccines and diluents. • Procedures and methods for loading the vehicle at the supplystore. • Procedure to operate the vehicle. • Describe how to unload the vehicle at the receiving store. • Describe procedure during overnight stops. • Review temperature records for each trip.	100 min	• Plan the delivery schedule • Prepare the refrigerated compartment • Pre cool the refrigerated compartment • Packing vaccines and diluents. • Loading the vehicle at the supplying store. • Operating the vehicle • Procedures to unload the vechicle at the reciving store. • Overnight stops • Review temperature records for each trip .	• Mini lectures • Brain Storming • Discussion • Presentation • Exercise	Question/ Answer Presentation
20	Part18: Monitoring temperature exposure	By the end of the session participants will be able to describe: • How to read and manage freeze indicators.	60 min	• Read and manage freeze indicators • Placing freeze indicators in cold box. • Placing freeze indicators in	• Mini lectures • Brain Storming • Discussion	Question/ Answer

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
	during vaccine transport	• Procedures and methods to place freeze indicators in cold box. • How to place freeze indicators in refrigerated vehicles. • How to monitor temperature in refrigerated vehicle. • Arrivals checks and reporting procedures. • Procedures for returning Requisition, Logistics and Issue form, Data Logger and freeze indicator.		refregrated vehicles. • Monitoring temperatures in refrigrated vehicles. • Arrivals checks and reporting procedures. • Returning Requisition, Logistics and Issue form, Data Logger and freeze indicator.	• Presentation • Exercises	Presentation
21	Part 19:Packing vaccine and diluents for transport, using cold boxes	By the end of the session participants can be able to describe: • The preparatory activities of vaccine transport. • How to prepare ice packs, cool water packs and its procedure. • How to manage cold box where icepacks are kept. • Hand hygine and orient its need. • List the name of vaccine that are not damaged by freezing. • Why conditioned ice packs is usedin packing freeze sensitive vaccines? • Procedures for packing diluents.	85 Min	• Preparatory activites • Train temporary workers • Prepare ice packs/cold water packs • Manage ice box where ice packs are kept • Observe hand hygine • Packing vaccines that are not damaged by freezing • Use of conditioned ice packs for packing freeze sensitive vaccines. • Packing diluents	• Mini lectures • Brain Storming • Discussion • Presentation • Exercises	Question/ Answer Presentation
22	Part 20:Using vaccine vial monitors	By the end of the session participants can: • Explain the use of vaccine vial monitors (VVM) • Preparatory procedures for transporting vaccine from store. • Describe procedure required when vaccine are received by lowerlevel store.	45 min	• Use of vaccine vial monitors • Activity when vaccine issued by a store. • Activity when vaccines are received by lower level store • When vaccine are administered.	• Mini lectures • Brain Storming • Discussion • Presentation • Exercises	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
		• Explain the activities to be done at the time of vaccine administered.				
23	Part 21:When and how to conduct the Shake Test	By the end of the session participants can: • Explain when to do Shake Test. • Procedure and methods to do Shake Test.(when and how) • Explain procedures for sampling methodologies. • Explain sampling proceduresof incoming shipments from vaccine supplier. • Explain sampling procedures of vaccine that is already in the supply chain. • Explain activity for disposal of freeze damaged vaccine and frozen control samples.	105 min	• Apply Shake Test • When and how to do Shake Test • Sample methodologies • Sampling incoming shipments from vaccine supplier • Sampling vaccine that is already in the supply chain • Disposal of freeze damaged vaccine and frozen control samples	• Mini lectures • Brain Storming • Discussion • Presentation	Question/ Answer Presentation
24	Part 22: Conditioning froze icepacks	By the end of the session participants will be able to describe: • What conditioned icepacks is? • How to know when an ice pack is conditioned? • When to use conditioned ice packs? • How to condition ice packs.	45 min	• What is conditioned ice pack? • How to know when ice pack is conditioned? • When to use condition icepacks? • How to condition icepacks?	• Mini lectures • Brain Storming • Discussion • Presentation	Question/ Answer Presentation
25	Part 23:Storing goods in the dry	By the end of this session, the participants will be able to describe that: • All the products are safely stored within the temperature and humidity levels specified for the product type. • Diluents, syringes and other products	30 min	• General procedures • Storing diluents, syringes and safety boxes • Storing expired or damaged vaccines, diluents and syringes • Storing electronic devices with	• Mini lectures • Brain Storming • Discussion • Presentation	Question/ Answer Presentation

Session	Topic	Objective	Time	Subject matter	Training methods	Evaluation
		with a limited self life can easily be located and distributed in Earliest-Expiry-First-Out (EEFO) order. • Expired or damaged products marked for disposal are kept separate from usable stock.		non replacable batteries • Storing spare parts, stationary and other items.		
26	Responsibility of persons working in effective vaccine management	By the end of the session participants will be able to: • Identify personnel responisibility according to the post.	45 min	• Introduction • Training activity	• Group game • Question/ • Answer • Questions of Frame Game	Question/ Answer
27	Mid term Evaluation test	By the end of the session participants will be able to • Specify the learning activity. • Develop the knowledge and skills through Participant's hand book and reference manuals.	45 min	• Guidelines for Mid term evaluation test. • Training reflection	• Individual exercise • Group • Review	Question/ Answer Observation
28	Training summary	By the end of the session participants will be able to understand: • Concept of Effective Vaccine Management • Major points of Effective Vaccine Management	15min	• Review of the Effective vaccine management • Objectives of training • Goal of training	• Mini lectures	Question/ Answer
Total time 17820 min /60 = 26.6 hour/6 = 5 day			1780			

CHAPTER I

Introductory Activity

Primary Objective:

By the end of this session, the participants will be able to understand introductory activities.

Enabling Objectives:

At the end of this session the participant can brief on:

- Logistics arrangement of the training.
- Goal, objective and training methodology.
- Prepare Group Norms of training.

CHAPTER II

Introduction and Overview of Effective Vaccine Management

Primary Objective:

By the end of this session, the participants will be able to describe on Effective Vaccine Management along with the content of the training.

Enabling Objectives:

At the end of this session, the participants will be able to describe:

- Concept of Effective Vaccine Management.
- Major points of Effective Vaccine Management.

CHAPTER III

Clearing Vaccines and Other Products Through Customs

Primary Objective:

By the end of this session, the participant will understand the procedures for clearing vaccines and other products through customs.

Enabling Objectives:

At the end of this session, the participant become capable on

- List out responsible personnel or representative for custom clearance.
- Describe about the polices and objectives.
- Identify and list associated materials and equipment.
- Describe the custom clearance procedure for vaccines and other products.

Instruction on Clearing Vaccines and Other Products Through Customs

Activity: Clearing vaccines and other products through customs

Responsibility: Representative of Airways,Civil Aviation Authority, Staff of Cargo agency, Transportation staff , Custom Officer , Security Officer, EPI Supervisor/Officer, Assitant Staff of Logistics Management Divison.

Objective: To avoid the obstacles in Immunization Program for immediate custom clearance of vaccine and other related product.

When? At the time of vaccine arrival

Required materials

- Shipment Airway Bill, Commercial Invoice, Packaging list, Manufacturer's production, Lot release certificate (each photo copy)
- Request letter addressing to custom office for immediate vaccine clearance.
- Request letter addressing to cargo company for immediate vaccine clearance
- Request letter addressing to Civil Aviation Authority for immediate vaccine clearance.
- Request letter addressing to security office for immediate vaccine clearance
- Present stock register
- Batch Card
- Vaccine Arrival Report:VAR
- Product Arrival Report: PAR

Activity	By whom	Procedure and methodology
1.Preparation for clearing vaccine	• Section Chief of Cold chain and Vaccine Distribution • EPI Supervisor/ Officer • Cold Chain Officer • Assistant Staff • Mechnical Engineer • Electronic Engineer, Assistants(Logictic Management Division) • Custom Officer, Civil Aviation Authority • Staff of Airway • Staff of Cargo company • Staffs related with security and Logistics.	a. Receive notice, vaccine production related informations (manufacture date, expiry date, Guideline) a monthbefore receiving product sent by UNICEF along with invoice. b. Register vaccine and its production company in Department of Drugs Administration only if they are not registered. c. Collect products arrived docunments(invoice, airway bills, and flight no.,packing lists, departure and arrival place of plane, date and time(in transit)from Cold chain and vaccine distribution section/Logistics Management Division. d. Prepare the letter addressing to custom office, cargo company, Civil Aviation Authority office for immediate vaccine clearance. e. Inform custom office a day earlier about vaccine arrival.

Activity	Responsibility	Procedure and methodology
2.Administrative/ Product Management	• Section Chief of Civil Aviation • Chief of Cargo, Representative of Airways • Security Officer • Custom Officer • Director of Logistics Management Division • EPI Supervisor/ Officer • Driver • Loader and packer	• Responsible person like EPI Supervisor/officer, driver and supportative staffs of Vaccine Distribution should reach the airport 3 hours early before the vaccine arrive. a. In case of flight delays: Inform Chief of Cold chain and staffs of central vaccine store about flight delays and new flight schedule (departure time and arrival time). b. EPI Supervisor/officer should get delivery order from cargo section. c. Get the entry pass from Civil AviationAuthority. d. EPI Supervisor/ Officer and assistant staffs should get vehicle pass from security. e. After collecting vaccine, load in the refrigerated vehicle and go to the custom office for clearance. f. Submit all the docunments related with vaccines to the custom officer. g. If all the informations are accurate, then a letter of vaccineclearance is received. h. If the docunments and the vaccine detailsdo not match then record in the vaccine arrivalreport and inform to the suppliers. i. Place vaccine to Central Vaccine Store in Teku.
3.For staff who handle vaccine.	Staffs who handle vaccine	a. Airways service that hold the responsibility to deliver the vaccine should inform Tribhuvan International Airport and cargo company a day earlier. b. Vaccine handling staff should ensure the followingpoints : i. First priority should be given to vaccine shipment rather than other product. ii. Be careful while handling vaccines. iii. Vaccines should not be directly.exposed to heat/sunlight c. Cargo handler should carefully keep the vaccines to the nearby corner of the plane. d. Cargo handler should hand over the shipment's docunment to EPI Supervisor/Officer or responsible officer. • Take the refrigerated vehicles to the place where vaccine are placed. e. Logistics Management related loaders and packers should cafefully load the vaccines into the refrigerated van. f. Then, the vaccines and other products in refrigerated vehicle should be taken to Custom Office. g. Custom officer should check the docunments and give approval. h. If the docunments and arrived vaccines do not match with each other,there will br problems in clearance, so t the Logistics Management Division should writea letter to custom office for support. i. After clearing vaccines, drive the vaccines and other products to the Central Store, Teku immediately.

Activity	Responsibility	Procedure and methodology
4.Procedures for clearing syringe, safety box and immunization supplies	• Section Chief • EPI Supervisor/ Officer • Staff of Cold Chain	a. Receive letter in advance a month earlier receiving the product with invoice of other productsincluding packing lists, and products details (manufacture date, expiry date, guidelines). b. Collect the docunments like invoice, airways bills, packing lists and others from cold chain and Vaccine Distribution Section/Logistics Management Division. c. Based on the request of UNICEF,prepare a request letter from Logistics Management Division to the office of Director General for clearing other products. d. Prepare the memo for custom clearance from Director General to Ministry of Health -Planning and International Coordination Division. e. Prepare a letter from Ministry of Health Planning - International Coordination Division to Ministry of Finance for final decision. f. Receive an approval letter from Ministry of Finance to Cold Chain and Vaccine DistributionSection through Logistics Management Division to continue further process. g. Prepare a letter by Ministry of Finance to Custom Office informing about the details of the products to arrive through India border. h. Monitoring with EPI Officer/Cold Chain Officer:Receive letter fromCustom Office and send to the referred clearing agent. i. EPI Officer/Cold Chain Officer should monitor with custom office for quick custom clearance of products according to the approved letter of Ministry of Finance. j. Prepare a seperate delivery order letter written by Director of Logistics Management Division to Cargo Agency. k. Documents related to the products should be sent to CentralStore Teku and Pathalaiya. l. If the products are imported from the third country then, prepare a request letter from Director of Logistics Management Divisionto India custom officefor allowing the entry of the products in Nepal custom office. m. Write a letter to UNICEF Supply Division asking the appopriate day in a week to receive the products.

Activity	Responsibility	Procedure and methodology
5.Clearing products (syringe, safetly box and other immunization related materials) •	• Section Chief	a. Submit theMemorandum Of Understanding(MoU) at the beginning of the year for clearing syringe, safety box and other products with all related docunments from cargo agency to cargo agent. b. Cargo Agent should inform the Custom Office about the arrival of products. c. Cargo Agent should submit all the required letters to Custom Office. d. After clearing products from customs, Cargo Agency should deliver all products to Central Store Teku or Pathalaiya.
6.Monitoring the Shipments	• Section Chief • EPI Supervisor/ officer • Cold chain staffs	• Perform physical count of the products and record them. • Check the physical condition of the products and record them. • Check expiry date of the productsand record. • Check the manufacturer's date.
7.Report the problems	• Section Chief • EPI Supervisor/ officer • Cold chain staffs	a. Inform to the Section Chief/ Logistics Management Division. b. After informing about the problems, monitor the activity with reference to the MoU with Supply Agency.
8.Monitoring	• Section Chief • EPI Supervisor/ officer • Cold chain staff	a. After receiving new vaccines or products update the stock register. b. Plan for the distribution to Regional Medical Stores.
9. Orientation	• Cold chain section • Custom Department • Cargo agency, security • Civil Aviation Authority	a. Regular training should be given by Cold chain Sectionto handlers,loaders/ packers and staffs of custom office about correct procedures for shipment handling and how to look after vaccines. b. Organize trimester meeting among Cold Chain Section, Logistics Management Division, Child Health Division and Civil Aviation Authorityto coordinate training, solve the problems, share the information, etc.

CHAPTER IV

Vaccine Arrival Procedure

Primary Objective:

By the end of this session, the participants will know how to check an incoming vaccine shipment so as to ensure that the vaccine is in good condition and has been supplied with all relevant paperworks before it is accepted into the national vaccine supplychain.

Enabling Objectives:

By the end of this session, the participants willable to describe the following points:

- Check advance notice documentation and prepare for the arrival.
- Collection of vaccine from the Tribhuvan International Airport.
- Inspection of the shipment
- Storethe shipment.
- Report the problems.
- Implementation and follow up suggestions.
- Procedures for vaccine purchased from other sources.

Instruction on Vaccine Arrival Procedure

Activity	Vaccine Arrival procedure
Responsibility	Director (Logistics Management Division), Supply Agent (Production/Supply Organization), Supply Unit of Unicef,Section Chief, EPI Supervisor/Officer/Cold chain Assistant/Officer (Cold Chain and Vaccine Distribution Section), Civil Aviation Authority, Custom Officer(Tribhuvan International Airport), Pharmacy Officers (Department of Drugs Administration), Director/EPI officers (Child Health Division), National Immunization Coordinator (WHO).
Objective	To check an incoming vaccine shipment so as to ensure that the vaccine is in good condition and has been supplied with all relevant paperwork before it is accepted into the national Vaccine Supply chain.
When?	At the time of vaccine arrival

Required materials	• Prepare the copy of docunments required for pre-shipment
	• Shipment Airway Bill
	  • Commercial invoice
	  • Manufacturer's Production and Testing Protocols,Manufacturers' Guarantee,Certificate of insurance
	• Request letter address to Cargo Officer for immediate vaccine clearance by Logistics Management Division.
	• Request letter address to Security office for immediate vaccine clearance by Logistics Management Division
	• Request letter address to Civil Aviation Authority for immediate vaccine clearance by Logistics Management Division
	• Stock register
	• Batch cards
	• Vaccine Arrival Report Form
	• Electronic devices alarm report form
	• Coolant and compliance with shipping indicators
	• VVM or Cold chain card instructional manual
	• Electronic equipments (Q tag, 3M, Spy temp, etc)
	• Product Information sheet (Q tag, 2+, spy tempII, OAMS, 3M Temperature logger Manual)
	• Received form(ma.le pa no. 46)

Activity	By whom	Procedure and methodology
1.Check advance notice documentation and prepare for the arrival	▪ Focal person-Distribution Unit/Unicef ▪ Section Chief ▪ EPI Supervisor/ Officer ▪ Cold Chain and Vaccine Distribution Section	• Inform UNICEF-Distribution Section well in advance about which day in a week are acceptable for scheduling arrivals. a. Within 7 days before the vaccine arrives, you should receive the following documents by email or fax: - Shipping notification from UNICEF's freight forwarding agent - Copy of airway bill (AWB) - Copy of packing list - Copy of invoice - Copy of release certificate - Check these documents and file them in the vaccine arrival report. b. Record the flight arrival details and notify the personnel to collect the vaccine from the airport. c. Inform Custom Office about flight arrival details. d. Confirm readiness to receive vaccines by telephone or email if the airline requires you to do so as a condition of delivery. e. Prepare the alternative options at the time of loadsheding and the staffs during odd hours (transportation service). f. Manage the loader/packer for that day. g. Make arrangements for the refrigerated vehicles from Logistics Management Division to be at the airport in time to collect the vaccine. h. Request Letter to Civil Aviation Authority, Custom Office and Security Office about the collection of vaccine and related informations (Quantity, manufacturing country, schedule of airways)
2.Collect the vaccines from Tribhuvan International Airport	• Chief(Cold Chain and Vaccine Distribution Section) • EPI Supervisor/Officer • Cold Chain Officer • Helper (Cold Chain and Vaccine Distribution Section)	a. Get clearance letter from cargo agency/supplier. b. Present Vaccine arrival notice to cargo section. c. Receive entry pass from Civil Aviation Authority. d. Manage the security process by the EPI Supervisor/ personnel. e. Entry to the remp area to receive vaccine. f. Receive vaccine and load to the refrigerated vehicles- of Logistics Management Division then take the refrigerated vehicles to the Custom Office for vaccine clearance. g. For approval, present all the docunments to the custom office for certification by supply. h. Finish all the procedure of vaccine arrival within 3 hours. i. Immediately unload the vaccines to the center store from refrigerated van/vehicles.

Activity	Responsibility	Procedure and methodology
3.Inspect the shipment	• EPI Officer • Cold chain Officer(Cold chain and Vaccine Distribution Section) • Officers (Department of Drugs Administration) • Custom Officer (Custom Office)	a. Inspect the shipment when it arrives and check for physical damage or missing items. b. Count the numbers of cartons once received by Logistics/supplier. c. Custom Officer should check whether vaccines have arrived as per the shipping documents. d. Open each shipping container in Central Vaccine Store, Teku and stop the electronic shipping indicators (Q-Tag/VCCM/Vax Alert or similar). Mark each container with the unique ID so that you know to which container it belongs. e. Check that the following documents accompany the shipment; - Invoice - Packing list - Release certificate (Note: this is the Lot Release certificate from the NRA in the country of origin) - Vaccine Arrival Report f. Check the status of the electronic shipping indicators. Record the details of any alarms on the Electronic Device in Alarm Report form. You must complete this form for every indicator device which shows an alarm. Make a photocopy or scan of the electronic indicator screen showing the alarm condition(s). g. Record all required details for each vaccine in the shipment on the Vaccine Arrival Report (VAR) form supplied for that vaccine. Note: Do not record details of more than one vaccine type on a VAR. A separate VAR form must be completed for each vaccine – e.g. one for OPV, one for BCG, etc. The VAR must be signed by Chief of Cold Chain and Vaccine Distribution Section andEPI Supervisor/Officer. h. Hand a copy of the VAR, the Electronic Device Alarm Report form and/or the CCM card record to the UNICEF country office within 72 hours of the flight arrival. The country office will forward a copy to UNICEF Supply Division.

Activity	Responsibility	Procedure and methodology
4.Stock the shipment	• Cold Chain Assistant / Officer • EPI Supervisor/Officer	• Prepare the batch card and arrange vaccine according to batch card and lot number. • Vaccine accepted: If no problems are identified and the vaccine is accepted, unpack the shipping containers and place the vaccine in the cold chain (cold room, freezer room, refrigerator or freezer). Place the diluents in the diluent dry store. • Immediately record the arrival in the stock control system (Khata No 52) in hand written and update in the computerized system. • Vaccine rejected: If problems are identified, do not unpack the vaccine until the problem is resolved. Instead, stack the affected shipping container(s) together with the temperature monitoring device(s) on pallets in a designated area of the cold room or freezer room, as appropriate. Clearly mark each container "Do not use". Place any associated diluents in a designated area of the diluent dry store. Clearly mark each container "Do not use". Do not record the arrival in the stock control system. • Fill all related docunments (bills, invoice, etc.

<table>
<tr><th>Activity</th><th>Responsibility</th><th>Procedure and methodology</th></tr>
<tr><td>5.Report problems</td><td>• Chief/EPI Supervisor
• Officer(Cold Chain and Vaccine Distribution Section)</td><td>In case of any discrepancies, contact the Supply/Logistics Division of UNICEF Nepal.
In accordance with the procedure shown below, report the problems identified to the UNICEF country office, UNICEF Supply Division and the Ministry of Health.
Arrival of vaccines and customs clearance.
↓
Inspection at central cold store. Vaccine Arrival Report (VAR) filled and signed.
↓
Copy of VAR (including copy of device screen) sent to UNICEF Country Office
↓
Copy of VAR (including copy of device screen) sent to Child Health Division
↓
Copy of VAR (including copy of device screen) sent to UNICEF Supply Division, Copenhagen (SD)
↓
<table>
<tr><th>INDICATOR</th><th>OK</th><th>DEFECTIVE</th></tr>
<tr><td>Advance notification</td><td>Recorded</td><td>SD to follow-up with forwarder</td></tr>
<tr><td>Vaccine type/expiry date</td><td>Recorded</td><td>SD to follow-up with manufacturer
Eventual report to WHO for further investigation if necessary</td></tr>
<tr><td>Shipping Documents</td><td>Recorded</td><td>SD to follow-up with forwarder or manufacturer
Eventual report to WHO/IVB of problems related to release certificate</td></tr>
<tr><td>Quantities received</td><td>Recorded</td><td>SD to follow-up with forwarder/manufacturer</td></tr>
<tr><td>Status of temperature indicators</td><td>Recorded</td><td>SD to report to WHO, investigation to be carried out</td></tr>
</table></td></tr>
<tr><td>6. Follow-up action</td><td>• Chief(Cold Chain and Vaccine Distribution Division)</td><td>If problems have been reported, carry out follow-up activities as agreed with UNICEF.</td></tr>
</table>

Procedure for vaccine purchased from other sources		
Activity	**By whom**	**Procedure and methodology**
1.Check advance notice documentation and prepare for the arrival	• Director(Logistics Management Division) • Section Chief • EPI Supervisor • Officer (Cold chain and Vaccine Section) • Agent (Cargo agencies)	a. Maintain regular coordination between LogisticsManagement Division and Supply Organization on the basis of MoU. b. Collect informations regarding the vaccines arrival date through Cold Chain and Vaccine Distribution Section and also get informations from the suppliers. c. Receive emails regarding the informations of shipments before a week or 10 days earlier to Cold Chain Section. d. Check whether the following docunments are received or not: • Copy of Airway bills. • Copy of packing lists • Copy invoice • Copy of certificate e. Coordinate properly with Cargo Agent in phone or emails about the vaccine arrival procedures. f. Manage space for storing vaccine and diluents in cold room. g. If supplier requests, EPI supervisor should go to the International Airport at the time of vaccine arrival. h. Collect all the required informations about the shipments and inform to the person collecting the shipment. Example:Alternative solutions at the time of loadsheding and appropriate vehicle facility to the staffs after work.
2.Collect the vaccines from Tribhuvan International Airport	• Chief(Cold Chain and Vaccine Distribution Section) • Cargo Agent(Distributor)	• Get clearance letter from cargo agency/supplier. • Receive entry pass from Civil Aviation Authority. a. Manage the security process by the EPI Supervisor/ personnel. b. Entry to the remp area to receive vaccine. c. Receive vaccine and load to the refrigerated vehicle of Logistics Management then take the refrigerated vehicle to the Custom Office of TIA for vaccine clearance. d. Inform the Cargo section about the vaccine arrival through letter. e. For approval, supplier shouldpresent all the docunments to the custom office for certification. f. Finish all the procedure of vaccine arrival within 3 hours. g. Immediately unload the vaccines to the center store from refrigerated van/vehicles.

Activity	Responsibility	Procedure and methodology
3. Inspect the shipment	• SectionChief • EPI Supervisor • Officer (Cold Chain and Vaccine Distribution Section)	a. Check the following docunments • Invoice • Packing Lists • Certificate • Vaccine Arrival Report • Quantity of container b. Check the vaccines related docunments in Central Vaccine Store • The lable of cartons • Quantity • Expire Date • Lot No, Ice packs and condition of VVM, temperature • Guarantee tests of manufacture • Certification of Origin c. For approval, the docunments must be signed by Section Chiefand EPI Supervisor/Officer. d. The copy of this report, electronic device alarm report, and Vaccine Cold Chain Monitor(CCM) should be submitted to the UNICEF and the supplier company within 3 days.
4. Problems details	• SectionChief • EPI Supervisor • Officer (Cold Chain and Vaccine Distribution Section)	a. Inform to the Section Chief if any problems arise. b. Chief of Cold Chain and Vaccine Distribution should inform to the Directors of Logistics Management Division, WHO,UNICEF, Production company. c. List out the problems with proofs. Examples: Photos, samples, electronic monitoring equipments, bills, transportation docunments etc. d. If any damage occur then claim to the Logistics/suppliers. e. Prepare the report and present to the UNICEF.

Activity	Responsibility	Procedure and methodology
5. Store the shipment	• Cold Chain Assistant/Officer	a. Prepare the batch card and manage the vaccine according to the batch card and lot number. b. Vaccine accepted: If no problems are identified and the vaccine is accepted, unpack the shipping containers and place the vaccine in the cold chain (cold room, freezer room, refrigerator or freezer). Place the diluents in the diluent dry store. Immediately record the arrival in the stock control system. c. Registere the received vaccine(handwritten form ma.le.pa n-52) in stock control and update in the computer. d. Vaccine rejected: If problems are identified, do not unpack the vaccine until the problem is resolved. Instead, stack the affected shipping container(s) together with the temperature monitoring device(s) on pallets in a designated area of the cold room or freezer room, as appropriate. Clearly mark each container "DO NOT USE". Place any associated diluents in a designated area of the diluent dry store. Clearly mark each container "DO NOT USE". Do not record the arrival in the stock control system.
6.Follow up action	• Chief(Cold Chain and Vaccine Distribution Section)	• If problems have been reported, carry out follow-up activities as agreed with UNICEF.
7.Record keeping	• Chief(Cold Chain and Vaccine Distribution Section)	a. File all the report invoice and shipment in Airway bills. b. Register in Received Form(ma.le. pa.46). c. Retain VARs and all correspondence relating to unsatisfactory shipments or procedures for a minimum period of three years.

Annex 1: UNICEF VAR guidelines

2.9 UNICEF Vaccine Arrival Report guidelines for completion

Introduction

The purpose of the Vaccine Arrival Report (VAR) is to contribute to efforts to ensure vaccine security. The VAR is designed to:

- Monitor cold chain conditions during transport;
- Monitor compliance with shipping instructions;
- Ensure adequate record keeping;
- Serve as a basis for documenting claims or initiating corrective action if problems occur.

UNICEF Vaccine Arrival Report guidelines

Vaccine Arrival Report (VAR)

Acitivity:	Vaccine arrival report
Responsibility:	The consignee receiving the vaccines is responsible for the inspection and acceptance of each shipment, and should complete the VAR. In those cases where UNICEF is not the consignee, it is the responsibility of UNICEF Country Offices to assist in the implementation of the VAR.
Objective:	Support for the vaccine safety. • Monitor cold chain conditions during transport; • Monitor compliance with shipping instructions; • Ensure adequate record keeping; • Serve as a basis for documenting claims or initiating corrective action if problems occur.
When to report?	UNICEF Country Offices, UNICEF Supply Division in Copenhagen at the time of vaccine arrival.
Inspect the vaccine arrival	– Assure security of the vaccines at the point of delivery; – Record shipment details; Provide indicators for monitoring vaccine delivery performance.

Activity	When?	Procedure and methodology
1.Inspect the vaccine arrival	Immediately upon the arrival of the vaccine shipment	• Customs clearance; • Inspection of all vaccines, and of all diluent or droppers; • VAR to be completed and signed; • VAR to be sent to UNICEF Country Office within 24 hours of vaccine arrival; • Copy of VAR to be sent to UNICEF Supply Division, Copenhagen by e-mail or fax.
2.Completing the VAR	Immediately upon the arrival of vaccine shipment.	• A separate VAR must be completed for every vaccine shipment. Therefore in the case of split delivery of the same purchase order, a separate VAR must be completed for each delivery. • Due to differences between vaccines in temperature sensitivity and packaging, only one type of vaccine should be recorded on each VAR. • Therefore in the case of combined deliveries, a separate VAR should be completed for each vaccine in the shipment. For deliveries of DTP-HepB+Hib, one VAR should be used for DTP-HepB and another VAR for Hib, again due to differences in temperature sensitivity and packaging. • Diluent and droppers must be detailed on the same VAR as the vaccines with which they have been shipped.

Activity	When?	Procedure and methodology
		• In the event of short shipment (quantity received does not match quantity on packing list) of vaccine, diluents or droppers, where the quantity that was short-shipped is delivered at a later date, separate VARs must be completed for each delivery. • All sections of the VAR must be completed.
3.Heading		• Recipient country; • Date of report • Report number- The report number is for internal record keeping purposes, and should follow the format COUNTRY CODE-YEAR-REPORT NUMBER, e.g. BUR-2003-001 (in the case of Burundi). In the event of short shipment, the report numbers for each delivery should follow the format BUR-2003-001.1, BUR-2003-001.2, etc.; • Place, date and time of inspection • Date and time of entry of vaccines into cold store.
4.Advance notice		• Date on which copies of shipping documents were received by fax or e-mail; • Confirmation of the ementioned fax or e-mail comprised of the pre-advice (cover sheet stating delivery details), air waybill (AWB), invoice and packing list, highlight either YES or NO for each document to indicate whether or not each was received.
5.Shipment details	Immediately upon the arrival of vaccine shipment.	• Number of the purchase orders issued by UNICEF Supply Division -this number is in the format 450xxxxx; • Generic name of vaccine being delivered (not the brand name); • Number of doses per vial- Most vaccines supplied by UNICEF contain either 1, 2, 5, 6, 10, 20 or 50 doses in each vial; • Name of manufacturer of vaccine being delivered.
6.Information regarding the actual quantity of vaccine received:		• Batch numbers; • Quantity of shipping cartons per batch; • Quantity of vials per batch; • Expiry date of each batch; • Total quantity of shipping cartons; • Total quantity of vials; • (In the event of short shipment, also state total quantity of shipping cartons and vials that has not been delivered).

Activity	When?	Procedure and methodology
7.Information regarding the actual quantity of diluent or droppers received:		• Batch numbers; • Quantity of shipping cartons per batch; • Quantity of vials or droppers per batch; • Expiry date of each batch; • Total quantity of shipping cartons; • Total quantity of vials or droppers; • (In the event of short shipment, also state total quantity of shipping cartons and vials/droppers that has not been delivered).

CHAPTER V

Products Arrival Procedure

Primary Objective:

By the end of this session the participants will be able to describe how to check incoming shipments of syringes, safety boxes, refrigerators, cold boxes, vaccine carriers, temperature monitoring devices and non vaccine products so as to ensure that the products are in good condition and have been supplied with all relevant paperworks before they are accepted in the national supply chain.

Enabling Objective:

By the end of the session participants will be able to describe:

- Responsible personnel to check advance documentation and prepare for the arrival, its procedures or process.
- Responsible personnel to collect shipment from the port, its procedures and process.
- Responsible personnel to inspect the shipment with procedures and process.
- Responsible individual to stock and distribute the shipment.
- Responsible Personnel to report the problems, how to identify the problems, its procedures and methods.
- Responbile person to implement the suggestions as well as its procedures and methods.
- Procedures for products purchased from other sources.
- Procedures for record keeping.

Instruction of Products Arrival Procedure

Activity:	Products arrival procedure
Responisibility:	Director(Logistics Management Divison), EPI Supervisor/ Storekeeper (Cold Chain and VaccineSupply centre), Cargo Agent (Suppliers)In the case of shipments received from UNICEF Supply Division, the MoH will be responsible for reporting back to UNICEF Supply Division in Copenhagen via the UNICEF country office. Supply Division will be responsible for record keeping, for follow-up with manufacturers, freight forwarders and WHO, and for providing timely feedback to countries. *Ministry of Health Department of Health Sciences/ Logistics Management Division for products procured from other sources.*
Objectives:	Prepare all the required docunments for the arrival of the vaccine and inspect the condition of the products.
When?	During vaccine arrival.
Required materials:	• Product Arrival Informed letter of Shipment • Copy of Airway Bill • Copy of packing list • Copy of invoice form • Product Arrival form • Leger book • Batch Card • Received form, Logistics details(could be used for example: freeze and damaged like syringe) • MoU with the supplier(date, technical details,unit cost, delivery date, delivery schedule) • Q tag, Freeze tag

Activity	Responsibility	Procedure and methodology
1.Check advance notice documentation and prepare for the arrival	• Section Chief • EPI Supervisor/ Officers • Officer Staffs of Cold Chain (Cold Chain and Vaccine Distribution Section)	**a. Documentation Process** • Receive all the informative documents a month earlier through UNICEF such as invoice, packing list, Manufacture information, manufacture date, expiry date, user manual. • Collect the products arrival documents(invoice, airways, packing lists etc) from Cold chain and Vaccine Distribution Section /Logistics Management Division. • With consent between UNICEF and Logistics Management Division, prepare a letter to Director General Of Central Office. • Then a letter is e sent to the Policy, Planning and International Cooperation Section of Ministry Health for custom clearance. • The letter is forwarded to Economy Ministry for final decision.

Activity	Responsibility	Procedure and methodology
	•	• A letter with acceptance to continue the upcoming process by Ministry of Finance. • Prepare a letter mentioning about the product arrival from India with coordination between Finance Ministry and India Custom Office. EPI Supervisor Officer/Cold Chain Section Officer need to check whether letter received or not and related supplier and agent about the clearance. • Based on a letter with acceptance from Ministry of Finance, EPI Officer /CCA officer should collect information about the process and procedure from Custom Office. • Prepare the delivery order to the related cargo agency by the Director of Logistics Management. • Prepare the documents to Central Vaccine Store Teku/Central Store Pathalaiya if the products arrive from the India: register the income entry and source activity (Logistics Management Division) as must. • If the vaccines and other products are obtained from third country, a request letter written to Government of India from Director of Logistics Management Division for the permission. • Inform UNICEF-SD, Copenhagen well in advance about which days in a week are acceptable for scheduling arrivals. • Between five, and not more than ten days before the shipment arrives, you should receive the following documents by email or fax: • Shipping notification from UNICEF's freight forwarding agent • Copy of airway bill (AWB) • Copy of packing list • Copy of invoice • Check these documents and file them in the product arrival file. • Record the shipment arrival details and notify the personnel to collect the product from the port of entry. • Inform customs of the details. • Suppliers ensure that the Logistics Management is well prepared for transportation, fuels, drivers and loaders at the time of products arrival. • Make arrangements for staffs by the Section Chief to be at the port of entry in time to collect the shipment if necessary.

Activity	Responsibility	Procedure and methodology
2.Collect the shipment from supply agency	• Section Chief • EPI Supervisor Officer (Cold Chain and Vaccine Distribution Section) • Supply Agent (referred cargo agency)	a. Clear dry port and the shipment through customs within 7 days of arrival otherwise custom office will charge fine. b. Transport the products to the Central Vaccine Store, Teku and unload carefully. c. Collect received products from custom officeand store in central Store , Pathalaiya.
3.Inspect the Shipments	• Section Chief, Referred person(Cold Chain and Vaccine Distribution Section) • Logistics Management Division/Central Store, • Chief-Central Store Pathalaiya.	a. Check and monitor the physical damage and absence of products in Logistics Management Division or Central Store Pathalaiya. b. Check that the following documents accompany the shipment; • Invoice • Packing list • Copy of certificate(s) of conformity (if required) . • Products as per the details received. • Reconciliation of the products mentioned in bills. • Count of Cartons and boxes c. Syringes: Check the lot numbers, expiry dates and/or manufacturing dates and confirm that they comply with the order requirements. Also check if the syringes are wet or not. d. Safety boxes: Check a sample of the products to confirm that they comply with the order requirements. e. Single use electronic devices: This category includes freeze indicators and 30-day refrigerator temperature loggers. Check the lot numbers, expiry dates and/or manufacturing dates and confirm that they comply with the order requirements. f. Refrigerators and freezers: Considering the WHO/UNICEF Specification, check that the model numbers comply with the order requirements and that all loose components such as vaccine baskets and spare parts have been supplied.

Activity	Responsibility	Procedure and methodology
		g. Cold boxes and vaccine carriers: Considering the WHO/UNICEF Specification and request letter,check that the model numbers comply with the order requirements and that the correct number and type(s) of water packs has also been supplied. h. Record all required details for each product in the shipment on the Product Arrival Report (PAR) form (see Annex 1 and Annex 2). Note: Do not record details of more than one product type on the arrival report. A separate PAR form must be completed for each product type in the shipment – e.g. one for syringes, one for safety boxes, one for refrigerators, etc. The arrival report must be signed by Director of Cold Chain or Vaccine Supply and EPI Supervisor/Office .Two people should sign the form – the person who did the inspection and the Store Manager or EPI Manager . i. Hand a copy of the PAR to the UNICEF country office within 72 hours of the arrival at the store. The country office will forward a copy to UNICEF Supply Division.
4.Stock and Distribute the Shipment	• Section Chief • Cold Chain Officer(LogisticsManagement Division)	a. Shipment accepted: If no problems are identified and the product(s) are accepted, transport them to the correct store or warehouse. o Record all related docunments(invoice, bills, letters etc) o Physical count of the products. o Stock the products in the Central Store/Logistics Management Division and Central Store Pathalaiya and register the details in the ledger. o Separate syringe boxes and safety boxes. b. Syringes: Record the arrival in the stock control system, including manufacturer's name, lot number(s) and expiry date(s). Stock and distribute in Earliest-Expiry-First-Out (EEFO) order to prevent expiry in stock.

Activity	Responsibility	Procedure and methodology
	•	c. Safety boxes: Record the arrival in the stock control system, including manufacturer's name and capacity. Stock and distribute in First-in-First-Out (FIFO) order to ensure stock rotation. d. Single use electronic devices: Record the arrival in the stock control system, including manufacturer's name, lot number, expiry date and/or production date. Stock and distribute in Earliest-Expiry-First-Out (EEFO) order to prevent premature battery failure in stock or in use. e. Refrigerators and freezers: Record the arrival in the stock control system, including manufacturer's name, model and serial number. At the same time, record the required product details in the national cold chain equipment inventory. If a unique labelling system is used in the country, fix ID tags to each product before distribution. f. Cold boxes and vaccine carriers: Record the arrival in the stock control system, including manufacturer's name, model and serial number. At the same time, record the required product details in the national cold chain equipment inventory. If a unique labelling system is used in the country, fix ID tags to each product before distribution. g. Shipment rejected: If problems are identified, stack the unopened shipment on pallets or shelves in a designated area. Clearly mark the shipment "DO NOT USE". h. Documentation: Details information should be submitted to Director of Logistics Management Division/Child health, UNICEF and WHO. i. Distribution: Implementation of the plan to register the Issue Form in Central Medical Store. (ma.le.pa.fa51)
5.Report Problems	• Section Chief (Cold Chain and Vaccine Distribution Section) • Referred by Section Chief	a. Present and report all the docunments to Director of Logistics Management Division done by Biomedical engineers, Mechanical engineers and Cold chain specialists with proofs(photos, samples). Cold Chain Section should also secure the proofs. b. Separate damaged /unused materials. c. Send the syringe for quality check in Government laboratory. The quality decreaction should be immediately informed to suppliers for replacement. d. Report the problems identified to the UNICEF country office, UNICEF Supply Division and the Ministry of Health.

Activity	Responsibility	Procedure and methodology
6.Follow up action	• Section Chief • Cold Chain Officer • Store Keeper	a. Follow up action should be led by Director of Child Health and Logistics Management Division of plan of materials supply and needs. b. Check the ledger of the store by Cold Chain and Vaccine Distribution Division/Logistics Management Division. c. Register and enter the details in the form (Ma. Lee.pa .fa no. 46) by Storekeeperof Central Store,Teku and Pathalaiya and should be checked by Director with signature. d. If problems have been reported, carry out follow-up activities as agreed with UNICEF.

Procedures for purchasing other immunization supplies through other source

Activity	Responsibility	Procedure and methodology
1.Check advance notice documentation and prepare for the arrival	• Director of Logistics Management Division • Section Chief • Chief of Cold Chain and Vaccine Distribution Section • EPI Supervisor/Officers,/ Logistics Management Division • Chief (Central Store – Pathalaiya • Supply agent (referred by cargo agency)	a. A week before the shipment arrives, you should receive the following documents by email or fax: • Shipping notification from freight forwarding agent • Copy of airway bill (AWB) • Copy of packing list • Copy of invoice b. Check these documents and file them in the product arrival file. c. Record the shipment arrival details and notify the personnel who will collect the product from the port of entry. d. Send the docunments related with incoming products through India to Pathalaiya Store Centre and entry it and register the income activity. e. Make arrangements for the inspection at the port by Cold Chain Director to collect the shipment.
2.Collect the shipment from supply agency)	• SectionChief • EPI Supervisor (Cold chain and Vaccine Section) • Supply Agent (referred by cargo agency)	a. Clear the shipment through customs within 7 days of arrival otherwise custom office will charge fine. b. Transport the products to the Central Vaccine Store, Teku and unload carefully. c. Collectreceived products from custom office and store in Central Store, Pathalaiya.

Activity	Responsibility	Procedure and methodology
3.Inspect the Shipments	• Section Chief Referred person (Cold Chain and Vaccine Distribution Section) • Logistics Management Division/Central Store, • Chief-Central Store Pathalaiya.	a. Check and monitor the physical damage and absence of products in Logistics Management Division or Central Store Pathalaiya. b. Check that the following documents accompany the shipment; • Invoice • Packing list • Copy of certificate(s) of conformity (if required) • Products as per details provided • Count of Cartons and boxes • Approval of the products mentioned in bills. • Approval of price in mentioned bills. • Copy of Approval certificate (if necessary). c. Syringes: Check the lot numbers, expiry dates and/or manufacturing dates and confirm that they comply with the order requirements. Also check if syringes are wet or not. d. Safety boxes: Check a sample of the products to confirm that they comply with the order requirements. e. Single use electronic devices: This category includes freeze indicators and 30-day refrigerator temperature loggers. Check the lot numbers, expiry dates and/or manufacturing dates and confirm that they comply with the order requirements. f. Refrigerators and freezers: Considering WHO and UNICEF specification, check that the model numbers comply with the order requirements and that all loose components such as vaccine baskets and spare parts have been supplied. g. Cold boxes and vaccine carriers: Considering WHO and UNICEF specification and request letter, check that the model numbers comply with the order requirements and that the correct number and type(s) of water packs has also been supplied. h. Record all required details for each product in the shipment on the Product Arrival Report (PAR) form (see Annex 1 and Annex 2). Note: Do not record details of more than one product type on the arrival report. A separate PAR form must be completed for each product type in the shipment – e.g. one for syringes, one for safety boxes, one for refrigerators, etc. The arrival report must be signed by Director of Cold Chain or Immune Supply and Immune Supervisor/Office .Two people should sign the form – the person who did the inspection and the Store Manager or EPI Manager . i. Hand a copy of the PAR to the UNICEF country office within 72 hours of the arrival at the store. The country office will forward a copy to UNICEF Supply Division.

Activity	Responsibility	Procedure and methodology
4.Stock and Distribute the Shipment)	• Section Chief • Cold Chain Officer(LogisticsManagement Division)	a. Shipment accepted: If no problems are identified and the product(s) are accepted, transport them to the correct store or warehouse. • Record all related docunments(invoice, bills, letters etc) • Physical count of the products. • Stock the products in the Central Store/Logistics Management Division and Central Store Pathalaiya and register the details in the ledger. • Separate syringe boxes and safety boxes. b. Syringes: Record the arrival in the stock control system, including manufacturer's name, lot number(s) and expiry date(s). Stock and distribute in Earliest-Expiry-First-Out (EEFO) order to prevent expiry in stock. c. Safety boxes: Record the arrival in the stock control system, including manufacturer's name and capacity. Stock and distribute in First-in-First-Out (FIFO) order to ensure stock rotation. d. Single use electronic devices: Record the arrival in the stock control system, including manufacturer's name, lot number, expiry date and/or production date as shown below. Stock and distribute in Earliest-Expiry-First-Out (EEFO) order to prevent premature battery failure in stock or in use. e. Refrigerators and freezers: Record the arrival in the stock control system, including manufacturer's name, model and serial number. At the same time, record the required product details in the national cold chain equipment inventory. If a unique labelling system is used in the country, fix ID tags to each product before distribution. f. Cold boxes and vaccine carriers: Record the arrival in the stock control system, including manufacturer's name, model and serial number. At the same time, record the required product details in the national cold chain equipment inventory. If a unique labelling system is used in the country, fix ID tags to each product before onward distribution. g. Shipment rejected: If problems are identified, stack the unopened shipment on pallets or shelves in a designated area. Clearly mark the shipment "DO NOT USE". h. Documentation Details information should be submitted to Director of Logistics Management Division/Child health division, UNICEF and WHO. i. Distribution: Implementation of the plan to register the Issue Form in Central Medical Store.(ma.le.pa.fa 51)

Activity	Responsibility	Procedure and methodology
5.Report Problems	• Section Chief(Cold Chain and Vaccine Distribution Section) • Referred by section Chief	a. Present and report all the docunments to Logistics Management Division done by Biomedical engineers, Mechanical engineers and Cold chain specialists with proofs(photos, samples). Cold chain Section should also secure the proofs. b. Separate damaged /unused materials. c. Send the syringe for quality check in Government laboratory. The quality decrease should be immediately informed to suppliers for replacement. d. Report the problems identified to the UNICEF country office, UNICEF Supply Division and the Ministry of Health.
6.Follow up action	• Section Chief • Cold Chain Officer • Store Keeper	a. Follow up action should be led by Director of Child Health and Logistics Management Division of plan of materials supply and needs. b. Check the ledger of the store by Cold Chain and Vaccine Distribution Section/Logistics Management Division. c. Register and enter the details inthe form (Ma.Le.Pa. 46) by Storekeeperof Central Store Teku and Pathalaiya and should be checked by Director with signature. d. Information letter should be submitted to the Logistics Management Division by Section chief. e. If problems have been reported, carry out follow-up activities as agreed with main supplier.
7.Record Keeping	Store keeper	• Retain PARs and all correspondence relating to unsatisfactory shipments or procedures for a minimum period of 3 years.

Annex 1: PAR form

RETURN TO (agency) COUNTRY OFFICE FOR FORWARDING TO (supplying agency)

PRODUCT ARRIVAL REPORT (PAR)

COUNTRY			
REPORT No		Date of report	

Place of inspection	Date and time	Name of store and date and time product entered into store

PART I - ADVANCE NOTICE

Date received by fax/ email	Pre-advice	Copy Airway Bill (AWB) or Bill of Lading (BOL)	Copy of Invoice	Copy of Packing List
	Yes ☐No ☐	**Yes ☐No ☐**	**Yes ☐No ☐**	**Yes ☐No ☐**

Other documents requested (give description)		**Yes ☐No ☐**

PART II - ARRIVAL DETAILS

AWB number or BOL number	Airport/ sea port or border crossing of destination	Flight No Vessel or Vehicle No	ETA as per notification		Actual time of arrival	
			Day	Time	Day	Time

NAME OF CLEARING AGENT: _____

ON BEHALF OF: _____

PART III - DETAILS OF SHIPMENT

Procurement agency	Purchase Order No.	Consignee	Product description	Manufacturer	Country

Product details			
Lot or model number	Number of boxes	Number of items	Expiry date or manufacturing date (as applicable)

(Please continue overleaf if necessary)

Was quantity received as per shipping notification?	Yes ☐ No ☐
If not, were details of short-shipment provided prior to product arrival?	Yes ☐ No ☐

PART IV - DOCUMENTS ACCOMPANYING THE SHIPMENT

Copy of invoice	Copy of packing list	Copy of Certificate of Conformity (where required)	Other (specify)
Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐ N/A ☐	Yes ☐ No ☐

PART V - GENERAL CONDITION OF SHIPMENT

What was the condition of boxes on arrival?	
Were necessary labels attached to shipping boxes?	
Other comments:	

PART VI - NAME AND SIGNATURE

_____ _____ _____ _____

Authorized Inspection Supervisor DATE Primary Store or EPI Manager DATE

CHAPTER VI

Correct storage temperatures for vaccines and diluents at fixed locations

Primary Objective:

By the end of this session, the participants will understand the products kept in the Vaccine Distribution chain and state the temperatures at which they should be stored at fixed sites.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- How to store vaccines in vaccine freezer at correct temperature by responsible personnel and its procedures.

Instruction of Correct storage temperatures for vaccines and diluents at fixed locations

Acitivity:	Procedure for correct storage temperatures for vaccines and diluents at fixed location
Responsibility:	Chief of Cold Chain and Vaccine Distribution , Cold Chain Officers/Assistant or Health workers
Objective:	List the products kept in the Vaccine Distribution chain and state the temperatures at which they should be stored at fixed sites.
When?	During storage time
Required materials:	Non- fridge, Refrigerator Temperature Monitoring Equipments, Thermometer, Digital theromometer, Model prepared for training Mid level Manager.

Activity	By whom	Vaccine and diluents	Procedure and methodology
1. Store vaccine in vaccine freezer	▪ Central vaccine store ▪ Regional vaccine store	▪ O.P.V	Store at -15°C to -25°C in freezer rooms or vaccine freezers
	▪ Central Store ▪ Regional medical store ▪ District vaccine store ▪ Sub store level ▪ Health facility (Health post/ Sub-health post)	• B.C.G • M.R • D.P.T, Heb B Hib • T.T/T.D • J.E • P.C.V • I.P.V • Rota	Store at +2°C to +8°C in cold rooms or vaccine refrigerators
	▪ Central vaccine store ▪ Regional medical store	• Polio • O.P.V • B.C.G • Measeal	Store at regional and central vaccine store
2.Storing vaccines in emergency	▪ Assistant of Cold Chain Assistant/Officers ▪ Health workers	• O.P.V • All lyophilized vaccines	If the freezer room or a vaccine freezer breaks down, OPV and all the lyophilized vaccines can safely be stored temporarily at +2°C to +8°C. All other vaccines must only be stored at +2°C to +8°C – they must not be frozen.
3. Storing diluents	▪ Assistant of Cold Chain Assistant/Officers ▪ Health workers	▪ All diluents	Except at health facility level, all diluents should be stored at room temperature unless they are packed with the vaccine. Diluents must never be frozen. In health facilities, All diluents must be stored at +2°C to +8°C.

Annex 1 – WHO recommended storage temperatures

<table>
<tr><th rowspan="3">Vaccine</th><th rowspan="2">Primary</th><th colspan="2">Regional Medical Store</th><th rowspan="2">Health Facility</th><th rowspan="2">Health Post</th></tr>
<tr><th>Regional</th><th>District</th></tr>
<tr><td colspan="3">Maximum storage period</td><td colspan="2">Maximum storage period</td></tr>
<tr><td>6-12 months</td><td>3 months</td><td>1 month</td><td>1 month</td><td>According to session plan</td></tr>
<tr><td>OPV</td><td colspan="2">Store at -15°C to -25°C
OPV is the only vaccine that can safely be frozen and unfrozen repeatedly</td><td colspan="3">Store at +2°C to +8°C</td></tr>
<tr><td>BCG
Hib lyophilized
JE
Measles
Meningitis
MMR
MR
Yellow Fever</td><td colspan="2" rowspan="8">Store these lyophilized vaccines at +2°C to +8°C. Under exceptional circumstances they can be temporarily stored at -15°C to -25°C (e.g. if there is a temporary shortage of storage space. Never freeze diluent.</td><td colspan="3" rowspan="8">Store at +2°C to +8°C
DO NOT FREEZE</td></tr>
<tr><td>Cholera
DT/TT/Td
DTP
DTP-HepB
DTP-HepB+Hib
DTP-HepB-Hib
DTP-Hib
Hepatitis B
Hib liquid
HPV
Influenza
IPV
Pneumoccocal
Rabies
Rotavirus</td></tr>
<tr><td colspan="6">Diluent: If diluent is included in the vaccine packaging, store it between +2°C and +8°C. However, if diluent is supplied separately, it can be stored outside the cold chain but must be cooled before use, preferably for a day or for a period of time sufficient to ensure that the vaccine and diluent are both at temperatures between +2°C and +8°C when they are reconstituted. Never freeze diluent.
Note that diluent/adjuvant for some pandemic influenza vaccines must be stored in the cold chain.</td></tr>
</table>

Source: WHO/IVB/08.01: *Training for mid-level managers: Module 1 - Cold chain, vaccines and safe-injection equipment management.* Updated in April 2011 by WHO/IVB/QSS to include additional vaccines.

CHAPTER VII

Monitoring vaccine storage Temperatures at fixed storage locations

Primary Objective:

By the end of this session, the participants will understand the responsibility of the individual to apply in the workplace, how to operate and interpret the temperature monitoring device and keep daily temperature records to carry out periodic temperature reviews.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- How to store vaccines in vaccine freezer at correct temperature by responsible person and its procedures.

Instruction for Monitoring vaccine storage Temperatures at fixed storage locations

Activity: Procedure for monitoring vaccine storage temperature

Responsibility: Cold chain Assistant /Section officer, MechnicalEngineer,Referigerator Technician, EPI Supervisor/Officer, Cold Chain Section Chief,all storekeepers and health workers who are responsible for monitoring and recording temperatures in the cold chain equipment at fixed storage locations throughout the Vaccine Distribution chain.

Objective:

a. To verify whether the storage temperature is within the acceptable temperature ranges of +2°C to +8°C in cold rooms and vaccine refrigerators and - 15°C to -25°C in the freezer room and freezers.

b. To detect temperature alarm conditions[1] which may have caused vaccine damage and to take appropriate action.

c. To assess the performance over time of vaccine handling at each link of the cold chain and to monitor the performance of cold chain device.

When? Daily, weekly and monthly temperature monitoring in the supply chain

Required materials: Daily entry Log form of WIC and WIF**,** Chart or temperature schedule of electronic monitoring equipments

1. **Level of cold chain device**	**Temperature monitoring devices**	
	Recommended devices	**Minimum requirement**
Freezer rooms in Central and Regional stores	• External digital thermometer or gas/vapour pressure dial thermometer • Electronic continuous temperature monitoring system • Temperature alarm system with auto-dialer	• External digital thermometer • Pen recording thermometer • Alcohol stem thermometer
Cold rooms in Central and Regional stores	• External digital thermometer or gas/vapour pressure dial thermometer • Electronic continuous temperature monitoring system • Temperature alarm system with auto-dialer	• External digital thermometer or gas/vapour pressure dial thermometer • Alcohol stem thermometer • Pen recording thermometer • Temperature alarm system
Vaccine freezer in Central and Regional stores	• Electronic continuous temperature monitoring system • Temperature alarm system with auto-dialer	• External digital thermometer • **Alcohol stem thermometer

[1] WHO pre-qualified electronic temperature monitoring devices for refrigerators and cold rooms have the following standard alarm settings:
- Low alarm setting: Exposure to -0.5°C or below for 60 minutes.
- High alarm setting: Exposure to a +8°C or above for 10 hours.

1. **Level of cold chain device**	**Temperature monitoring devices**	
	Recommended devices	**Minimum requirement**
Vaccine refrigerator in central and regional vaccine stores	• Electronic continuous temperature monitoring system • Temperature alarm system with auto-dialer • Electronic freeze indicators	• **Alcohol stem thermometer • External digital thermometer
Vaccine freezer in districts	• **Alcohol stem thermometer • 30-day electronic refrigerator temperature logger	• **Alcohol stem thermometer
Vaccine refrigerator in sub centres and health facility	• **Alcohol stem thermometer • 30-day electronic refrigerator temperature logger	• **Alcohol stem thermometer

** Bi-metallic dial thermometers are not recommended because they quickly loose their calibration.

Activity	**By whom?**	**What?**	**Procedure and methodology**
2.Where to place temperature monitoring devices	▪ Mechnical Engineer ▪ Cold Chain Assistant/Officer, ▪ EPISupervisor/Officer	▪ Freezer room	• The sensor for the dial or digital thermometer and the sensor for the continuous temperature monitoring equipment are fixed by the cold room installer and should not be moved.
		▪ Cold rooms	• The sensor for the dial or digital thermometer and the sensors for the continuous temperature monitoring equipment are fixed by the cold room installer and should not be moved.A minimum of four electronic freeze indicators (FreezeTag®, FreezeAlert® or similar) should be placed on the cold room shelves in front of the vaccine in places where the lowest temperatures are found. Try to cover the positions where temperatures are consistently lower than the average reading shown by the continuous temperature monitoring device. Use an electronic thermometer to find the coldest places in the room where vaccine is stored.
		• In a typical cold room up to 40m³:	• Place one device on the shelf which is closest to the evaporator air stream from each of the refrigeration units. • Place two more devices on the shelves in the centre of the cold room, one on the middle shelf and one on the bottom shelf. • Use additional devices in cold rooms larger than 40m³.
		▪ Vaccine freezers	Place the alcohol thermometer/ thermometer on top of the vaccine where is can easily be read.

Activity	By whom?	What?	Procedure and methodology
		▪ Vaccine referigerators	Place the temperature monitoring devices (30-day refrigerator temperature logger, sensors for computerized temperature monitoring systems, thermometer and freeze indicator) on top of the vaccine where the devices can easily be read.
3.How to read a dial or stem thermometer	Cold chain assistant/ officer		When you read the temperature on a dial or stem thermometer you must look at the device with your eyes at right angles to the instrument. If you read the instrument at an acute angle, the temperature you observe on the scale will be incorrect by ±1°C.
4.How to maintain the temperature record charts and reports	Cold chain Assistant/ Officer		Ensure that every freezer room, cold room, vaccine freezer and vaccine refrigerator has a current chart on which temperature readings can be recorded twice daily. File the charts and replace them with a new one every week.Annex 1 shows a monthly recording chart. Annex 2 shows a monthly temperature review reporting form.

5.What to do if temperatures (plus) are out of range?

5.1. By whom:Cold Chain Assistant/officer, Refrigerator Technician

5.2. At what?: Cold room and vaccine refrigerators

Temperature	Situation	Action
a.Temperature between +2°C and +8°C	Normal	No action necessary.
b.Temperature between 0°C and +2°C	Monitor the situation carefully.	If the temperature has NOT returned to between +2°C and +8°C by the time of the next inspection; • Electric refrigerators: Adjust thermostat . Continue to monitor the temperature carefully to make sure it does not drop below 0°C. If the thermostat is not adjustable, call the maintenance technician. • Kerosene refrigerators: Lower the flame setting.
c.Temperature at or below 0°C	Vaccine at risk	- **Electric refrigerators including solar**: Adjust thermostat. Continue to monitor the temperature carefully to make sure it does not drop below 0°C. If the thermostat is not adjustable, call the maintenance technician. - **Kerosene refrigerators**: Adjust the flame setting. - If a freeze indicator shows × or a 30-day refrigerator temperature logger shows a 'low alarm', the temperature has dropped below -0.5°C for more than 60 minutes. Inspect the freeze-sensitive vaccines and carry out a Shake Test to establish if any has been frozen. Frozen vaccine will have to be discarded. Make a report.

Temperature	Situation	Action
d.Temperature between +8°C and +10°C:	Monitor the situation carefully.	If the temperature has NOT returned to between +2°C and +8°C by the time of the next inspection: • **Electric refrigerators, including solar**: Check that the refrigeration unit is working. If there has been a temporary power failure, continue to monitor carefully after the power comes back to make sure the temperature returns to +2°C and +8°C. If the temperature is not maintainted, adjust the thermostat. If the thermostat is not adjustable, call the maintenance technician. • **Kerosene refrigerators:** Check the fuel tank and fill if necessary. If fuel is OK, raise the flame setting.
e.Temperature above +10°C	Vaccine at risk	Take immediate action to implement the agreed contingency plan. Check VVMs for colour changes to establish whether vaccine has been damaged or shelf life shortened. Make a report.

6. What to do if temperatures (minus) are out of range?

6.1 **By whom:**Cold Chain Assistant/officer, Refrigerator Technician

6.2 **At what?:**Cold room and vaccine refrigerators

Temperature	Situation	Action
a.Temperature between -25°C and -15°C	normal	no action necessary
b.Temperature below -25°C		• Adjust thermostat • Check that the temperature is within the normal range at the time of the next inspection.
c.Temperature above -15°C:	If there has been a temporary power failure,	no further action is necessary.
	If there has been power failure for a long time	A temporary rise to +10°C is permissible following an extended power cut. Check that the refrigeration unit is working, monitor the situation closely and take appropriate action if conditions are not normal at the time of the next inspection.
d.Temperature above +10°C	Vaccine at risk	Take immediate action to implement the agreed contingency plan, and make a report.

Activity	By whom	Where	Procedure and methodology
7.Daily activities 7.1 Monitoring temperature	Cold Chain Assistant/ Officer	Freezer rooms in Central and Regional stores	a. Read the temperatures shown on the external dial or digital thermometers twice daily, 7 days a week. Take readings at 10 pm in the morning and 4 pm in the afternoon. Check that the readings are between -15°C to -25°C. b. Check whether the readings on the chart recorder or electronic continuous temperature monitoring system have been between -15°C to -25°C. throughout the previous 24 hours. c. For each freezer room, record the results of the daily readings of the temperature chart.
7.2 Temperature monitoring	Cold Chain Assistant/ Officer	Cold rooms of Central and Regionalstores	a. Read the temperatures shown on the external dial or digital thermometers twice daily, 7 days a week. Take readings at 10 am in the morning and 4 pm in the afternoon. Check that the readings are between +2°C to +8°C. b. Check whether the readings on the chart recorder or electronic continuous temperature monitoring system have been between +2°C to +8°C. throughout the previous 24 hours. c. Check the status of the electronic freeze indicator(s). d. For each cold room, record the results on the temperature chart.
7.3 Temperature monitoring	Cold Chain Assistant/ Officer	Vaccine freezer of Central and Regionalstores	a. Read the temperatures shown on the dial or digital thermometer stored with the vaccine twice daily, 7 days a week. Take readings at 10 am in the morning and 4 pm in the afternoon. Check that the readings are between -15°C to -25°C. b. IF INSTALLED: Check that the readings on the electronic continuous temperature monitoring system have been between -15°C to -25°C. throughout the previous 24 hours. c. For each vaccine freezer, record the results on the temperature chart.

Activity	By whom	Where	Procedure and methodology
7.4 Temperature monitoring	Cold Chain Assistant/ Officer	Vaccine refrigerators in Central stores and Regional stores	a. Read the temperatures shown on the dial or digital thermometer stored with the vaccine twice daily, 7 days a week. Take readings at 10 am in the morning and 4 pm in the afternoon. Check that the readings are between +2°C to +8°C. b. Check whether the readings on the electronic continuous temperature monitoring system or 30-day electronic refrigerator temperature logger have been between +2°C to +8°C throughout the previous 24 hours. c. Check the status of the electronic freeze indicator(s). d. For each vaccine refrigerator, record the results on the temperature chart.
7.5 Temperature monitoring	Cold Chain Assistant/ Officer	Vaccine freezers in regional and district stores	a. Read the temperatures shown on the dial or digital thermometer stored with the vaccine twice daily, 7 days a week. Take readings at 10 am in the morning and 4 pm in the afternoon. Check that the readings are between -15°C to -25°C. b. For each vaccine freezer, record the results on the temperature chart.
7.6 Temperature monitoring	Cold Chain Assistant/ Officer	Vaccine refrigerators in district and sub stores	• Read the temperatures shown on the dial or digital thermometer stored with the vaccine twice daily, 7 days a week. Take readings at 10 am in the morning and 4 pm in the afternoon. Check that the readings are between +2°C to +8°C. Check the status of the electronic freeze indicator(s). • For each vaccine refrigerator, record the results on the temperature chart.

Activity	By whom	Where	Procedure and methodology
8.Weekly activity	Cold Chain Assistant/ Officer	All related cold chain devices in stores	a. Electronic continuous monitoring: Print out the weekly charts for all connected cold chain equipment in the store. Check whether there have been any excursions outside the acceptable temperature ranges. Mark these on the chart and discuss with your supervisor for any action that needs to be taken. File the chart in weekly order in the current year's temperature record file. b. Chart recorder: Change the disc at the end of each week. Write the start date on the new chart. Write the finish date on the old chart and file it in the temperature record file. Check the pens and replace if necessary. c. File the charts and/or discs in weekly order in the current year's temperature record file.
9.Monthly activity	Cold chain Section Chief	All related devices of cold chain placed stores	a. Hold a meeting to review the past month's temperature records. b. Identify any systematic temperature trends which may indicate cold chain equipment problems. c. Discuss and agree any remedial action needed. d. Record results of the meeting on the monthly temperature review form and file the form in the monthly temperature record file. See Annex 1.
10.End of the year	Cold chain Section Chief	All related devices of cold chain placed stores	a. Start new files for the daily and weekly temperature records and for the monthly temperature review reports. b. Store all the previous year's temperature records and files. c. Prepare an annual storage temperature report based on the previous year's records. See Annex 3.
11.Record keeping	Cold chain Officer	All related devices of cold chain in store	a. File temperature records and monthly temperature review records in date order. b. Retain records for a minimum of three years. c. Store the previous year's records in specific location.

Annex 1 – Temperature chart for electronic recording devices

Cold room/refrigerator number :
Equipment model : :
Start date: <dd/mmm/yyyy>
Location:
Key: FI = freeze indicator (status OK or X)

Day		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29	
	° C	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm
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>+8 °C alarm	Once every 24 hours, enter high alarm status and maximum temperature recorded by the continuous temperature monitoring device																																																					
Alarm time or OK																																																					
Maximum °C																																																					
< -0.5 °C alarm	Once every 24 hours, enter low alarm status and minimum temperature recorded by the continuous temperature monitoring device																																																				
Alarm time or OK																																																				
Min °C																																																					
Initials:																																																				

Province:
District:
Health centre:
Month:
Year:
Supervisor:
Remarks:

Cold room/refrigerator number :
Equipment model : :

Start date: <dd/mmm/yyyy>
Location:

Key: FI = freeze indicator (status OK or X)

Day		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29	
	° C	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm
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Alarm time or OK																																																							
Min °C																																																								
Initials:																																																							

Province:
District:
Health centre:

Month:
Year:
Supervisor:

Remarks:

Cold room/refrigerator number : ILR # 1
Equipment model : : RCW 42 EG
Start date: <dd/mmm/yyyy> 03 Oct 2011
Location: Erehwon HC
Key: FI = freeze indicator (status OK or X)

Temperature chart

Day		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29	
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Alarm or OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK		OK																									
Maximum °C		+ 7.5		+ 6.5		+ 6.3		+ 4.5		+ 5.2		+ 3.3		+ 3.0		+ 1.8		+ 0.2		-0.8		-0.5		+ 5.2		+ 5.4		+ 5.3		+ 6.1		+ 5.5		+ 6.1																									
< -0.5 °C alarm		Once every 24 hours, enter low alarm status and minimum temperature recorded by the continuous temperature monitoring device																																																				
Alarm or OK		OK		OK		OK		OK		OK		OK		OK		OK		X		X		OK		OK		OK		OK		OK		OK		OK																									
Min °C		+ 5.8		+ 5.4		+ 4.8		+ 3.5		+ 3.6		+ 2.8		+ 1.7		+ 0.8		-0.5		-1.5		-1.3		+ 0.9		+ 3.5		+ 3.8		+ 3.6		+ 4.6		+ 3.9																									
Initials:		PNL	PNL	PNL	PNL	PNL	PNL	FD	FD	FD	FD	FD	FD	FD	FD	FD	FD	FD	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL	PNL																									

Province: Jazir
District: District 9
Health centre: Erehwon
Month: October
Year: 2011
Supervisor: AG
Remarks: Thermostat incorrected adjusted by temporary health worker. C
on 12 Oct

Annex 2 – Monthly temperature review report

Location:			Serial no:	
Review period:				
Reviewers:				
Date:				
Enter all vaccine losses during the review period which are formally recorded on loss/adjustment reports.				
Equipment	**Date**	**L/A report #**	**Affected vaccine**	**Doses lost**
Record all instances during the review period when storage temperature are outside recommended limits.				
Equipment	**Date**	**Temperature**	**Vaccine at risk?**	**Action taken at time of event**
Narrative:				
Recommendations:				
Original copy	**Copy 1**	**Copy 2**	**Copy 3**	

Example

Location:	National Vaccine Store		Serial no:	MR11/06
Review period:	1/6/11 to 31/6/11			
Reviewers:	A. Store. Manager, A Storekeeper			
Date:	8/7/11			
Enter all vaccine losses during the review period which are formally recorded on loss/adjustment reports.				
Equipment	**Date**	**L/A report #**	**Affected vaccine**	**Doses lost**
Cold room # 1	3/6/11	L/A02/01	HepB	9,500
Cold room # 1	3/6/11	L/A02/01	DTP	5,500
Etc.				
Record all instances during the review period when storage temperature was outside recommended limits.				
Equipment	**Date**	**Temperature**	**Vaccine at risk?**	**Action taken at time of event**
Cold room # 1	1/6/11	-1° C	Yes	None
Cold room # 1	2/6/11	-2° C	Yes	None
Cold room # 1	3/6/11	-6° C	Yes	Engineer called L/A # 02/02 raised
Narrative: Cold room #1 had a defective thermostat sensor between 1st and 3rd June, resulting in an unacceptable loss of vaccine. On enquiry I found that the duty staff did not know that HepB freezes at -0.5° C, so they ignored the sub-zero temperatures on 1st and 2nd June and only notified the storekeeper that there was a problem on 3rd June. The cold room has not yet been fitted with a temperature alarm, although this has been on order since April. No other problems were noted during the period.				
Recommendations: Duty staff should receive additional training in temperature monitoring. Until this has been done, the storekeeper should monitor temperatures each day. Temperature alarms should be fitted to cold rooms 1, 2 and 3 and to the three vaccine freezers before 21st July.				
Original copy	**Copy 1**	**Copy 2**	**Copy 3**	

Annex 3 – Annual temperature review report

Location: Prepared by:

Review period: to Supervisor:

Equipment type (Cold room, Freezer room, Refrigerator or Freezer)	Make	Model	Unique ID	Recording method (T, T + FI, 30-day, Chart, Logger)	Cold room or refrigerator				Freezer room or freezer		
					Nbr of low alarms	Nbr. of high alarms	Days below +2°C	Days above +8°C	Nbr of high alarms	Days above -15°C	Days above 0°C

Notes:

1) Temperature recording methods: T = thermometer; T + FI = thermometer plus freeze indicator; 30-day = 30 day electronic recorder; Chart = chart recorder; Logger = computerized monitoring system. If more than one method was used during the period, enter all types used, e.g. T/30-day or Chart/Logger.
2) If the recording method has an alarm system, record number of high or low alarms from the daily temperature records.
3) If the daily temperature record shows any excursion(s) above the correct storage temperature range, count this as 1 day.
4) If the daily temperature record shows any excursion(s) below the correct storage temperature range, count this as 1 day.

Example

Location: Erehwon HC

Prepared by: Mr Y

Review period: 01 Jan 2010 to 31 Dec 2010

Supervisor: Ms Z

Equipment type (Cold room, Freezer room, Refrigerator or Freezer)	**Make**	**Model**	**Unique ID**	**Recording method** (T, T + FI, 30-day, Chart, Logger)	**Cold room or refrigerator**				**Freezer room or freezer**		
					Nbr of low alarms	Nbr. of high alarms	Days below +2°C	Days above +8°C	Nbr of high alarms	Days above -15°C	Days above 0°C
Refrigerator	Dometic	RCW 42 EG	2007-RF-EG-0101	30-day	15	12	25	15	n/a	n/a	n/a

Notes:

1) Temperature recording methods: T = thermometer; T + FI = thermometer plus freeze indicator; 30-day = 30 day electronic recorder; Chart = chart recorder; Logger = computerized monitoring system. If more than one method was used during the period, enter all types used, e.g. T/30-day or Chart/Logger.
2) If the recording method has an alarm system, record number of high or low alarms from the daily temperature records.
3) If the daily temperature record shows any excursion(s) above the correct storage temperature range, count this as 1 day.
4) If the daily temperature record shows any excursion(s) below the correct storage temperature range, count this as 1 day.

CHAPTER VIII

Checking the accuracy of temperature monitoring devices

Primary Objective:

By the end of this session, the participants will be able to describehow to carry out an accuracy check ,what action to take if the device is found to be inaccurate, and how many times accuracy checks need to be carried out.

Enabling Objectives:

By the end of this session, the participants become capable on:

- How to check accuracy of the device and its required equipment and procedures.

Instruction of Checking the accuracy of temperature monitoring devices

Activity:	Instruction of checking the accuracy of temperature monitoring devices
Responsibility:	Mechnical Engineer and Cold Chain Officer
Objective:	• How to carry out an accuracy check • What action to take if the device is found to be inaccurate. • How to monitor temperature in vaccine store and refrigerated vehicle • How many times accuracy checks need to be carried out. •
When?	Checking the accuracy of temperature at least one in a year.
Required materials:	Thermo Stat, MULTi LOG,Thermometer, Freeze Tag

Actitivity	Procedure and methodology
1. Calibrated thermometer	Both procedures require a calibrated digital reference thermometer with the following specification: a. Accurate to ±0.5°C or better within the range -30°C to +20°C. b. Resolution: ±0.2°C or better within the range -30°C to +20°C. c. Have an external sensor lead which can be fitted through the seal on the lid of an ice-lined refrigerator or vaccine freezer. d. Have a valid calibration certificate issued by an ISO/IEC 17025 accredited testing laboratory or by Measurement and quality control section..
2. MULTiLOG	This procedure requires the following materials and equipment: • Wristwatch with second hand. • Roll of electrical insulation tape. • Clipboard and pen. • Record sheet as shown in Annex 2. • Spare MULTiLOG sensors.
3. Alcohol stem thermometers and bi-metallic dial thermometers	No action is required to check the accuracy of this type of device. • Alcohol stem thermometers have no moving parts and are unlikely to use their calibration in normal use. Bi-metallic dial thermometers can easily lose their calibration if they are dropped or corroded by high humidity.
4. Disposable electronic temperature monitoring devices	No action is required to check the accuracy of this type of device. • Freeze indicators such as the FreezeTag® or FreezeAlert®, and 30-day refrigerator temperature logger FridgeTag® or LogTag® Temperature Recorder are designed to be disposed when their batteries fail. The calibration of these devices is maintained throughout their design life.

Activity	By whom	Procedure and responsibility
5.MULTi LOG	• Mechnical Engineer • Cold Chain Officer(Central and Regional	Carry out the following procedure for each of the three MULTiLOG boards: • Record the location of the MULTiLOG system and the details of the check procedure on the MULTiLOG temperature accuracy check form - see Annex 2. • In the 'Sensor location' column of the calibration record sheet, enter the name of the cold chain equipment whose sensor you are checking – for example 'Cold room no. 1'. • Use the MULTiLOG software menu option 'Data/Download Data' to manually download any data in the MULTiLOG because re-starting MULTiLOG (see step g) will overwrite these data. • Set your watch to the exact time shown on the MULTiLOG (to the nearest second). • Note the system's current Reading Time Interval (RTI) so that you can restore the setting at the end of the checking procedure. • Reset the RTI to one minute. • Re-start MULTiLOG logging (exactly at the "start" of a minute on the watch). • At each sensor location for this board: • Position the sensor of the digital thermometer as close as possible to the MULTiLOG sensor and tape the two leads together with electrical insulation tape so that the sensors are as close together as possible. Do not cover the sensors with tape. If the sensor is located in a vaccine refrigerator or freezer, close the lid of the appliance and read the thermometer whilst standing next to the appliance. If the sensor is located in a cold room or freezer room, record the temperature whilst standing inside the room. • Take the first reading with the digital thermometer, record temperature and time on the record sheet. • Wait exactly one minute. Take the second reading and record it in the same way. • Wait exactly one minute. Take and record the third reading. • Download the MULTiLOG readings. Match the times with those you have written on the record sheet, and compare the manual and logged readings at each location. • If the mean difference between the three thermometer readings and the three MULTiLOG reading is greater than ±1.0°C, replace the MULTiLOG sensor with a new one and repeat the checking procedure for the new sensor. • Restore the original RTI and re-start MULTiLOG. • Repeat the procedure from step (a) for every MULTiLOG board in the same computer.

Annex 1 – Generic temperature accuracy check form

a. Store location: …….....

b. Form start date: …….....

c. Form finish date: ……..

Date	Device description	Device location	Reference thermometer	Check method	Reference temperature	Difference from reference	Initials	Comments	Verified by/ date
12 Dec 2010	Rueger TFH 100	Cold room # 1	XYZ 500	Ice point	0°C	+2°C	AG	Adjusted and rechecked - OK	SJ 15 Dec2010

Annex 2 – MULTiLOG temperature accuracy check form

Date of inspection: ……..

Name of inspector: …….

Store location: ……..

No.	Sensor location:	Time	Temp °C	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

CHAPTER IX

Storing vaccines and water packs in cold rooms and freezer rooms

Primary Objective:

By the end of this session, the participants know how to identify the safe storage in cold rooms and freezer rooms.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Responsible person for inspection of safe storage area in cold room racks for vaccine storage, its procedures and methods.
- Cold rooms: Responsible person for inspection of safe storage areas in lower surface of cold rooms, required procedures and methods.
- Cold rooms and freezer rooms: Responsible person, required procedures and methods to mark the pallets placed in cold rooms and freezers.
- Responsible person, required procedures and methods for storing vaccines in the racks
- Responsible person, required procedures and methods for storing vaccines in the pallets.
- Responsible person, required procedures and methods for freezing ice packs/water packs.
- Store vaccine in WIC (at +2°C to +8°C) and its procedures.
- Store vaccine in WIF(at -15°C to -25°C) and its procedures.

Instruction of Storing vaccines and water packs in cold rooms and freezer rooms

Activity:	Storing vaccines and water packs in cold rooms and freeze rooms
Responsibility:	EPI Officer/Cold Chain Assistant/Officer(Central and Regional medica store/district
Objective:	How to identify the safe storage in cold rooms, how to store vaccine on shelves and how to store vaccine on pallets.
When?	Storing vaccine
Required materials:	• Electronic 30-day refrigerator • Digital thermometer • MULTi LOG • Temperature data recording sheet • Plastic pallets • Duct tape

Activity	By whom	Procedure and methodology
1.General procedures	▪ EPI Officer/Cold Chain Officer	• **Cold rooms:** Do not store vaccine in the air stream close to the evaporator units. Freeze-sensitive vaccines (DPT, TT, Heb-B, Hib Liq, Tetravalent or Pentavalent) placed in this zone may be at risk of freezing. Check the limits of the safe storage zone using an activated electronic 30-day refrigerator temperature logger or temperature data logger device . • Polio vaccine are store in WIF only in central and regional vaccine store. All vaccines except OPV are store in +2°C and +8°in central and WIC-Walk in Cooler in regional. • **Supplementary vaccines:** Vaccine for supplementary activities is usually stored on the floor of the cold rooms or freezer rooms. Vaccine stored in this way must always be stacked on pallets. This ensures that air circulates freely. It also keeps the vaccine off the floor, which may be dirty or damp. • **Hygiene:** Always wash hands thoroughly before handling vaccine cartons and vaccine vials.

Activity	By whom	Procedure and methodology
2.Cold rooms: checking safe storage areas on the shelves	▪ EPI Officer/Cold chain Officer	• Place the temperature recording device on the shelf closest to the evaporator unit. Leave the device for a minimum of 48 hours and then check the maximum and minimum temperature readings. • If all the readings are between +2°C and +8°C, the area should be safe for storing vaccine. Otherwise, mark the area as unsafe and move the device further along the shelf. • Repeat the test procedure on all the shelves close to the evaporator until you have established the limits of the safe storage zone. • Record results of the temperature mapping exercise on the sensor data recording sheet (See Annex 1). • Clearly mark the front of the shelf units in the danger zones using coloured tape. Do not use these areas for storing freeze-sensitive vaccines. Repeat this check whenever a refrigeration unit is replaced.
3.Cold rooms: checking the safe floor storage area	▪ EPI Officer/Cold chain Officer	a. Place a pile of empty cartons about 150 cm high at the nearest point to the refrigeration unit and within the area where you want to store vaccine on pallets. Place the temperature recording device on top of the cartons. Leave the device for a minimum of 48 hours and then check the maximum and minimum temperature readings. Measure the temperature of Walk in Cooler from all the sides. b. If all the readings are between +2°C and +8°C, the area should be safe for storing freeze-sensitive vaccine. Otherwise, change the position of the marked area and carry out another test until you have established the limits of the safe storage zone. c. Record results of the temperature mapping exercise on the sensor data recording sheet. See Annex 1. d. Remove vaccines from the carton of the containers. e. At the time of vaccine delivery, the suppliers use the foams in the cartons. Never leave vaccine in the foams carton in Cold chain equipments(Fridege/WIF/WIC, vaccine packs). f. Do not use confusing words or synomous while labelling cartons such as J.E vaccine with the J.E diluents. No differences should be made with the labeling in the carton of the vaccine and vaccine inside.

Activity	By whom	Procedure and methodology
4.Cold rooms and freezer room: marking the pallet areas	▪ EPI Supervisor/Section officer ▪ Cold chain assistant/section officer	• Obtain the required number of plastic pallets and stack them in a dry place in the store for use when required. Plastic pallets should be used because wooden pallets can become contaminated with fungal spores. • Mark out an area on the floor of the cold rooms and freezer room where supplementary vaccines can safely be stored. In the cold rooms, make sure that this area is entirely within the safe storage zone. • Use paint or duct tape for the markings and make sure that the marked area matches the dimensions of the pallets. Leave a space of at least 10 cm between the pallets for air circulation. For example, a space for two 120 x 80 cm pallets should be either 120 x 170 cm or 250 x 80 cm. Leave a minimum margin of 80-90 cm between the marked area and the adjacent shelf units to allow access to the shelves.
5.Storing vaccine on shelves	▪ EPI Supervisor/Officer ▪ Cold Chain Assistant/Officer	• Place the vaccine cartons on the shelves so that air can freely circulate. Leave a 5 cm clear space between the cartons and the walls of the room. Do not place cartons closer that 10 cm to the ceiling. Do not store vaccine on the floor below the bottom shelf. • Group the vaccine cartons on the shelves of the cold rooms and freezer room by vaccine type, batch number and expiry date. Leave 5 cm vertical spaces between each group for identification purposes and to allow for air circulation. Make sure that the printed labels on the cartons are visible. Fix a label to the edge of the shelves to show the vaccine type, manufacturer, presentation, batch number and expiry date. • Some vaccines are supplied in tertiary outer cartons. Store these vaccines in the outer cartons until you need to open them to remove the smaller secondary cartons. This makes stock management and stock counting easier.
6.Storing vaccines on pallets	▪ EPI Supervisor/Officer ▪ Cold Chain Assistant/Officer	a. Place the required number of pallets within the marked area. b. Stack vaccine on the pallets. Do not stack higher than about 150 cm. Make sure that the load does not overlap the edges of the pallets. c. If the vaccine on the pallet is for supplementary activities label the stack to show the vaccine type, manufacturer, presentation, batch number, expiry date and VVM status.. d. If the vaccine is marked for disposal, clearly label the contents. e. Remove the pallets from the cold room or freezer room when they are no longer required. Unused pallets limit access and are a trip hazard.

Activity	By whom	Procedure and methodology
7.Freezing or cooling ice packs/ water packs	▪ EPI Supervisor/ Officer ▪ Cold Chain Assistant/Officer	• You may use ice freeze/ freezer room to freeze ice packs or use a cold room to chill cool water packs provided you observe the following rules: • Freezer rooms: If the freezer room contains vaccine, do not allow water packs to touch the vaccines. Do not allow the temperature of the room to rise above -15°C during the water pack freezing process. • Cold rooms: If the cold room contains vaccine, do not allow water packs to touch the vaccines. Do not allow the temperature of the room to rise above +8°C during the water pack cooling process.
8.Storing Vaccine in WIC (+2° to +8° C)	▪ EPI Supervisor/ Officer ▪ Cold Chain Assistant/ Officer	• Place all the vaccine from national or regional level not O.P.Vbetween +2°C and +8°C in WIC for storage. • Make sure the air passes between the carton which are piled.And the distance between the cartons to be 3- 5 cm. • Never put DPT,TT Td, Hep B, Hib Liq., tetravalent or pentavalent infront of cool air that comes from WIC or any vaccines that may be damaged by freezing.
9.Storing Vaccine in WIF (-15°to -25°C)	▪ EPI Supervisor/ Officer ▪ Cold Chain Assistant/ Section Officer	a. Store all National and regional level of OPV in WIF or Deep Freezer (DF). If there is not enough space in WIC then store BCG, measeals, Rubeala,MMR,JE in the same temperature. b. Vaccine store in WIF can be placed in front of cooling unit.

Annex 1 – Sensor data recording sheet

Store name:		Cold room ID:			Temperature set point: °C		
Test start date:		Test finish date:			Name of tester:		
#	**Sensor location**	**Start** (dd:hh:mm)	**Finish** (dd:hh:mm)	**Min temp** (°C)	**Max temp** (°C)	**Average** (°C)	**Pass/Fail?** (must be +2°C to +8°C)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
Comments:							

CHAPTER X

Safe working in cold rooms and freezer rooms

Primary Objective:

By the end of this session, the participants will be able to sets out the safety rules which must be observed by all personnel who have access to cold rooms or freezer rooms.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Daily, weekly tasks.
- Basic safety measures and requird procedures.
- Procedures and methods requird for Individual safety.

Instruction of safe working in cold rooms and freezer rooms

Activity: Safe working in cold rooms and freezer rooms.

Responsibility: EPI Officer, Cold Chain Assistant/ Officer,(Central and Regional medical store/ district)

Objective: Sets out the safety rules which must be observed by all personnel who have access to cold rooms or freezer rooms.

When? While working in cold rooms and freezer rooms.

Required materials:

- Thermal trousers
- Gloves
- Masks
- Thermal jacket with hat

Activity	By whom	Procedure and methodology
1. Training	▪ Cold chain section	a. Familiarize all temporary workers on the safe working procedures set out in this SOP. 'Temporary workers' in this context includes supervisory personnel, maintenance personnel and those who assist with the routine stock counts. b. Make sure that all people who work in the store know that they must wear suitable cold weather clothing. Suitable clothing for a cold room includes long trousers, thermal jacket and gloves. Suitable clothing for a freezer room includes thermal trousers, a thermal jacket, gloves and a hat.
2.General safety rules	▪ Cold chain section officer	a. **Clothing:** Do not allow anybody to enter the cold room for periods of more than five minutes without wearing suitable clothing. A person who is not wearing warm clothing must be accompanied at all times. Do not allow anybody to enter the freezer room unless they are wearing suitable clothing. b. **Keys:** Make sure all cold room and freezer room keys are kept in a safe place and are accounted for at the end of each working day. Have one active key for each room and keep spare keys separately. c. **Dry ice:** Internationally shipped vaccines may be packed in dry ice. Dry ice changes into carbon dioxide gas when it evaporates. If carbon dioxide accumulates in a confined space it can cause suffocation. If you receive large quantities of vaccine in international shipping containers, do not place the containers in the cold rooms or freezer room until the dry ice has been removed. • **Arrange the door alarm :** Set the door alarm for every 5 minutes. •

Activity	By whom	Procedure and methodology
3.Personal safety	▪ All staffs who work in cold rooms and freezer rooms.	a. **Tell a colleague what you are doing**: Do not enter a cold room or freezer room on your own without informing a colleague first. If you become trapped in the room you may suffer from hypothermia and you could die. b. **Check the lock:** Before you enter check that you have the key and that the door was locked by the last user. Keep the key with you so that you cannot be locked in the room by mistake. c. **Check the door**: Before anyone enters a cold room or freezer room, check that the door can be opened from the inside. d. **Cold rooms**: Do not work for more than five minutes in a cold room unless you are wearing suitable clothing. e. **Freezer rooms:** Never enter a freezer room without wearing suitable clothing. Never remain inside on your own for more than a few minutes; you may become chilled and your reactions may become slow. f. **Check the people**: When you enter a cold store with more than one other colleagues, count the people before they go in and count them again when they come out. Make sure no one is left behind. g. **Lock the door** when you leave: Switch off the lights lock the door and put the key in a safe place.

CHAPTER XI

Looking after store buildings

Primary Objective:

By the end of this session, the participants will be ableto function the daily, weekly, monthly, annual and five-yearly tasks needed to ensure that the store building(s) are kept fully operational. It also covers emergency maintenance procedures.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Perform daily, weekly, monthly and annual tasks of store building.

- Procedures for emergencies maintainance of the store building.

Instruction of Looking after Store building

Activity: Looking after the store building.

Responsibility: EPI Officer, Cold Chain Assistant/ Officer (Central and regional medical st district)

Objective: Prepare the annual report and plan for long term maintainance with regular update.

When? Rountine(Daily, Weekly, Monthly, Yearly)

Required materials:

- Consumables
- Cleaning supplies,
- Ladders
- Other access equipment

Activity	By whom	Procedure and methodology
1.Daily tasks	▪ Assistant staffs	a. Clean the toilet and wash basins and replenish soap and toilet paper. b. Remove and dispose of redundant packing materials and other rubbish. c. Replace broken light bulbs and strip lights as and when needed. d. Sweep and wash the floors.
2.Weekly tasks	▪ Assistant staffs	• Sweep and wash floors. Dust and wipe down other surfaces, including the tops and sides of refrigerators and freezers.
3.Monthly tasks	▪ Assistant staffs ▪ Cold chain Assistant/ Officer	a. Clean the store windows. b. Check for signs of pest activity. If pest activity is found, arrange for appropriate pest control measures to be carried out. c. Check the stock of consumables (cleaning products, soap, toilet paper, light bulbs, etc.) and make arrangements to re-stock items as necessary. d. Check that the supplies in the first aid kit are sufficient and that items have not expired. Replenish or replace items as necessary.

Activity	By whom	Procedure and methodology
4.Annual tasks	▪ Section Chief/ other staffs	• Carry out a general inspection of the building, including the roof, and repair any defects that require immediate attention. Record non-critical defects so that they can be included in the five yearly repair cycle. • Check the rainwater disposal system and clear all roof outlets and rainwater pipes. Remove leaves and other debris from the roof because this may cause blockages. • Check the underground drainage system, including the septic tank serving the toilet. • Check the mechanical ventilation system and ensure that it is operating correctly. Clean fan filters and air inlet and outlet grilles. • Service and re-certify the fire extinguishers . • Prepare an annual maintenance report, listing all significant routine maintenance and emergency repair works carried out. Highlight any outstanding items that require immediate or longer term attention and funding. • Inform Section Chief about the repair and maintenance through the store section. • Section Chief should inform Director of Logistics Management Division about the repair and maintenance • Get approval from Director of Logistics Management Division.
5.Emergency Maintainance	▪ Section Chief/store keeper	Follow these emergency maintenance procedures when an unexpected event occurs, such as a leaking roof or blocked drainage. • If vaccine and/or vaccine supplies are at immediate risk from the emergency, make temporary arrangements to protect the vaccine. • Carry out emergency repairs as rapidly as possible, preferably within seven days. • If emergency repairs are only temporary, make arrangements for permanent repairs to be carried out as soon as possible.

Activity	By whom	Procedure and methodology
6.Fire Safety Measures	▪ Section Chief/Store keeper	The workplace need to be safe, that creates the efficiency and productivity of the environment. On security point of view it is must to make Fire Response Plan in the store building.To protect the building from fire portable fire extinguisher is attached for safety measures. • Withrecommendationfrom technician, fire extinguisher need to be attached in the cold room of store building in regional and district. • In addition, firealarm and sensor should also be attached in sensitive areas. • Use fire extinguisher that are labotatory certified and one which can be refilled. • Choose appopriate size of fire extinguisher according to the space available in the room. • Demonstrate or give training from the trained person to all the staffs on how to Fire drill. • Place all the emergency phone numbers of related district- police office and fire brigade office. • If you do not know how to use fire extinguisher then immediately call to police or fire brigade office. • Manage the fire suit .

CHAPTER XII

Looking after cold rooms and freezer rooms

Primary Objective:

By the end of this session, the participants will be able toknow how to operate the refrigeration, temperature monitoring and alarm equipmentand also when routine maintenance is required, and how to recognize common faults includingall the routine and emergency maintenance of the cold rooms and freezer rooms.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Responsible personnel, required procedures and methods for daily, weekly, monthly and annual maintenance of cold rooms anf freezer rooms.

- Procedures for emergency mantainance.

Instruction on Looking after cold rooms and freezer rooms

Activity:	Looking after cold rooms and freezer rooms.
Responsibiity:	Mechinical Engineer and Refrigerator Technician
Objective:	Looking after cold rooms and freezer rooms for daily or emergency maintenance
When?	Routine servicing and maintainance or emergeny repairs or when needed.
Required materials:	• Tools • • Spare parts

Activity	By whom	Procedure and methodology
1.Daily tasks	▪ Cold chain Assistant/ Officer	• Listen to the cooling equipment. If you notice any unusual noise, or if the unit seems to be running for longer than normal, refer to the checklists in Annex 1. Contact Mechnicial Engineer immediately if you are unable to resolve the problem. • Check inside the room. • Is the airflow from the evaporator normal? • Is the evaporator fan running quietly? • Is there water on the floor? If there is, the evaporator drainpipe may be blocked. • At the end of the day. Make sure that: • All lights in the room are switched off. • There is nobody inside the room. • The door to the room is closed and locked.

Activity	By whom	Procedure and methodology
2.Weekly tasks	▪ Mechanical Engineer ▪ Refrigerator Technician ▪ Cold Chain Assistant	• Check the liquid sight glasses. If the cooling units have accessible sight glasses, check that both are filled with liquid and show "dry" conditions. If you see bubbles, there may be a leak of refrigerant. If the moisture indicator shows "wet", the filter-drier probably needs changing. Ask the Mechnicial Engineer or Refrigerator Technician to check and replace it if necessary. • Check ice build-up on the evaporator. Check the ice formation on the evaporators. Look at the pipes and fins. Most modern cooling units have an automatic defrosting system. If they are coated with ice more than 5 mm thick the evaporator needs defrosting and there could be a defect in the defrosting system. Ask the Mechnicial Engineer or Refrigerator Technicianto check. • Check the duty-sharing system. Check that the automatic duty-sharing system is working. • Check the temperature monitoring system: Check that the temperature monitoring system is operating correctly. If chart recorders are fitted, check the pens and replace the paper discs. • Check the alarm system. Press the test button. The alarm should sound. If it does not, the alarm may be faulty. Ask the Mechnicial Engineer to check it immediately. • Check the store. In addition to the daily checks: • Is the vaccine correctly stacked? • Are the vaccines and diluents correctly organized? • In the freezer room, make sure there is no build-up of ice on the floor, walls or shelves. • Clean the floor as recommended by the installer.

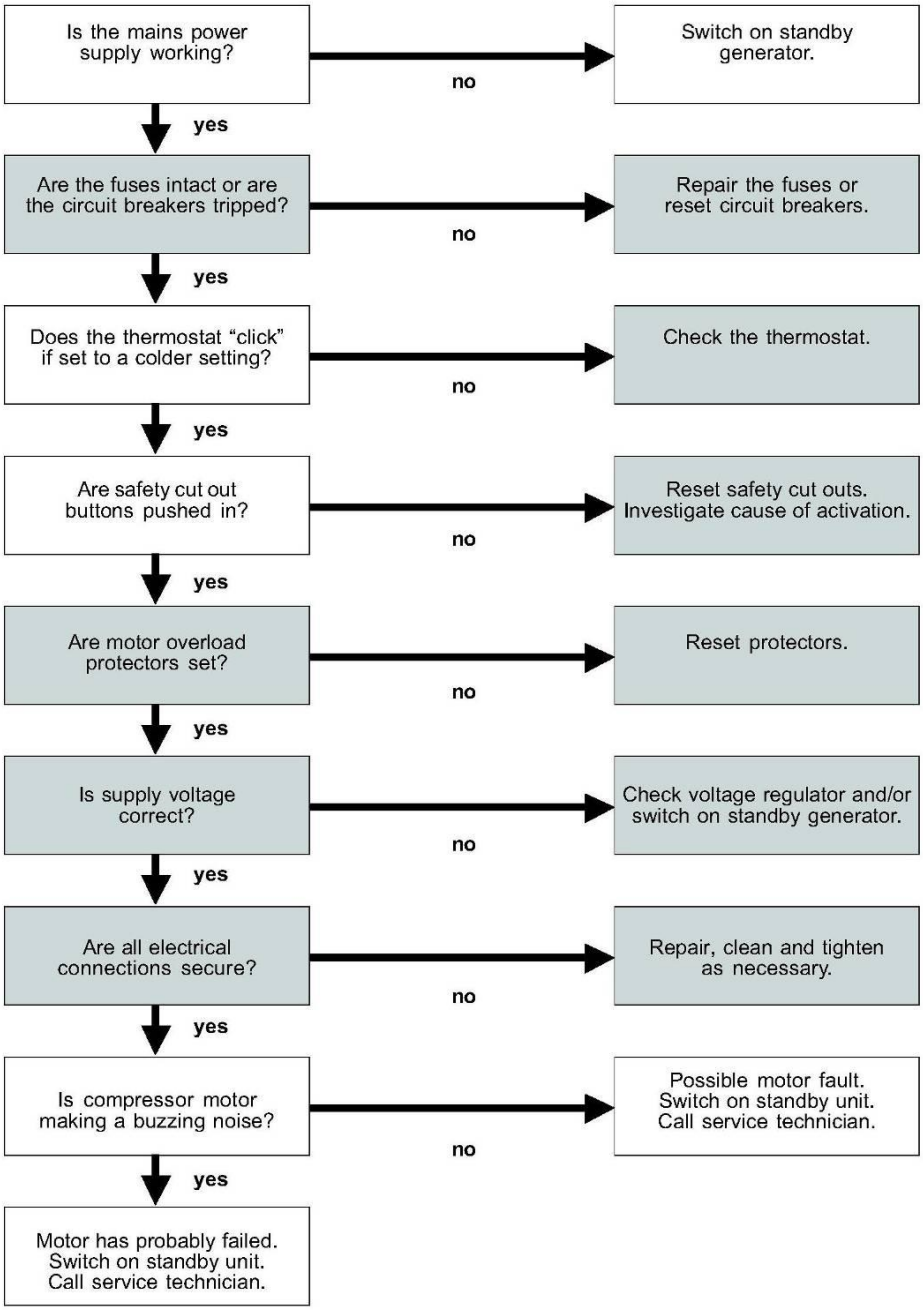
Activity	By whom	Procedure and methodology
3.Monthly tasks	▪ Cold Chain Assistant ▪ Mechnicial Engineer ▪ Hired Technician	• Check the room enclosures. Carry out the following checks: • Check the bottoms of theinsulation panels to see if there are any signs of rust. Rust may occur if the panel coating is damaged and if water left after the floor has been washed collects under the floor panels. • Inspect the panel joints internally and externally. There should be no evidence of movement along the joint lines and no sign of condensation or ice build-up . • Inspect the area around the evaporator. This is the coldest part of the room. If there is significant ice build-up on the panels, it needs to be removed. A temporary shut-down may be needed. • Check the locks. Check that the door locks are working properly and that all keys are accounted for. • Check the doors. Go inside the room and ask a colleague to close the door from outside. • Test the action of the internal safety release handle. Does it work properly? If not, call the mechnicial engineer. • The freezer room has an electrically heated door seal. If the door seal heater is not working the door may freeze shut. If the door is difficult to open and there is ice around the door seal, the heater may not be working. Call the technician if you cannot repair. • Check the strip curtain. If it is damaged, instruct the mechnicial engineer to replace it. • Pressure freezer room pressure release vent: The freezer room is fitted with a pressure release vent. If the door is difficult to open, check the release vent to see if it is iced up. Remove the ice if you can. If you cannot do this, call the mechanical engineer or refrigerator technician. If not call expert technician.
4.Annual tasks	▪ Mechnicial Engineer ▪ Refrigerator Technician	a. **Check the spare parts inventory**: Check that the stock of cold room/freezer room spare parts is adequate. If it is not, make sure that low or missing inventory is replenished.
5. Emergency maintenance	▪ Cold Chain Assistant ▪ Mechnicial Engineer ▪ Refrigerator Technician	a. If vaccine is at immediate risk. Make temporary arrangements to protect the vaccine by moving it to another location in the store. b. If both refrigeration units fail. Carry out emergency repairs to at least one of the two units within 24 hours. c. If a single refrigeration unit fails. Carry out emergency repairs within seven days. d. **Temporary repairs**. If emergency repairs are only temporary, make arrangements for permanent repairs to be carried out as soon as possible. e. **Spare parts.** If spare parts have been used, update the spare parts inventory and order replacements as needed.

Annex 1 – Troubleshooting check lists

The following generic checklists are taken from WHO/V&B/02.31. User's handbook for vaccine cold rooms and freezer rooms. The checklists do not replace the specific instructions given in the manufacturer's maintenance manuals.

Do not carry out any of the work shown in the shaded boxes unless you have been trained to do so.

Table 2. The condensing unit does not start



Work safely

- Switch off power before checking fuses or securing electrical connections
- Moving parts can be dangerous
- Do not carry out work shown in shaded boxes unless you have been trained to do so

Table 3. The temperature in the room is too high

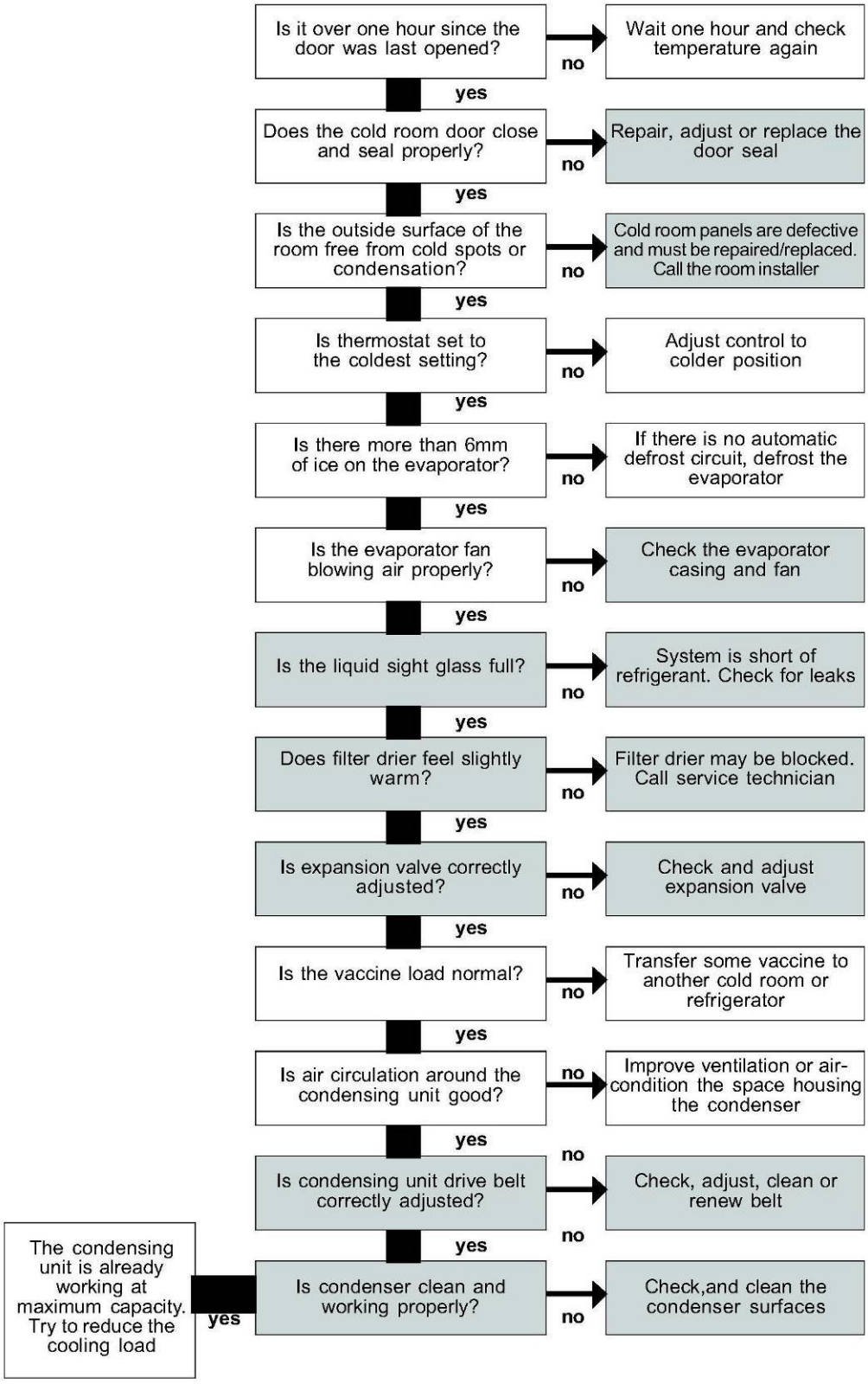


Table 4. The temperature in the room is too low

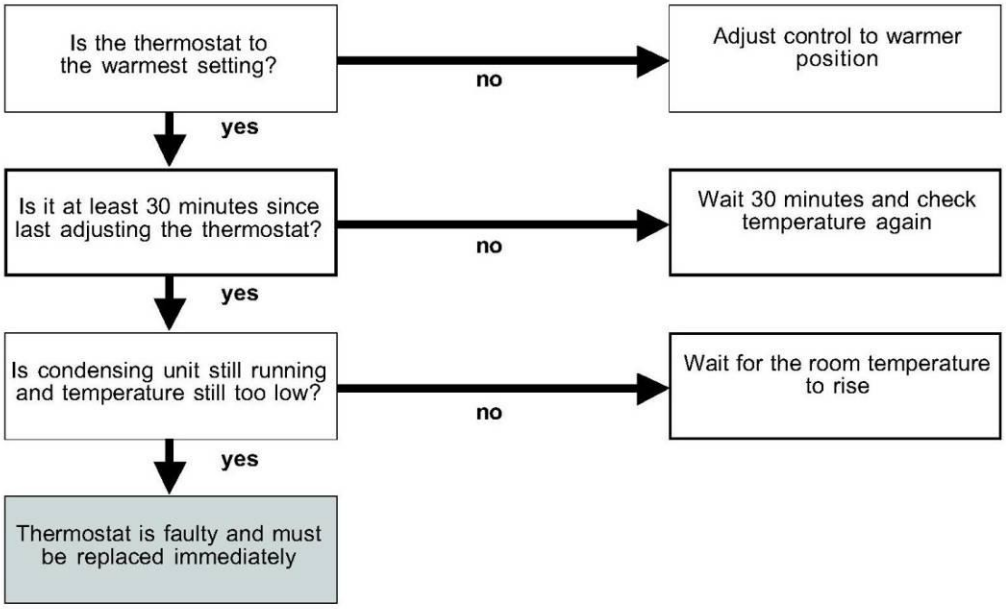


Table 5. The temperature in the room is correct but the condensing unit runs for long periods

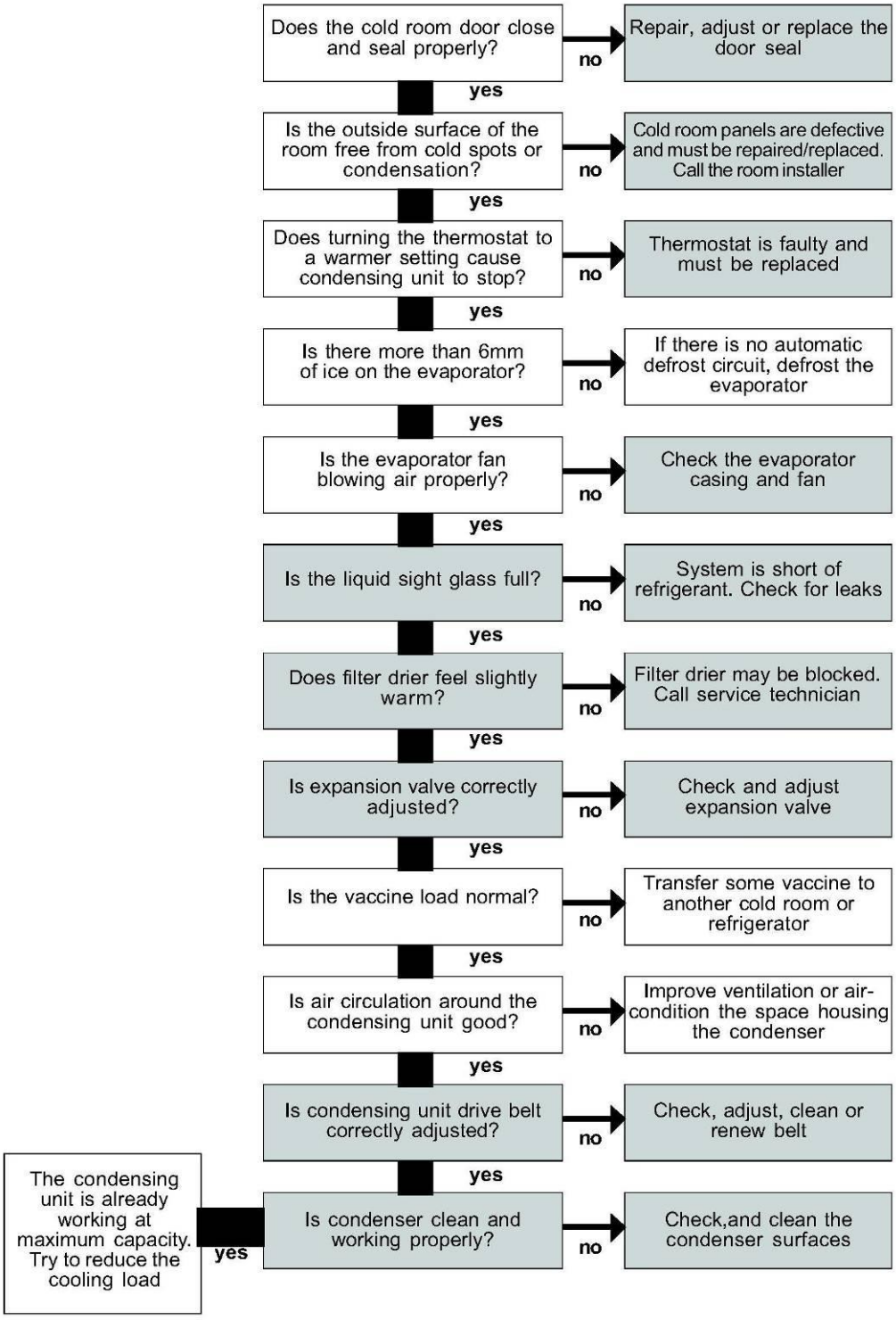


Table 6. The temperature in the room is correct but the condensing unit is unusually noisy

Table 6.1. Loose, rattling noises

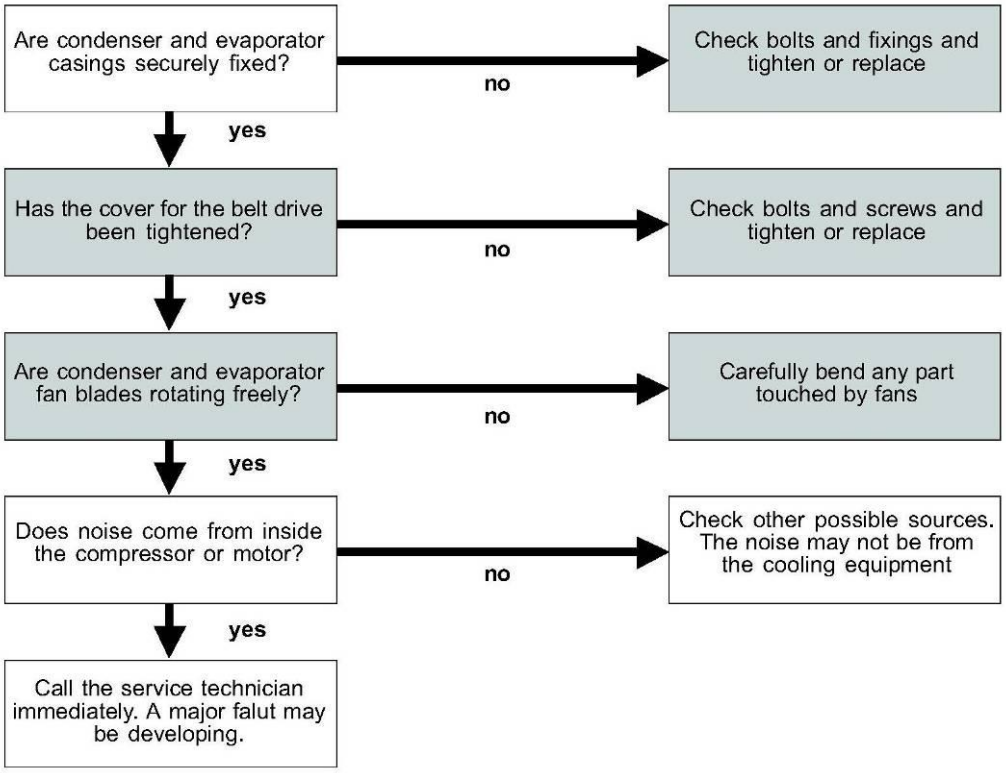


Table 6.2. Dry, squeaking noises

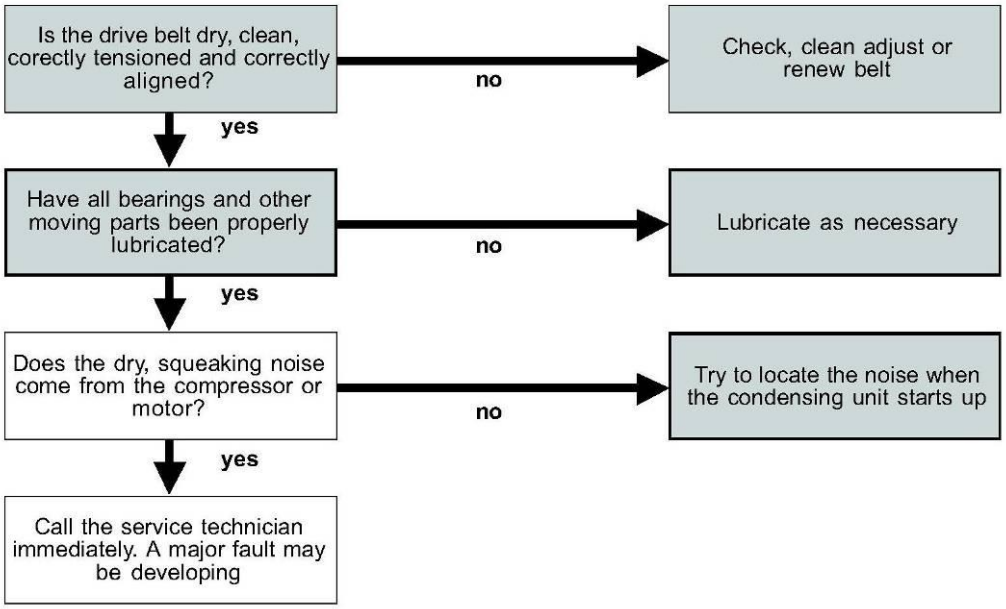


Table 6.3. Heavy knocking or banging noises

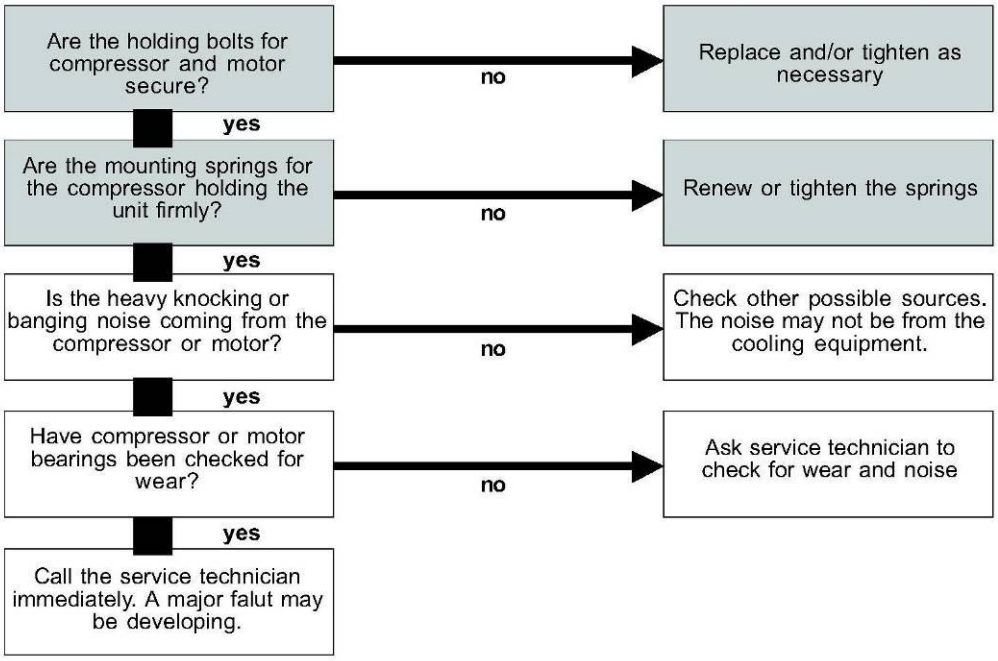
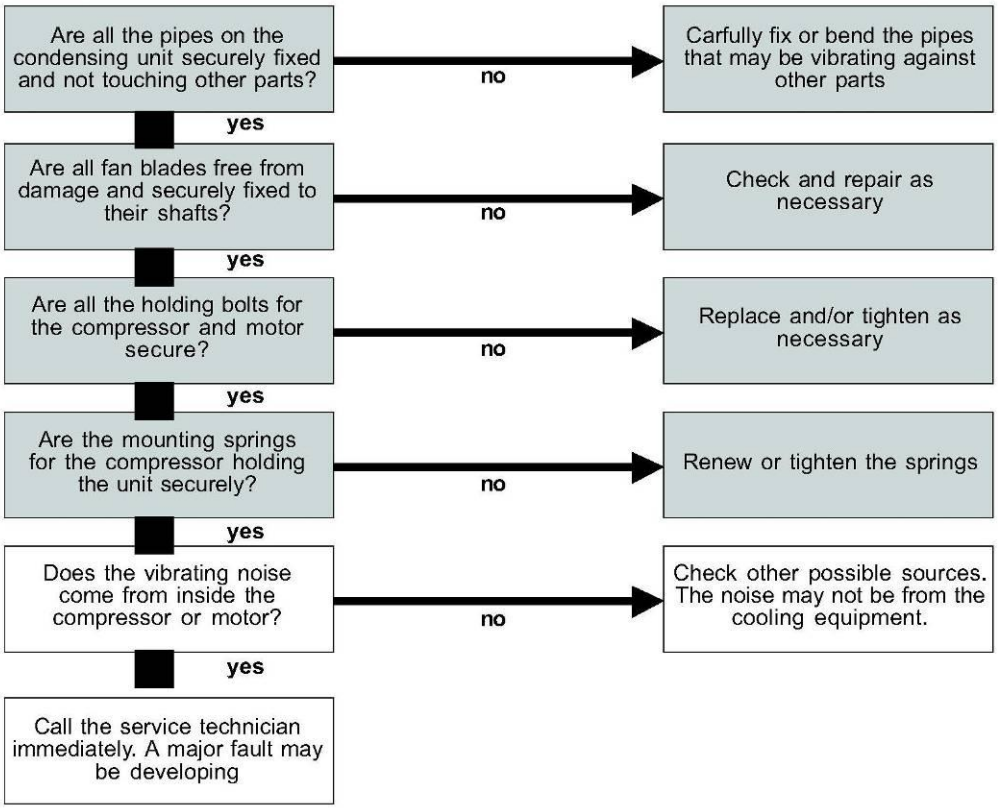


Table 6.4. Regular vibrating noises



CHAPTER XIII

Looking after standby generators

Primary Objective:

By the end of this session, the participants will be able to cover the routine and emergency maintenance of fixed diesel standby generator sets.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Responsible personnel, required procedures and methods for mechanical inspections,rountine servicing and emergency repairs of generator daily, weekly, monthly, and yearly basis.

- Procedure to follow the specific guidance for troubleshooting checklists.

Instruction on Looking after standby generators

Activity: Looking after standby generators

Responsibility: Electronic Engineer,Mechnicial Engineer(Central Vaccine store), Cold Chain Assistant/ Officer

Objective: Routine and emergency maintenance of fixed diesel standby generator sets.

When? Regular routine servicing and maintainance and emergency repairs or when needed.

Required Materials

- Tools
- spare parts
- voltalge stabilizer
- fuel
- Filter
- Mobil,
- diseal filter
- fan
- fan belt
- air purifier
- generator.
- Standard form for recording generator run-time
- generic guidance
- trouble shooting checklists
- manual

Activity	By whom	Procedure and methodology
1. Routine maintenance	▪ Mechnicial Engineer	a. Keep daily records of hours run to monitor usage and to plan servicing and maintenance schedules. See Annex 1. If the generator has an hours counter, you can use the counter instead of a paper record. b. Keep records of fuel used and periodically calculate fuel consumption in litres per hour. Compare this figure with the manufacturer's rated fuel consumption. (Note: If the fuel consumption is consistently higher than the rated consumption, there may be a problem with the engine.) c. Run the unit for five minutes - Automatic start generators: Turn the main power supply back on. Check that the generator stops correctly. - Manual start generators: Turn the generator off. Turn on the main power supply.

Activity	By whom	Procedure and methodology
2.Weekly testing	▪ Electronic Engineer ▪ Mechnicial engineer ▪ Refrigerator Technician ▪ Cold chain assistant/ officer	1.Warn store personnel that a generator test will take place. Turn off the main power supply to the store. • Manual start generators: Isolate the mains power supply. • Always start the generator 'off-load'. The generator engine should be started with the alternator isolator switch in the OFF position.
3.Weekly/Monthly engine inspection	▪ Mechnicial engineer ▪ Cold chain assistant/ officer ▪ Refrigerator Technician	a. Check fuel and oil levels. Fill up as necessary. b. Water-cooled engines only: Check coolant levels. Fill up as necessary. c. Check the battery water level if applicable. d. Check for loose nuts and bolts. e. Check the fan belt tension, if applicable. f. Drain water from the fuel filter/agglomerator. Check Agglometer while fueling diesel.
4.Occassional/Alternate inspection	▪ Electronic Engineer ▪ Mechnicial Engineer	a. Keep alternator ventilation openings clear. Use a dry air supply to clean internally. b. Grease alternator bearings as required. c. Check the functioning and condition of switchgear: Relays, contactors and protection devices. d. Check and tighten all machinery nuts and bolts, and terminals. e. Check the condition of the mountings and frame. f. Brush type generators: Check the brushes and slip rings for wear and replace if necessary. g. If problem cannot be solved by Electronical/Mechnical Engineer,contact Auto Mechanical Engineers for more difficulty..
5.Weekly generator room cleaning	▪ Assistant Staff	a. Sweep the floor of the generator room and remove all rubbish.
6.After every 125 hours running	▪ Electronic Engineer ▪ Mechnical or Auto mechanical Engineer	a. Check the battery condition (if fitted). b. Water-cooled units: Check for coolant leaks. c. Call auto mechnicial engineer if the problems cannot be solved by electronic or mechnicial engineer

Activity	By whom	Procedure and methodology
7.After every 250 hours running	▪ Mechnicial Engineer ▪ Electrical Engineer	a. Change the engine oil and oil filter. b. Check valve clearances. (enough space for valve) c. Clean or replace the injectors if the exhaust smoke is black. d. Replace the fuel filter element if using dirty fuel. e. Check the condition or tension of drive belts (alternator, fan, etc.). f. Contact auto mechnicial engineer if the problems cannot be solved by electronic or mechnicial engineer.
8.After every 500 hours running	▪ Mechnicial Engineer ▪ Electrical Engineer	a. Replace the air filter element. b. Replace the fuel filter element. c. Check the exhaust and air intake for leaks, damage or restrictions. d. Check the battery charging system, if applicable. e. Replace the fan belt if in use.
9.Annual tasks	▪ Mechnicial engineer ▪ Electrical engineer	• Water cool engines: Drain, flush and refill the cooling system.
10.Every 5 years, starting from 2014	▪ Chief of Cold Chain Vaccine Distribution Section, LogisticsManagement Division ▪ Cold Chain Assistant/Officer ▪ Mechanical Engineer ▪ Electrical Engineer ▪ Cold Chain and Vaccine Distribution Section	• Looking after store buildings, carry out a full safety inspection of the electrical system in the generator room, repair any defects and re-certify the system for the next five years.

Activity	By whom	Procedure and methodology
11.Emergency Maintainance	**Central level:** • Section Chief • ColdChain and Vaccine Distribution Section • Electrical • Mechnical Engineer **Regional Level:** • Regional Medical Store: Section Chief • Electrical Engineer • Mechnical Engineer • Refrigerator Technician **District level:** • Chief-District ImmunizationSection • Bio Medical Engineer • Electrical Engineer • Mechnical Engineer • Refrigerator Technician • Related company.	Follow these emergency maintenance procedures when an unexpected event occurs. See troubleshooting checklists in Annex 2. Refer also to Responding to emergencies in fixed storage locations.. • Minor defect: Rectify the defect within 24 hours and test the generator. • Major defect: Notify the electricity supply company that the standby generator is not working and that power cuts lasting more than two hours in 24 hours will place the vaccine at risk. Rectify the defect within seven days. • Manage the generator • Major breakdown requiring generator replacement: Rent a mobile generator and make the necessary temporary connections to the control panel. Order a permanent replacement and install it when it arrives.
12.Troubleshooting of AVR unit of generator	• Mechanical Engineer • Electrical Engineer • Refrigerator Technician	a. Apply the Annex 1 electronic troubleshooting checklists and read electroguard insulation manual in case of difficulty. First follow the security procedure. b. If you need spare parts in district(eg carbon brush) or exchange then, request to the electronic engineer or technician of the related district. c. If the problem cannot be solved in regional level then contract the technician team, with their recommendation buy or maintain the materials. d. If the maintainance cost is expensive then proceed for auctioning.
13.Additional information for repair and maintainance of generator.		If the problems cannot be solved with the capacity and ability of governmental techicians team then the external technicians are hired officially for repair and maintainance or recommendations further the informations are delivered to regional and central also.

Annex 1– Generator run-time form

Generator run-time form																									Sheet no:	8
Location:															Central Medical Stores										Inventory ID:	GEN10
Model:															Stamford 140 kVA										Year installed:	2006
Service interval table (hours run):	125	250	375	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	2000	2125	2250	2375	2500	2675	2750	2875	3000			
	3125	3250	3375	3500	3625	3750	4000	4125	4250	4375	4500	4675	4750	4875	5000	5125	5250	5375	5500	5675	5750	5875	6000			
Hours run at time of last service:																										2005
Hours brought forward:															2065.0										Next service due (see service interval table):	2125
Date														Hours run						Cumulative hours run				Comments		Initials
3 Jun 2011														1.5						2066.5				Mains failure		EB
5 Jun 2010														0.5						2067.0				Weekly test		FC
Hours carried forward:																										

Note: Use comments column to record reason for running and routine and emergency service and repair actions. Use service interval hours table to identify time of next service.

Annex 2 – Troubleshooting checklists

Larger generators often come with a control panel for auto-start, either designed independently of the actual generator set, or procured with it. Defects caused by the failure of control panel electronics (fuses, relays, internal clocks, etc.) are not specifically covered by the checklists below – for this type of fault, refer to the panel manufacturer's instructions and wiring diagrams.

Checklist 1: Generator problems

Symptom	Possible causes
No generator output	• Faulty or loose terminals, disconnected wiring or dirty contacts • Blown fuse or tripped circuit breaker caused by: - Overloaded generator - Short circuit due to breakdown in cable insulation • Break in stator output coil • Demagnetized permanent magnet • A faulty automatic voltage regulator (AVR) • Brush type generators only: Worn or dirty brushes and slip rings.
Output voltage is very low (only a few volts)	A faulty AVR Brush type generators only: Disconnected rotor coil Worn brushes or faulty contact
Output voltage is low but more than a few volts	Engine speed too low – adjust Short circuit in a coil A faulty AVR
Output voltage is high at normal engine speed	A faulty AVR
Output voltage is normal when the generator set is cold, but varies when the set warms up	A faulty AVR
Generator trips out, or rated generator output is not available and the speed of the engine fluctuates significantly (>10%) between no-load and load conditions	Excessive initial current at start up: reduce load by: Starting higher loads first Fitting reduced voltage starting equipment Output of engine is below rated engine power: service and/or repair the engine. Faulty engine governor
Engine problems	See Checklist 2 and 3.
Warning: DO NOT change fuses or re-set circuit breakers without first isolating the supply, stopping the generator and correcting the fault. DO NOT attempt to start a generator with an electrical load connected.	

(Source: Intermediate Technology Publications. Engineering in emergencies: A practical guide for relief workers. 2001 edition. Table 14.3)

Checklist 2: Symptoms and possible causes of faults in diesel engines

Symptom	Possible causes (Checklist 3)
Difficult starting:	
Engine turns over, but will not fire – fuel problem	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Engine will not turn over, or only slowly – cranking problem	12, 15, 16, 17, 18
Engine turns easily – poor compression	19, 20, 21, 22, 23, 24, 25, 26, 30
Engine will not bring generator up to speed – lack of power	Poor compression, fuel problems and overheating, plus: 27, 28, 29, 30, 56
Engine misfires	Poor compression, fuel problems and overheating, plus: 4, 5, 6, 8, 9, 28, 29
Engine runs, then stops	Fuel problems, poor compression, overheating plus: 14, 31
Engine fails to attain running speed	6, 10, 15, 31, 53
Engine 'hunts' (speed varies up and down around a mean)	6, 8, 9, 53
High fuel consumption	Poor compression, plus: 1, 8, 9, 11, 20, 23, 24, 26, 27, 28, 29, 30, 56
High oil consumption	21, 23, 24
Dark blue exhaust smoke	23, 24
White exhaust smoke	7, 32
Black exhaust smoke	1, 8, 11, 31, 33
Excessive carbon deposits on piston head, cylinder head and in exhaust	1,8, 11, 27, 28, 54, 55, 56
Overheating:	
Air-cooled engines	14, 28, 31, 34, 35, 44
Water-cooled engines	14, 28, 31, 36, 37, 38, 39
Low oil pressure	13, 14, 40, 41, 42, 43
High oil pressure	43
Vibration	Poor compression, plus: 8, 9, 20, 24, 44, 45, 46, 47
'Knocking' (detonation)	Overheating, plus: 1, 8, 28, 52
Mechanical noises	23, 26, 46, 47, 48, 49, 50, 51, 52

(Source: Intermediate Technology Publications. Engineering in emergencies: A practical guide for relief workers. 2001 edition. Table 14.3)

Checklist 3: Possible causes and remedies of faults in diesel engines

Possible causes (see Checklist 2)		Possible remedies
1	Incorrect grade, or poor quality fuel	Change fuel
2	Fuel tank empty	Fill tank and bleed fuel system of air
3	Stop/start lever in wrong position	Adjust
4	Choked fuel filter – visually inspect	Poor servicing – change filter
5	Faulty fuel lift pump	Inspect and repair
6	Air in fuel system	Bleed air from system
7	Water in fuel system	Drain fuel system, including filter bowl, agglomerator and tank
8	Faulty injector nozzle	Test spray and clean or change nozzle
9	Faulty fuel injection pump	Have pump checked by competent workshop
10	Retarded injection	Check and adjust
11	Choked air filter	Poor servicing – clean or replace
12	Lubricating oil too heavy	Change oil
13	Lubricating oil too thin	Change oil
14	Lubricating oil level low	Poor servicing – top up
15	Engine started under load	Disengage load at clutch
16	Battery not charged (electric start)	Charge battery, or 'jump-start'
17	Loose or corroded battery terminals	Check, clean and tighten
18	Faulty starter motor (electric start)	Check terminals, solenoid switch, starter gear, brushes
19	Loose injector	Check and tighten
20	Valves leaking or sticking	Clean and re-grind. Reset tappets
21	Valve guides worn	Replace guides
22	Broken or defective valve spring	Replace spring
23	Worn cylinder bore: excessive piston clearance gives a continuous 'slapping' noise	Re-bore and fit with oversized piston and rings
24	Broken, worn or sticking piston rings	Clean and free rings. Check cylinder liner is not scored
25	Incorrect decompressor clearance	Inspect and adjust
26	Incorrect tappet clearance	Check and adjust
27	Choked exhaust system	Clear or replace
28	Incorrect injection pump timing	Check and re-time
29	Incorrect valve timing	Re-set valve timing
30	Cylinder head gasket leaking	Check and replace
31	Engine overloaded	Reduce load
32	Water leaking from the cooling system into the cylinder combustion area	Check and replace gasket
33	Inlet air temperature high	Improve ventilation to engine housing and airflow to and from the engine
34	Poor circulation of cooling air Re-circulated cooling air Air inlet and/or outlet obstructed	As 33 above
35	Cylinder cooling fins blocked	Clean
36	Water cooling thermostat faulty	Check and replace
37	Cooling water level too low	Top up
38	Slack water pump drive belt	Inspect drive belt for wear. Tighten or replace

Possible causes (see Checklist 2)		Possible remedies
39	Blockage in water cooling system	Clear with cleaning fluid additive
40	Choke oil strainer or filter	Clean strainer or change filter
41	Badly worn bearings	Overhaul
42	Worn oil pump or damaged drive	Check and replace
43	Defective oil pressure relief valve	Repair or replace
44	Piston seizure	Stop engine immediately
45	Damaged cooling fan	Reshape or replace
46	Loose or damaged engine mountings	Inspect, tighten or change
47	Loose flywheel – intermittent 'thuds'	Check and tighten
48	Worn connecting rod bush or bearing – low pitched 'knock'	Overhaul
49	Worn gudgeon pin or small end bearing – high pitched 'tap'	Overhaul
50	Main bearing worn – low pitched 'thud'	Overhaul
51	Crankshaft end play – intermittent 'thuds'	Adjust
52	Excessive carbon build-up on piston	De-carbonize
53	Incorrectly adjusted governor or tight governor linkages	Adjust
54	Continuous idling	Shut down instead of idle
55	Regular running on low load	Match engine to load by choosing a lower powered generator set.
56	Low temperature running	Check sizing and operation of cooling system – especially water-cooled engines.

(Source: Intermediate Technology Publications. Engineering in emergencies: A practical guide for relief workers. 2001 edition. Table14.3)

CHAPTER XIV

Looking after voltage regulators

Primary Objective:

By the end of this session, the participants will understand how to carry out routine checks on the three-phase voltage regulators that are connected to the cold rooms and freezer rooms. It also tells you how to check whether the single-phase voltage regulators connected to individual vaccine refrigerators and freezers are working.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Responsible personnel, required procedures and methods for routine check up of the voltage regulators.
- How to carry out routine checks on the three phase voltage regulators that are connected to cold rooms and freezer rooms.
- How to check whether the single phase voltage regulators connected to individual vaccine refrigerators and freezers are working with its procedures and methods.
- Troubleshooting of electrogards units.

Instruction on Looking after voltage regulators

Activity:	Looking after voltage regulators
Responsibility:	Electrical Engineer (Central Vaccine Store), Refrigerator Technician (Regional Medical store) CCA/Section officer (District level)
Objective:	Regular check up of three voltage referigerator
When?	Daily testing or inspection
Required materials:	• Tools and spare parts. • Voltage stabilizer International or Manual • Troubleshooting checklist of voltage stabilizer.

Activity	By whom	Procedure and methodology
1. Training	▪ Electrical Engineer(Central store) ▪ Electrical Engineer ▪ Mechnical Engineer Refrigerator Technician(Regional medical store and district level)	• All personnel who are responsible for looking after voltage regulation equipment should receive appropriate hands-on training to ensure that they are capable of carrying out all of the tasks set out in this SOP.
2.Manual	▪ Electrical Engineer	• Read the manufacturer's operating instructions and follow them exactly. File the instruction manuals in a safe place.
3.Daily checks	▪ Cold chain Officer	• Carry out the checks described below at the same time as the morning temperature monitoring check.
4.Three-phase voltage regulators for cold rooms and freezer room	▪ Electrical Engineer (Central or Regional medical Store)	• Check that the 3-phase meter is reading 400 volts ±1% (396-404 volts) and check that the three individual phase meters on the lower panel are all reading 230 volts ±1% (228-232 volts). • Check the voltage regulators for any problems exits, call the related Engineers or technicians. • If automatic transformers do not have any problems, check electronic voltage controls. Note: Check that all three red yellow and blue 'output' phase indicator lights and 'input' phase indicator lights are on or not. Then carefully listen for the sound in the unit. If you hear the chattering sound continuously, call the engineer or technician.

Activity	By whom	Procedure and methodology
5.Single-phase refrigerator and freezer voltage regulators	▪ Cold Chain assistant/Officer ▪ EPI Supervisor/Officer(Central /regional medical store/ district)	• Make sure that the correct type of unit is connected the refrigerator or freezer. Electric compression cycle equipment requires one type of unit. • Check that the input and output indicator lights on each of the units are showing correctly. • If the unit is defective, replace it as soon as possible. • Inform to the Regional or Central in case of discomfort.
6.Troubleshooting the Electrogard units	▪ Electronic Engineer ▪ Mechnical Engineer ▪ Refrigerator Technician	• If problems are reported, follow the Electrogard troubleshooting checklists shown in Annex 1 and consult the Electrogard installation manual. Take suitable electrical safety precautions whilst carrying out this work. • If spare parts are required, or spare parts have been used – for example, carbon brushes, request the electrical engineer or related technician to order replacements.
7.Additional support for the maintainance of voltage stabilizer		If the problems cannot be solved by the capacity and skills of governmental technician team then contract of MoU is prepared for the external team support in repair and maintainance or recommendations.

Annex 1 – Electrogard troubleshooting checklist

The following notes and troubleshooting tables have been supplied by Electrogard. The work shown on the troubleshooting tables must only be carried out by a qualified electrician.

Control panel indicators and switches

1. Each phase voltage can be selected by turning the yellow rotary switch mounted just below the main voltmeter on the top left hand corner of the front panel. This enables R-Y, Y-B and B-R voltages to be read on the voltmeter. These voltages should always be 400 volts ±1% (396-404 volts). In addition, the individual Phase to Neutral voltage is shown on the three single phase meters behind the central glass panel. Each Phase to Neutral voltage should be 230 volts±1% (228-232 volts).

2. Three input indicators - Red, Yellow and Green - indicate availability of three phases from the mains commercial supply to the regulator. If any one of the phases is missing, the indicator of that phase will switch-off and the regulator will trip and show zero output voltage. In such a case, your electrician needs to check and ensure that all the three phases are made available to the regulator from the commercial supply and that nothing is wrong with the regulator.

3. Three output indicators - Red, Yellow and Green indicate availability of all the three phases, properly stabilized, to the cold room or freezer room. If the regulator trips due to any fault, these three output indicators will switch-off simultaneously. This could be due to excessively high input voltage in one or more of the phases, or any phase missing, or a fault with the regulator.

4. These regulators are protected against high voltages and single phasing resulting in output voltage trip in both the cases. The overloading/ short circuit protection is provided by an MCB in the input circuit and located on the right side panel.

Servo Voltage Stabilizer Maintenance/ Trouble Shooting Manual

If the Servo Voltage Stabilizer is not giving satisfactory service, please check and do the necessary adjustments as suggested below:

FAULT	SOLUTION
1) MAINS ARE GIVEN TO SERVO BUT NO OUTPUT VOLTAGE FROM SERVO.	• CHECK THE INPUT CONNECTIONS, IF LOOSE TIGHTEN THEM. • CHECK THE MCB ON SIDE PANEL, WHETHER ON OR NOT. • CHECK THE CONTACTOR WHETHER ON OR NOT. IF NOT CHECK THE PRESENCE OF VOLTAGE ON THE CONTACTOR COIL, IF PRESENT – COIL IS DEFECTIVE – REPLACE CONTACTOR COIL. • CHECK IF THE INPUT VOLTAGE IS WITH IN THE SPECIFIED WINDOW. IF OUTSIDE THE WINDOW, THE STABILIZER IS IN CUT-OFF MODE.
2) OUTPUT VOLTAGE IS NOT AT 230 VOLTS IN ONE OR TWO PHASES	• OPEN THE FRONT PANEL. SET THE VOLTAGE FROM `POT', AFTER REMOVING THE CAP, WHERE SET-VOLTAGE IS WRITTEN, BY ROTATING CLOCK OR ANTI CLOCK WISE WITH SCREW DRIVER. • IF COULD NOT BE SET FROM POT, SET THE VOLTAGE FROM PRESET NO. P1 ON THE CARD BY ROTATING IT WITH SCREW DRIVER.
3) SERVO MAKES CHATTERING SOUND WHILE CORRECTING VOLTAGE.	• THE SESTIVITY PRESET P-2 ON THE CARD WILL SOLVE THE PROBLEM. ROTATE IN CLOCKWISE OR ANTI CLOCK -WISE SLOWLY. • CHECK THE SENSTIVITY BY INCREASING THE VOLTAGE MANUALLY & THEN PUTTING IT ON AUTO MODE. NOW DECREASE THE VOLTAGE & PUT ON AUTO MODE & SEE WHETHER THE SAME SOUND IS THERE OR NOT. ALSO CHECK THAT THE OUTPUT VOLTAGE COMES TO 230±1% VOLTS IN BOTH CASES, OTHERWISE ADJUST P2 AGAIN.
4) OUTPUT CUT OFF PROBLEM AT LOW / HIGH VOLTAGE.	• ADJUST PRESET ON THE CARD. P-3 IS FOR SETTING LOW VOLTAGE CUT OFF & PRESET P-4 IS FOR SETTING HIGH VOLTAGE CUT OFF.

FAULT	SOLUTION
5) OUTPUT IS ZERO IN ONE PHASE & DOES NOT INCREASE OR DECREASE MANUALLY.	• CHECK THE CARBON BRUSH OF VARIABLE TRANSFORMER (VARIAC) IF BROKEN, CHANGE IT. SPARE CARBONS ARE IN THE ARM ITSELF UNDER THE ALUMINIUM COVER.
6) METER IS NOT SHOWING INPUT OR OUTPUT VOLTAGE.	• CHECK THE METER SWITCH IS ON OR NOT. • METER MAY BE DEFECTIVE IF NOT SHOWING INPUT AS WELL AS OUTPUT. • THE SELECTOR SWITCH MAY BE FAULTY, CHANGE IT.
7) VOLTAGE IS SET ON EACH PHASE AT 230 VOLTS BUT BETWEEN R-Y, Y-B & B-R, i.e., BETWEEN PHASE TO PHASE IS NOT 400 VOLTS AS REQUIRED OR DIFFERS WITH EACH OTHER.	• TIGHTEN THE NEUTRAL ON ALL THE VARIACS & INPUT/ OUTPUT TERMINALS. • IT IS ADVISABLE TO HAVE A DEDICATED EARTH DUG UP FOR GROUNDING THE NEUTRAL. THE SERVO CHASSIS SHOULD HAVE A SEPARATE EARTH.

CHAPTER XV

Managing diluents in the supply chain

Primary Objective:

By the end of this session, the participants will know how diluent stocks should be managed throughout the supply chain so that vaccine and diluent stocks always match one another closely and health workers are always able to reconstitute freeze-dried vaccine with the correct diluent.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Procedure and methods for maintaining stock record of diluents received and proper distribution of diluents.
- Procedures for correct storage of diluents at central, regional levels and health facility level.

Instruction on Managing diluents in the supply chain

Activity:	Managing diluents in the supply chain
Responsibility:	All personnel who have responsibility for vaccines and diluents in vaccine stores, health facilities, and during transport.
Objective:	How diluent stocks should be managed throughout the supply chain so that vaccine and diluent stocks always match one another closely and health workers are always able to reconstitute freeze-dried vaccine with the correct diluents.
When?	During the time of Vaccine Distribution
Required materials:	• Packing materials • Registered form(ma. Le. Fa:46) • Issued form(ma.lee.fa:48) • Logistics, Received and Supply Form

Activity	By whom	Procedure and methodology
1.Record diluent arrivals in the stock records	▪ EPI Supervisor/ Officer ▪ Cold Chain Assistant/ Officer ▪ Store keeper ▪ Chief Health Facility(Vaccine sub store)	All stores must record the following minimum information for vaccine diluents when they are received in the store in Registration form (Ma. Le. Pa. 46) and issue or Supply form (Ma. Le. Pa. 48) • Type of vaccine for which the diluent is intended. • Manufacturer of the diluent. • Vial presentation (doses per vial). • Batch number(s). • Expiry date. • Number of doses received
2. Record outgoing diluent in the dispatch records	▪ EPI Supervisor/ Officer ▪ Cold Chain Assistant/Officer	All stores must record the following minimum information for vaccine diluents when they are dispatched by the store to a lower level facility in Issue or supply form (Ma. Le. Pa. 48): • Type of vaccine for which the diluent is intended. • Manufacturer of the diluent. • Vial presentation (doses per vial). • Batch number(s). • Expiry date. • f. Number of doses issued.

Activity	By whom	Procedure and methodology
3. Issue diluents correctly	▪ EPI Supervisor/ Officer ▪ Cold Chain Assistant/Officer ▪ Health Facility Chief(Vaccine Sub store)	All outgoing freeze-dried vaccines must be accompanied by diluents which meet the following requirements: • The correct diluent (same manufacturer, same vaccine type and same vial/ampoule size). • The number of diluent vials issued must exactly match the number of vaccine vials, even if the lower level store or health facility reports unequal quantities of vaccine and diluent in its requisition form . • Compatible expiry date to the vaccine .
4.Pack and transport diluents correctly	▪ EPI Supervisor/ officer ▪ Cold Chain Assistant/Officer ▪ Health Facility Chief(Vaccine Sub store)	• Diluent ampoules are fragile. The lightweight inner cartons must be packed in outer cartons with sufficient padding material to prevent movement. • Diluents must not be exposed to temperatures below 0°C during transport.
5.Store diluents correctly at central and regional levels	▪ EPI Supervisor/Section officer ▪ Cold Chain Assistant/Officer	a. Diluents which are supplied to vaccine store must be kept in the cold chain at +2°C to +8°C before 24 hour of supply. b. Diluents which are supplied separately from the vaccine must be stored in a clearly marked area of the store, arranged by vaccine type, vaccine manufacturer and date of expiry. c. Diluent which are supplied separately from the vaccine must be protected from physical damage, moisture, excessive heat and temperatures below 0°C .
6.Store diluents correctly at health facility level	▪ Chief of Health Facility ▪ Store Keeper	• At health facility level, and during outreach sessions, all diluents must be stored in the cold chain at +2°C to +8°C.

Note: While packing vaccine amd diluentes maintain the temperature between +2°C to +8°C.

CHAPTER XVI

Conducting a physical count

Primary Objective:

By the end of this session the participants will understand how tomanage the stockand recordsaccurately, it is likely that stockouts or over-stocking will occur in the supply chain. Participants will also understand that for this reason, the physical stock must be counted regularly to ensure that the stock levels recorded in the stock control system are accurate and complete.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Procedure and methods for systematic physical count.
- Regular physical check procedures for plan prepare and conduct the count.

Instruction on a Physical Count

Activity:	Physical count
Responsibility:	Cold chain officer, EPI Supervisor/ Officer
Objective:	To conduct the physical count.
When?	Every three months in Central and regional medical stores Every month in district and sub stores and health centre Any time when needed
Required materials:	Stock control register Electronic calculators Logistics Form Issue Receivedand Supply form Loss and Adjustment Form Stock count sheets Batch Card Logistics monitoring Form (ma.le.fa:49)

1.Procedure for Physical count

By whom	When	Procedure
a.Count frequency at central store level	every three months	Stock counts for vaccines, diluents, syringes and safety boxes
	once a year	Stock count for Cold chain equipmentspare parts.
b.Count frequency at regional medical store	every three months	Stock counts for vaccines, diluents, syringes and safety boxes
	once a year.	Stock count for Cold chain equipmentspare parts
c.Count frequency at district:	every month	Stock counts for vaccines, diluents, syringes and safety boxes
	once in a year	Stock counts forcold chain equipment spare parts
d.Count frequency at sub store or Vaccine Distribution centre:	at the time of requesting vaccine	Stock counts for vaccines, diluents, syringes and safety boxes
	once a year.	Stock counts for cold chain equipment spare parts

Activityy	By whom	Procedure and methodology
2.Plan the count	▪ Section Chief Cold Chain or VaccineDistribution Section	a. **Date**: Set the date for each count well in advance. b. **Cold Chain Assistant/ Officer:** Make firm arrangements with all the people who will help with the count. c. **Items to be counted:** Decide what items you are going to count .These supplies will include spare parts, stationary and disposable electronic temperature monitoring devices such as freeze indicators and 30-day refrigerator temperature loggers.
! Precautions • **Remember that physical count is different from stock count and should be conducted before receiving and distributing stock. Choose a day when no supplies are scheduled to arrive and there are no planned distributions.** • **In stores which have cold rooms and/or freezer rooms, provide all count assistants with the correct type of warm clothing. .** • **A typical routine count should cover vaccines, diluents, droppers, syringes and safety boxes. Ancillary supplies also need to be counted at least once a year so that they can be replenished.**		
3. Prepare for the count	▪ EPI Supervisor/ officer ▪ Cold Chain Assistant/Officer	**Complete the following tasks in the week leading up to the stock count:** • Cold rooms and freezer rooms: Ensure that vaccines are neatly arranged on shelves or pallets, organized by batch number and expiry date. • Refrigerators and freezers: Ensure that the vaccine is neatly arranged in refrigerators and freezers, organized by batch number and expiry date. • Diluent dry store: Ensure that diluents are neatly arranged in the dry store by batch number and expiry date. • Syringe store: Ensure that syringes are neatly arranged in the dry arranged by size. • Count sheets: Print sufficient count store by batch number and that safety boxes are neatly • sheets – at least one will be needed for each cold room, freezer room, refrigerator, freezer and dry store (see Annex 1). • Stock level report: On the day of the count, prepare a current stock level report .

Activity	By whom	Procedure and methodology
4. Conduct the count	▪ Cold Chain ▪ EPI Supervisor ▪ Cold Chain Assistant	a. **Close transactions**: Close all transactions in the store until the count is finished. DO NOT issue any further supplies until the count has been completed and reconciled. **b. Incoming stock:** If you have incoming stock which has not yet been entered into the stock records, DO NOT include it in the stock count. c. **Outgoing stock**: If you have previously prepared a draft dispatch which has not yet left the store, and you have already entered the transaction in the stock records, you MUST put this stock to one side. DO NOT include it in the stock count. d. **Instructions:**Review counting instructions with the counting assistants before they begin. Demonstrate how to identify product types, the number of doses per vial, lot number, expiry date, etc. Demonstrate an actual count. Explain the complete process, including the reason for the count and how to complete and double check a count sheet. e. **Safe working**: In stores with cold rooms and/or freezer rooms, explain safe working practices. Explain the need to work fast and accurately when counting the stock in refrigerators and freezers in order to minimize the exposure of vaccines to room temperature. f. **Count order**: Describe the order in which the count will be carried out – for example Cold Room no. 1, Cold Room no. 2, Freezer Room, Refrigerator no. 1, etc. Prepare a separate set of count sheets for each location. g. **Equipment**: Provide each counting team with an electronic calculator.
5. First count	▪ Cold Chain officer ▪ EPI Supervisor ▪ Assistant/Officer	• Work in teams of two . One person will count the item. The second person will record the count and the relevant information about the item on the count sheet. • Once a team has completed its assignment for the first count, the supervisor will assign the team to a different location to verify the results of the first count.
6. Second count	▪ Cold Chain Officer ▪ EPI Supervisor ▪ Cold Chain Assistant	• Each team will check the results of another team's first count. If there is only one team, the person who counted in the first count should change places with the person who previously recorded the results. • If any discrepancy is found between the two counts, notify the count supervisor.

Activity	By whom	Procedure and methodology
7. Reconciliation	▪ Cold Chain Officer ▪ EPI Supervisor ▪ Cold Chain Assistant	• Compare the finally agreed stock count for each item in each location in each store against the current stock level report you have previously printed. • Update the stock records as necessary to show the correct data for all items. If the difference for any item is greater than ±1%, investigate the reason.
8. Ancillary supplies count	▪ Cold Chain Officer	Identify all items that need to be replenished. Pay close attention to the expiry dates where these apply. This includes syringes and single use electronic temperature monitoring devices (freeze indicators and 30-day refrigerator loggers).

Annex 1-Stock count sheet for vaccine and diluents

The following two pages show blank count sheet for vaccine and other supplies. These can be printed out. Alternatively use the excel file.

- Stock count sheet for vaccine and diluents.
- Stock count sheet for syringe, safety bo and other products.

Stock count sheet for vaccines and diluents

Date:		Location:		Sheet no:	
First count team:					
Second count team:					

Count no.	Item description	Number of vials (A)	Doses per vial (B)	Total doses (A x B)	Lot no.	Expiry date	Notes
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							
1							
2							

Annex- 2

Vaccine Stock Control Form

Name of Vaccine:

S.No.	Date (DD/MM/YY)	Vaccine and Diluents	Vial Size	Manufa-cturer	Lot No.	Expiry Date (DD/MM/YY)	Received from	Received Quantity (in dose)	VVM Stage at the time of receive				Distrib-uted to	VVM Stage at the time of distribution		Damaged or lost vaccine and diluents quantity (dose)	Current vaccine balance	Current diluents balance	Remarks	Signature
									VVM					VVM						
									१	२	३	४		१	२					
		Vaccine																		
		Diluents																		
		Vaccine																		
		Diluents																		
		Vaccine																		
		Diluents																		

Note

In the case of B.C.G, Measles and J.E. needs to complete the diluents column
In the case of other vaccines diluents column should be blank

Balance of Physical Count		
Balance carried forwarded to		

Annex- 3

Safety Box Stock Control Form

Type of Safety Box: **Size:……. Liter**

S.No.	Date (DD/MM/YY)	Manufacturer	Received from	Received Quantity	Distributed to	Current Safety Box balance	Remarks	Signature

Balance of Physical Count	
Balance carried forwarded to	

Annex- 4

Syringe Stock Control Form

Type of Syringe: **Size: ……. ml**

S.No.	Date (DD/MM/YY)	Manufacturer	Lot No	Expiry Date (DD/MM/YY)	Received from	Received Quantity	Distributed to	Dmaged Quantity	Current Stock balance of syringe	Remarks	Signature

Balance of Physical Count	
Balance carried forwarded to	

Ma.Le.Pa. F. No. 49

Government of Nepal
……..Department
……..Office

Inventory Inspection Form

(Fiscal Year……)

S.No.	Stock book page No.	Inventory Classification No.	Particular	Unit	Balance as per stock book		Specification		During physical count			Running Condition		Remarks
					Quantity	Price	Matched Qty.	Unmatched Qty.	Less (Qty)	Excess (Qty)	Cost of Less/ More	Yes	No	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Signature of concerned personnel
Date:

Signature of Section Chief
Date:

Signature of Inventory Inspector:
Name:
Designation:
Date:

CHAPTER XVII

Safe disposal of expired or damaged vaccine and diluents

Primary Objective:

By the end of this session, the participants will understand the fundamental objective of supply chain management is to eliminate the vaccine wastage during storage. However, cases may arise where vaccine has been damaged or has exceeded its expiry date. When this occurs, the affected vaccine and any associated diluents must be clearly identified and isolated from other vaccines and diluents. Correct procedures must then be followed to account for the loss of the vaccines and to make sure that they are disposed of safely.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- Procedure for disposal of expired vaccines and diluents.

Instruction on Safe disposal of expired or damaged vaccine and diluents

Activity: Safe disposal of expired or damaged vaccine and diluents

Responsibility: Cold chain assistant/ Officer, EPI Supervisor/ Officer

Objective: Disposal of unopened damaged vials and expired vaccines management.

When? As needed

Required materials:

- Stock Control Register,
- Batch Card,
- Logistics report(ma.lee.fa:50),
- Product Register(ma.le.fa:52)
- Logistics Monitoring form (ma.lee.fa:49),
- Loss and adjustment form(WHO)
- Protective gloves and disinfectant are required if vials or ampoules broken.

Activity	By whom	Procedure and methodology
1.Managing expired vaccines and diluents		▪ Lyophilized vaccines and their associated diluents may not have the same expiry dates. Therefore, it is possible for a vaccine to expire before the diluent to which it belongs. ▪ It is also possible for the diluent to expire before the vaccine. If this occurs, it is essential that the associated vaccine or diluent is also withdrawn from stock. ▪ If it is not, there will be an imbalance between vaccine and diluent stocks and this will cause confusion. If the diluent is the first to expire, consider ordering new diluents in order to avoid wasting the vaccine.
2. At Central Vaccine Store (Teku)	▪ Store Keeper ▪ Cold Chain Chief(Logistics Management Division) ▪ Cold chain assistant/ Officer	a. Use thestock control register to identify the expired items. b. Collect expired and damaged items and placed them in a container clearly marked 'EXPIRED PRODUCTS FOR DISPOSAL– DO NO]T USE'.Remove the container outside the cold chain. c. If diluents also need to be removed from stock, place them in a container clearly marked 'EXPIRED DILUENT FOR DISPOSAL– DO NOT USE'. Store the container in a safe place in the dry store. d. Record the expired vaccine and/or diluents in the stock control system. Prepare a Loss and adjustment report – see Annex 1. e. As soon as permission is given to dispose of the vaccine, move the container to a safe place outside the cold chain.

Activity	By whom	Procedure and methodology
3.Managing damaged vaccines and diluents,physical damage	▪ Cold Chain Officer/Assistant ▪ EPI Supervisor/Officer ▪ Section Chief Cold chain	It is unlikely that vaccine vials will suffer from physical damage because glass vials are very robust. However, vaccine and diluents supplied in ampoules can break quite easily if they are dropped. If breakage occurs, wear protective gloves and proceed as follows: a. Write down the number and type of broken vials or ampoules and the batch number(s) and put them to one side. b. If vials or ampoules have been contaminated with spilled vaccine, write down the number and type affected. Place the broken and contaminated vials or ampoules in a closed leak-proof plastic container and treat the contents with disinfectant. c. If vaccine has been spilled, carefully collect all broken glass and clean the area of the spillage with disinfectant. d. Clearly mark the container: 'DAMAGED VACCINE FOR DISPOSAL– DO NOT USE'' and store it in a safe place outside the cold chain. e. Record the breakages in the stock control register. f. Used products are mentioned in product register(ma.le.pa 52) and signed by Cold Chain Section Chief /District Health/Public health Officer
4.Heat exposure (VVM colour change)	• Cold Chain Officer • EPI Supervisor	If the VVM shows that vaccine has reached the discard point, proceed as follows: a. Write down the number and type of damaged vials and their batch numbers and place them in a closed plastic container or carton. b. Clearly mark the container: 'DAMAGED VACCINE FOR DISPOSAL– DO NOT USE'' and store it in a cold room or vaccine refrigerator until permission is given to take it out of the cold chain. c. Record the damaged vaccine in the stock control register and prepare a Loss and adjustment report. Then entry in product discard report andproduct account (Ma. Le. Pa. 50) – see Annex 1 and 2. d. Prepare the Loss and adjustment report, product discard report and product account and approve it by section chief. e. As soon as permission is given to dispose of the vaccine, move the container to a safe place outside the cold chain.

Activity	By whom	Procedure and methodology
5. Exposure to freezing	▪ Cold chain Officer ▪ EPI Supervisor	If you suspect that vaccine has been frozen, you must carry out the Shake Test as described in EVM-SOP-E8-01: When and how to conduct the Shake Test. If you discover freeze-damaged vaccine, proceed as follows: a. Write down the number and type of damaged vials and their batch numbers and place them in a closed plastic container or carton. b. Clearly mark the container: 'DAMAGED VACCINE FOR DISPOSAL– DO NOT USE''. Store the container in a cold room or vaccine refrigerator until permission is given to take it out of the cold chain. c. Record the damaged vaccine in the stock control system and prepare a Loss and adjustment report. d. Fill the loss and adjustment form, product discard report and product account and signed it by Cold Chain Section Chief. e. As soon as permission is given to dispose of the vaccine, move the container to a safe place outside the cold chain.
6. Frozen Shake Test control samples	▪ Cold Chain Assistant/ Officer ▪ EPI Supervisor/ Officer(Central and District level)	Ensure that the frozen control samples for Shake Tests are also safely disposed off.
7.Final disposal procedures	▪ Cold Chain Assistant/ Officer ▪ Section Chief-Cold Chain and Vaccine Distribution Section ▪ Director (LogisticsManagement Division)	a.Obtain approval for disposal: 1. Collect information about the expired and damaged vaccines. 2. Inform to the Cold Chain Section Chief. 3. Fill the product monitoring form (ma. Le.pa.49)and prepare product discard report (ma. Le. Pa 50). 4. Submit the report to the committee of Section Chief, Account Officer, Administration and in district, to Chief of District Public Health Office, District Health Officer and Account Officer incorporated committee. 5. If needed get the approval of docunment by the committee. Once the committee has approved as per Ma Le Pa 49 and 50, the document should be signed by Office Chief. Final Disposal:As soon as permission is given to dispose of the vaccine, move the damaged vaccine to a incinitator. Note: Logistics Management Division will proceed for auctioning if the specialist report the products as unusable.

Annex 1-**Loss and Adjustment Report**

Note: Adapt this form to suit local requirements.

LOSS / ADJUSTMENT REPORT **No:** *serial number*

Issuing office: _____

Warehouse: _____

Issued by: _____ Date: _____

Signature: _____

Programme section:

Certified by: _____

Signature: _____

Loss: ☐ Damaged in transit: ☐ Other: ☐

Expired: ☐ Damaged in store: ☐ Explain:

Narrative & recommendation for corrective actions and disposal:

No.	Supply requisition	PO/ Delivery	Item description	Unit	Quantity to be disposed of

Property survey board submission:

List of attached documents to the report (photos, claim, lab analysis, batch and expiry dates, etc.)

Original copy:	Copy 1:	Copy 2:	Copy 3:

Ma.Le.Pa. No. 50

Government of Nepal
_____ Ministry/Deartment/Office/Project
Inventory Auction/Write-off Form

S.No	Inventory Classification ID No	Product Name	Specification	Received Date	Used Year	Quantity	Purchse Price	Tentative Present Price	Cause of aucton/ Write off	Type onf auction/Write off
1	2	3	4	5	6	7	8	9	10	11

Above mentioned information is exact and correct, as mentioned in the column no. 11 I am submitting for the approval of write-off/auction/dispose

Signature concerned *Section Chief's Signature* : *Approval's signature*

Personnal *Designation* :

Date: *Date:* *Date:*

CHAPTER XVIII

Vaccine and water/cool packs in refrigerators and freezers

Primary Objective:

By the end of this session, the participants will understand the procedures and methods to store vaccine in refrigerators and freezers.

Enabling Objectives:

By the end of this session, the participants will be able to:

- Clearly identify and access to Earlist Expiry-First-Out (EEFO) order of vaccines, its procedures and methods and distribute them accordingly.
- How to store freeze-sensitive vaccines in areas where there is no risk of freezing.
- Describe the storage procedures that allow cold air to flow freely around the stock.
- Separate the labelled vaccine, that cannot be used, from refrigerator for disposal from remaining stock.

Instruction on Storing vaccine and water/cool packs in refrigerators and freezers

Activity:	Storing vaccine and water/cool packs in refrigerators and freezers
Responsibility:	Cold Chain Assistant/ Officer(Central Vaccine Store/Regional Medical store, District store)
Objective:	Storing vaccine in refrigerators and freezers
When?	When needed
Required materials:	• Thermometer • Freeze tag

Activity	By whom	Procedure and methodology
1. General procedures	• EPI Supervisor/ Officer • Cold chain Assistant/ Officer	• **Arrange stock**: Arrange vaccines and diluents (where diluents are stored in refrigerators) by type, batch number and expiry date so that they can be accessed in Earliest-Expiry-First-Out (EEFO) order. • **Central and Regional stores:** If there is more than one vaccine refrigerator and/or vaccine freezer. Try to store one type of vaccine only in each appliance: • Print a contents list and attach it to the lid or door of the appliance. The list must show vaccine type, manufacturer, presentation, batch number and expiry date. • Replace the list with an updated version whenever vaccine is removed from stock or additional vaccine is added. Do not store diluents in the refrigerator. • Store all the vaccines(not OPV) refered by central and regional levelmaintaining temperature between +2 to +8 degree C and -15 to -25 degree C. (BCG and Measles can also be store but not necessary) • In health facility and all service delivery refrigerators: • Store vaccine and diluents in the refrigerator. If there is insufficient space, for all the diluent make sure you keep enough diluent in the refrigerator for the next immunization session. • Do not store expired vaccines, reconstituted vials with doses remaining after an immunization session, and vials with VVMs that have reached or are beyond their discard point. • Keep vials with VVMs showing more heat exposure than others in the box labelled ‘use first’. Use these vials first in the next session.

Activity	By whom	Procedure and methodology
		• Store all vaccine, dilutes and mixture of vaccine and diluents in district/substore at the temperature between +2 ºC to +8 ºC as recommended. • If MDVP is adopted, keep opened vials of DPT,Hebtid B,Hib,Polio and TT/TD vaccines, marked with the date of opening and place in the 'USE FIRST' box for first use during the next session. • In confusion of vaccine storing, place the vaccine between +2 ºC to +8ºC temperature. • Cooling and freezing water packs(+2 ºC to+8 ºC) • Do not use a refrigerator that contains vaccine to prepare cool water packs. • Do not freeze water packs in a freezer that contains vaccine unless the appliance has a separate ice pack freezing compartment. • Try to store unfrozen water packs upright to reduce the risk of leakage. Frozen water packs may be stored flat. • Hygiene • Always wash hands thoroughly before handling vaccine cartons and vaccine vials.
2. Storing vaccine and water packs in ice-lined refrigerators	• EPI Supervisor/ Officer • Cold Chain Assistant/Section Officer	a. Place vaccine and diluent cartons (where diluents are stored in the refrigerator) in the wire baskets provided with the refrigerator. Never remove the baskets to create additional storage space. Leave a vertical space between stacks of cartons to allow air to circulate b. Place the thermometer and freeze indicator device or 30-day electronic temperature data logger on the top of the stock, with the freeze-sensitive vaccines, so that it can easily be read. c. If there is a separate freezing compartment, use this to freeze water packs. Do not exceed the maximum number and weight of water packs stated in the refrigerator manufacturer's instructions. d. Neverfreeze ice packs in a refrigerator that contains vaccine. Always use a separate refrigerator that has been designated for this purpose.

Activity	By whom	Procedure and methodology
		e. Arrange vaccines and diluents as shown in the diagram below. The left hand side shows an arrangement of mixed vaccine stored at health facility level. The right hand side shows an arrangement for bulk vaccine storage at regional level. Note that older ILRs with adjustable thermostats may experience low temperatures if the thermostat is not correctly adjusted. Correct adjustment is critical. Placing a layer of empty water packs at the bottom of the unit also helps to reduce the risk of freezing in such units.
3. Storing vaccines and water packs in top opening refrigerators	• EPI Supervisor/ Officer • Cold Chain Assistant/ Officer	a. Place the thermometer and freeze indicator device or 30-day electronic temperature data logger on the top of the stock, with the freeze-sensitive vaccines, so that it can easily be read. b. If there is a separate freezing compartment, use this to freeze water packs. Do not exceed the maximum number and weight of water packs stated in the manufacturer's instructions. c. Never freeze water packs in a refrigerator that contains vaccine. Always use a separate refrigerator that has been designated for this purpose.
4. Storing vaccine and water packs in front-opening refrigerators	• EPI Supervisor/ Officer • Cold Chain Assistant/ Officer	a. Place the thermometer and freeze indicator device or 30-day electronic temperature data logger with the freeze-sensitive vaccines on the middle shelf. b. If there is a separate freezing compartment, use this to freeze water packs. Do not exceed the maximum number and weight of water packs stated in the manufacturer's instructions. c. 2,4 ice packs can be stored in refrigerator that contain vaccine which helps to maintain the temperature in loadsheding. A separate refrigerator that has been designated for freezing ice packs should be used. d. Arrange vaccines, diluents and water packs as shown in the diagram below.
5. Storing vaccine in chest freezers	• EPI Supervisor/ Officer • Cold Chain Assistant/ Officer	• Place the thermometer on the top of the cartons so that it is easily accessible. • Never freeze water packs in a freezer that contains vaccine. • ALWAYS use a separate freezer that has been designated for this purpose. • Never store diluent in a freezer.
6. Freezing and storing ice packs	• EPI Supervisor/ Officer • Cold Chain Assistant/ Officer	• Upright ice pack fast freezers: Stack water packs on the shelves and wait for them to freeze. Once they are frozen they can either be kept in the fast freezer or moved to a chest freezer for storage purposes. • Chest freezers with a single compartment: Place unfrozen ice packs evenly around the inner walls of the appliance. Once the packs are frozen, lay them on the bottom of the compartment and freeze a further batch.

CHAPTER XIX

Loading and operating refrigerated vehicles

Primary Objective:

By the end of this session, the participants will be able to cover the actions that should be taken when vehicles are loaded and unloaded, during transit, during overnight stops, and at the end of each trip.

Enabling Objectives:

By the end of this session, the participants can do:

- Preparatory tasks for the refrigerated compartment.
- Procedures and methods to pre cool the refrigerated compartment.
- Procedures and methods for packing the vaccines and diluents.
- Procedures and methodsfor loading the vechicle at the supplying store.
- Procedures to operate the vechicle.
- Describe how to unloadthe vehicle at the receiving store.
- Describe the procedures during overnight stops.
- Review temperature records for each trip.

Instruction of Loading and operating refrigerated vehicles

Activity: Loading and operating refrigerated vehicles

Responsibility: Chief (Cold Chain and Vaccine Distribution Section/ Logistics Management Division), Driver

Objective: How to load refrigerated vehicle and operate it

When? As when needed

Required material:

- Refrigerated vehicle;
- Packaging materials and restraining devices;
- Vehicle log book,
- Immunization packet,
- Temperature monitoring guide
- Containers
- Attached lid container
- Folding container with lid
- Collapsible container
- Nesting container
- Manual for loading the vaccine
- Trip report form,
- Supply form, Issued Form (ma.le.pa:48)

Activity	By whom	Procedure and methodology
1.Plan the delivery schedule	• Section Chief • Cold Chain Assistant/ Officer • Cold Chain and Vaccine Distribution section	a. Plan deliveries to make optimum use of the refrigerated vehicle(s). The planning process should take account of normal scheduled deliveries but also allow for urgent deliveries when these are required. b. Estimate the number of reusable shipping containers and disposable cartons which will be required for each delivery. c. Plan for vaccine distribution: Fill the Issue form for the demand of vaccine from Regional medical store d. Plan for travel:Departure time, means of transportation,contact number of driver,arrival time. e. In emergency, contact to the central and inform to the duty staffs for another option for travel with vehicle driver. Confirm about the safety of the vaccine. f. Loading the vehicle in the correct sequence is essential. If the vehicle is delivering to more than one store, plan load layouts so that loading takes place on a first-out-last-in basis. g. Schedule deliveries to arrive at designated times during working hours and notify receiving stores of the intended times of arrival.

Activity	By whom	Procedure and methodology
2.Prepare the refrigerated compartment	• Mechnical Engineer	a. Thoroughly clean the interior of the refrigerated compartment before each delivery. If the vehicle has been used for purposes other than the transport of vaccines or pharmaceuticals, disinfect the interior. b. Clean reusable shipping containers before each delivery. c. Maintain cleaning records for vehicles and reusable shipping containers to demonstrate obedience.
3.Pre-cool the refrigerated compartment	• Cold Chain Officer	a. Park the vehicle in the shade, and preferably under cover. b. Close the doors and pre-cool the refrigerated compartment to +2°C to +8°C before loading vaccine. Use mains electricity to power the refrigeration unit if this option is available. c. Vehicles with continuous temperature monitoring: Switch on the on-board continuous temperature monitoring equipment. Record the time of activation on the Trip Record Form – see Annex 2. d. Vehicles without continuous temperature monitoring: Securely attach an activated temperature data logger device in the refrigerated compartment as shown in Annex 1: Figure 1. Record the time of activation on the Trip Record Form – see Annex 2.
4.Packing vaccine and diluents	• Cold Chain Officer	a. Wash your hands and use clean gloves. b. Pack the vaccine and diluent cartons in the shipping containers or cartons with the vial caps uppermost. c. Use newspaper or other loose packing to ensure that the load cannot shift during transport. d. Place a packing list in the container/carton on top of the contents. e. Place a freeze indicator into at least one container/carton per destination. f. Label the container/carton with the final destination. g. Temporary workers: Have the pack-out checked by supervisor. h. If there is a lid: Close the lid and seal the carton with packing tape. i. Keep the shipping containers/cartons in a cold room (+2°C to +8°C) until the vehicle is ready to load. Alternatively, load them into the pre-cooled vehicle immediately after packing.

Activity	By whom	Procedure and methodology
5.Loading the vehicle at the supplying store	• Office Assistant • Helping staffs	a. During the loading operation, keep the loading door open for the minimum time possible . b. Use clean gloves. c. Load the vehicle so that shipping containers can be unpacked at the receiving stores on a first-out-last-in basis. This means that the containers which are to be delivered to the first store on the delivery round should be packed last, containers for the second store next to last, and so forth. d. Stack containers so as to encourage the even flow of cool air through the load. See Annex 1 for guidance principles. e. Stack the containers so as to ensure even weight distribution. f. Restrain the load securely with straps or netting. DO NOT cover the load with tarpaulin or other impermeable material – this will restrict air flow. g. Lock the doors to the refrigerated compartment: give key to driver. h. Record the time when loading is complete on the Trip Record Form – see Annex 2. i. Brief the driver on the route, planned delivery times, details of special or urgent deliveries, mobile phone numbers and any areas of concern on the route.
6.Operating the vehicle	• Driver • Cold Chain Officer	a. Check physical integrity of vehicle. b. Drive smoothly and carefully. c. Maintain contact with the supplying store by telephone at regular intervals. d. Vehicles with continuous temperature monitoring: Check the temperature of the refrigerated compartment at least once an hour using the in-cab thermometer display. e. Vehicles without continuous temperature monitoring: Check the temperature of the refrigerated compartment at least once an hour using the in-cab thermometer display. Record the temperature on the Trip Record Form only when stationary– see Annex 2. f. Take appropriate action if the temperature alarm sounds and/or the temperature display is outside +2°C to +8°C.

Activity	By whom	Procedure and methodology
7.Unloading the vehicle at the receiving store	• Vechicle driver • Helping staffs	• Park the vehicle in the shade, as close as possible to the loading bay. • Continue to run the refrigeration unit throughout the unloading operation. Use mains electricity to power the refrigeration unit if this option is available. • During the unloading operation, keep the loading door open for the minimum time possible • Use clean gloves. • Take the shipping containers into the store immediately. Check and unpack the containers as rapidly as possible and place the vaccines in the appropriate cold storage. If a cold room is available, unpack and check the shipment in the cold room. • Stack empty shipping containers in the refrigerated compartment. Restrain the containers securely. Ensure that exposed areas of T-floor or pallets are covered with cardboard to maintain even air flow through the remaining load as shown in Annex 1: Figure 3. • Record the time of arrival and departure on the Trip Record Form – see Annex 2. Notify the supplying store by telephone once the delivery has been completed and report if any problems. • Lock the doors to the refrigerated compartment. • Check the condition of the vehicle and refrigeration unit before departure.
8.Overnight stops	• Cold Chain Officer	a. Always park in a secure compound, in the shade. b. Ensure that the refrigerated compartment and driver's cab is kept locked. c. Ensure that one person remains with the vehicle at all times. d. Continue to run the refrigeration unit throughout the overnight stop. Use mains electricity to power the refrigeration unit if this option is available. e. Monitor the temperature of the refrigerated compartment at least once an hour using the in-cab thermometer. Record the temperature on the Trip Record Form – see Annex 2. f. Take appropriate action if the temperature goes outside +2°C to +8°C. g. Record the time of arrival and departure at the overnight stop on the Trip Record Form – see Annex 2. Notify the supplying store by telephone when you depart in the morning.
9.Review temperature records for each trip	• Cold Chain Officer	a. At the end of each trip complete the log book/route report. b. Download and print out the data from the on-board temperature recorder or temperature data logger and check the temperature record. Complete the Trip Record Form . See Annex 2. c. Investigate unexplained excursions outside the +2°C to +8°C range . Instruct the maintenance contractor or maintenance engineer to investigate and carry out necessary adjustments and/or repairs. d. File the temperature record and the completed Trip Record Form and keep the records for a minimum of three years.

Annex 1 – Guidance on loading a refrigerated vehicle

Source: www.horizonlines.com

Figure 1 – Side view of refrigerated compartment showing air flow through load

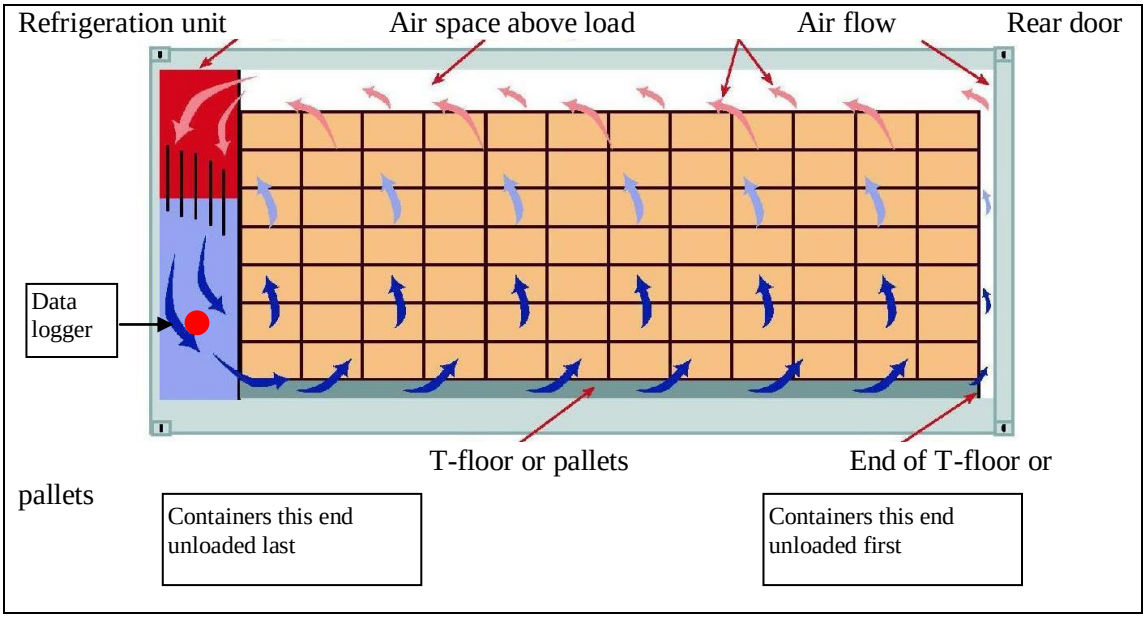


Figure 2 – End view of refrigerated compartment showing air flow through load

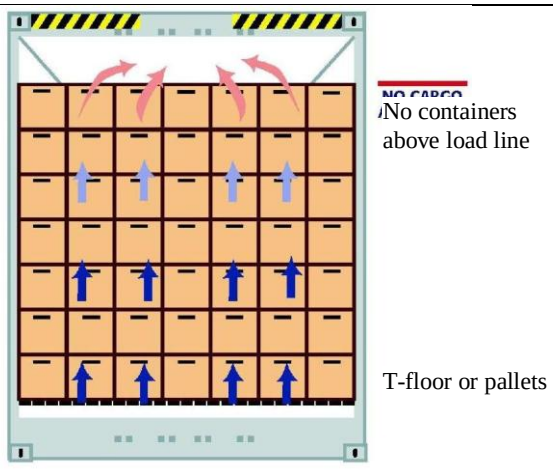


Figure 3 – Top view showing correct and incorrect packing

Optimal loading – Top view
In order to force air up and through the load, the entire floor should be covered.
Cover the floor from the front bulkhead to the end of the T-floor or pallet base.
Where the load does not cover the floor completely, lay cardboard or other filler material over the T-floor or pallet base.
Do not load past the end of the T-floor or pallet base.

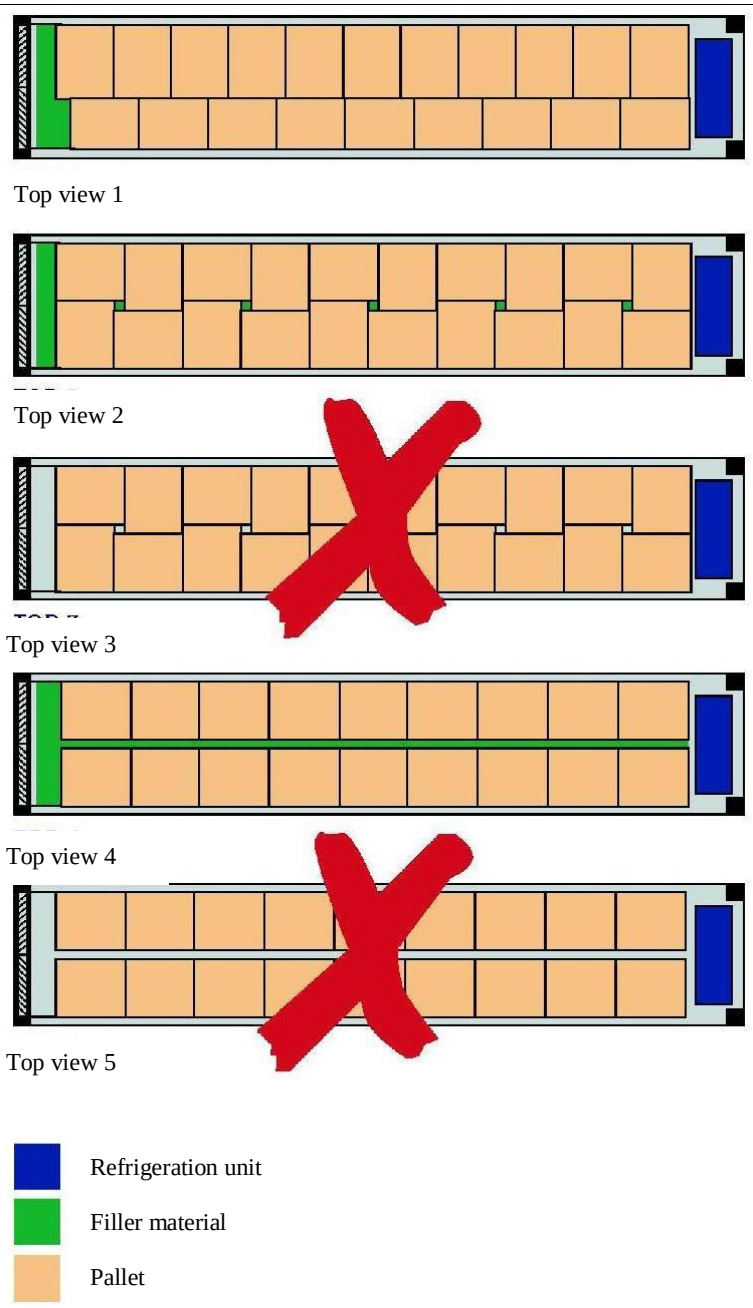
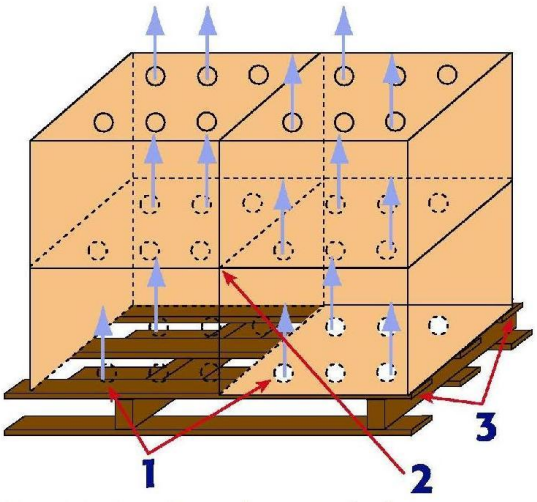


Figure 4 – How to load a pallet

- Place cartons on the pallets so that air can freely flow up into the cartons
- Fully support the corners of each carton on the pallet – do not allow them to overhang
- If pallets are wrapped with plastic film, DO NOT cover the top or bottom of the cartons – only wrap the sides.



Key:

1. Carton arrangement for unrestricted airflow
2. Strength of cartons in the corners
3. Corners of cartons supported

Annex 2 –Trip Record Form

Refrigerated vehicle trip record form

Vehicle registration number: _____ Trip start date: <dd/mmm/yyyy> _____ Sheet number: _____

Name of supplying store: _____ Trip end date: <dd/mmm/yyyy> _____ Nbr of sheets _____

Enter DATE:																																**Remarks**
Hour		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Temperature chart (°C)	+16																																																
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Event record		Enter time for each event - to the nearest hour																																															
Packing complete																																																
Start of trip																																																
Arrive at store																																																
Depart store																																																
Arrive at overnight																																																
Depart overnight																																																
End of trip																																																
Truck location																																																
Initials:																																																

CHAPTER XX

Monitoring temperature exposure during vaccine transport

Primary Objective

By the end of this session, the participants will learn how to read freeze indicators, how to pack them with a vaccine shipment and how to record freeze indicator and VVM status on the Requisition and Issue Voucher form.

Enabling Objectives

By the end of this session, the participants will be able to describe:

- How to read and manage freeze indicators and procedures.
- Procedures and methods to place freeze indicators in cold box.
- How to place freeze indicators in refrigerated vechicles.
- How to monitor temperature in refrigerated vehicle.
- Arrival checks and reporting procedures.
- Procedures for returning Requisition, Logistics and Issue form, Data logger and freeze indicator.

Instruction of monitoring temperature exposure during vaccine transport

Activity:	Monitoring temperature exposure during vaccine transport
Responsibility:	Cold chain Assistant/ Officer
Objective:	How to maintain accurate temperature during vaccine transport
When?	At the time of vaccine transport
Required materials:	• Thermostand • Vaccine Vial Monitor • Data logger • ISR form

Procedure:Freeze indicators should be placed with the most freeze-sensitive vaccine in each shipment. Typically this will be either the HepB or the pentavalent DTP-HepB-Hib or DTP-HepB+Hib vaccine. Freeze indicators DO NOT need to be placed in cold boxes which only contain BCG, OPV, Measles, MR or MMR because these vaccines are not damaged by freezing.

Activity	By whom	Procedure and methodology
1.Reading and managing freeze indicators	• Cold chain Assistant/ Officer	• **Reading electronic freeze indicators:** If the freeze indicator shows ✓ or OK it has not been exposed to freezing temperatures. If it shows X it has been exposed to a temperature of -0.5°C or below for more than 60 minutes. Once it has been triggered, the device cannot be used again. Two WHO pre-qualified types are: **Freeze Tag and Q-tag**  • FreezeTag® device • Reuse of freeze indicators: An indicator may be used many times, until either the battery expires or the device is triggered. • Storing freeze indicators: Freeze indicators must never be exposed to temperatures below freezing during storage. If they are, the indicator will trigger an alarm. Electronic freeze indicators are activated in the factory. They have a design life of up to five years. • Controlling freeze indicator stocks: All freeze indicators should be issued for use on an Earliest-Expiry-First-Out (EEFO) basis. Use the manufacturing date as a basis for issuing the device; this is printed on the device. • Safe disposal of electronic indicators: Once an electronic freeze indicator has been triggered it should be disposed off in accordance with local regulations for the safe disposal of batteries and old electronic equipment.

Activity	By whom	Procedure and methodology
2. Placing freeze indicators in cold boxes	• Cold Chain officer/Assistant	**a. Pack one freeze indicator for each location:** Choose at least one cold box in each shipment which contains freeze-sensitive vaccine. If a single vehicle is delivering vaccine to more than one receiving store, then the vaccine should be packed so that each receiving store receives at least one freeze indicator. Alternatively, if a single cold box is being used to deliver to more than one location, the storekeeper at the receiving store must be able to inspect the freeze indicator to check its status at the time when the vaccine is received . b. **Placing the indicator**: Place the freeze indicator in the cold box on top of the vaccine. Fix it to a secondary vaccine carton with adhesive tape or put it in a clear plastic bag and tape the bag in position. This will prevent the device from moving during transport. Do not place the device in direct contact with conditioned ice packs, cool water packs or warm water packs.
3.Placing freeze indicators in refrigerated vehicles	• Cold Chain Officer/Assistant	**a. Pack one freeze indicator for each location:** Choose at least one carton or reusable shipping container in each shipment which contains freeze-sensitive vaccine. If the refrigerated vehicle is delivering vaccine to more than one receiving store, then the vaccine should be packed so that each receiving store receives at least one freeze indicator. **b. Placing the indicator:** Place the freeze indicator in the carton or reusable shipping container on top of the vaccine. Fix it to a secondary vaccine carton with adhesive tape or put it in a clear plastic bag and tape the bag in position. This will prevent the device from moving during transport.
4.Monitoring temperatures in refrigerated vehicles	• Cold Chain Assistan/ Officer	a. **Vehicle without electronic temperature recorder:** The driver or co-driver must keep a Trip Record Form as shown in Annex 2. Read the temperature of the refrigerated compartment once an hour from the dashboard-mounted thermometer and mark it on the Trip Record Form when the vehicle is stopped . b. **Vehicle equipped with data logger or electronic temperature recorder**: Complete the Trip Record Form as shown in Annex 2. At the end of each trip, download and print out the temperature trace and attach it to the Trip Record Form. c. Investigate unexplained excursion outside +2 ºC to +8 ºC range. Instruct the maintenance contractor maintenance engineer to investigate and carry out necessary adjustments and repairs. d. File the temperature record and complete the Trip record form and keep the records for minimum 3 years.
5.Arrival checks and reporting procedures	• Cold Chain Officer/ Assistant	a. **Check freeze indicator**(s): Check the status of the freeze indicator(s) as soon as the vaccine arrives in the store. If the indicator has triggered (broken freeze watch or liquid spilled), carry out the Shake Test. b. **Check VVMs:** Inspect a sample vial for every vaccine and every batch in the shipment; check the VVM status. c. **Complete the Requisition and Issue Voucher**: Complete the temperature monitoring section of the Requisition and Issue Voucher form. Return one copy to the issuing store. The quantity and condition of vaccines received and the freeze indicator and VVM status must be checked and recorded. Annex 1 shows an example of a blank form and a completed form.

Activity	By whom	Procedure and methodology
6.Returning the Requisition and Issue Voucher and the freeze indicators	• Cold Chain Officer/ Assistant	• **Return the completed Requisition and Issue Voucher:** Receiving stores should return a copy of the completed Requisition and Issue Voucher to the issuing store. The procedure are as follows: • Fax the filled form that mentioned for a request of particular vaccines to Central store. • All details of vaccine such as quantity of vaccine, syringe and safety box, batch number, expiry date must be mentioned before returning vaccines a lot with form. • After receiving vaccine, record the quantity of vaccine and Vaccine Vial Monitor details with a signature by the cold chain section officer/assistant. • Keep record of the filled form by the vaccine received and return another to the refrigerated truck along to Teku. • File and record the docunments. • Data Logger • Take out the data logger after refrigerated van return to central vaccine store. • Attach the data logger in the computer and upload the data recorder. • If necessary, print the details. • Unplug the data logger from the computer. • Return the Freeze indicator • Store freeze indicators at room temperature. Return devices to the issuing store as soon as possible. • Receiving stores which collect vaccine from a issuing store should return the devices at the time when the next shipment is collected. • Store which receive vaccine should return details of device to the issuing store. • Re-stock un-activated freeze indicators: • Re-stock freeze indicators that have not been triggered. Continue to use them until they have been triggered or the battery (if any) has expired.

Annex 1 – Requisition and Issue Voucher

Voucher No: ☐

Article No	Request				Issue					Receive			
	Commodity Name	Previous Month's Consumption (doses)	Quantity in hand (doses)	Quantity requested (doses)	Batch Number	Expiry date	Freeze Indicator	VVM Status	Amount (doses)	Freeze Indicator	VVM Status	Amount (doses)	Remarks
A	B	C	D	E	F	G	H	I	J	K	L	M	N
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Requesting Facility : ☐	Issuing Facility : ☐	Receiving Facility : ☐
Requested by	*Approved by*	*Received by*
Name : ☐	Name : ☐	Name : ☐
Title : ☐	Title : ☐	Title : ☐
Requisition Date : ☐	Approval Date : ☐	Date : ☐
Signature : ☐	Signature : ☐	Signature : ☐

Source: WHO/IVB/06.12: Vaccine stock management. Figure 10.

This SOP covers the completion of these three columns only

Example of completted Requisition and Issue Voucher

Voucher No: 07-111

Article No	Request				Issue					Receive			
	Commodity Name	Previous Month's Consumption (doses)	Quantity in hand (doses)	Quantity requested (doses)	Batch Number	Expiry date	Freeze Indicator	VVM Status	Amount (doses)	Freeze Indicator	VVM Status	Amount (doses)	Remarks
A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	OPV	29,000	10,200	29,500	A111-0	5.2007	-	OK	29,500	-	OK	29,500	OK
2	DTP+HepB	18,200	6,200	18,800	D333-1	4.2008	OK	2	18,800	Active	2	18,800	All failed in shake test
3	BCG	27,000	8,000	27,760	B444-0	6.2008	-	OK	27,760	-	OK	27,800	40 extra
4	Measles	18,000	6,000	18,000	M555-3	8.2007	-	OK	15,700	-	OK	15,700	OK
5	BCG diluent				BD44-1	12.201	-	-	27,760	-	-	27,760	OK
6	Msls diluent				MD55-1	11.2011	-	-	15,700	-	-	0	No diluent received
7													
8													
9													
10													

Requesting Facility : Devrek Intermediate
Requested by
Name : Ahmet Tokus
Title : Store manager
Requisition Date : 07 January 2007
Signature : signed

Issuing Facility : Primary vaccine store
Approved by
Name : Hasan Tomruk
Title : Chief, Primary vaccine store
Approval Date : 11 January 2007
Signature : signed

Receiving Facility : Devrek Intermediate
Received by
Name : Ahmet Tokus
Title : Store manager
Date : 07 January 2007
Signature : signed

Source: WHO/IVB/06.12: *Vaccine stock management*. Figure 26.

Refrigerated vehicle trip record form

Vehicle registration number: ____________ Trip start date: <dd/mmm/yyyy> ____________ Sheet number: ____

Name of supplying store: ____________ Trip end date: <dd/mmm/yyyy> ____________ Nbr of sheets ____

Enter DATE:																																																		**Remarks**
Hour		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Temperature chart (°C)	+16																																																	
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	-4																																																	
	-5																																																	
Event record		Enter time for each event - to the nearest hour																																															
Packing complete																																																	
Start of trip																																																	
Arrive at store																																																	
Depart store																																																	
Arrive at overnight																																																	
Depart overnight																																																	
End of trip																																																	
Truck location																																																	
Initials:																																																	

CHAPTER XXI

Packing vaccine and diluents for transport, using cold boxes

Primary Objective:

By the end of this session, the participant will be able to describe how vaccines should be packed into cold boxes in order to minimize the risk of damage during transport.

Enabling Objectives

By the end of this session, the participants can be able to describe:

- Preparatory activities of vaccine transport.
- How to prepare ice packs, cool water packs and its procedures.
- How to manage cold box where icepacks are kept.
- Hand hygine and orient its need.
- List the name of vaccine that are not damaged by freezing.
- Why conditioned ice packs is used in freeze sensitive vaccines?
- Procedures for packing diluents.

Instruction of Packing vaccine and diluentsfor transport, using cold boxes

Activity: Packing vaccine and diluents for transport, using cold boxes

Responsibility: Cold chain Assistant/Section Officer

Objective: How to pack vaccine and diluents in cold boxes

When? At the time of the vaccine arrival

Required materials:

- Registration form,
- Logistics and Supply form,
- Issued form(ma.lee.fa:48),
- Cold boxes
- water packs
- Packing materials.

Activity	By whom	Procedure and methodology
1. Preparatory activity	• Cold chain Assistant/ Officer	a. Prepare the correct number of cold box for vaccine transport.(Do not use the foam box arrived with packing.) b. Conditon the ice packs for every cold packs. Use 12 to 24 ice packs as instructed by producer. c. Use frozen ice packs for OPV only. d. Sign the Issued form(ma. Le.pa 48) after including all antigen. e. Fill the Requisition, Logistics and Issue Form f. Place the vaccine and conditioned ice packs properly. g. Place thermometer in each box. h. Place freeze indicator in cold box where freeze sensitive vaccine are kept. i. Place the cold box in the vehicle use for transportation.
2. Train temporary workers	• Cold Chain Officer	**a. Define tasks:** Agree the task(s) that temporary workers will be assigned to carry out. **b. Provide training:** Provide training covering the assigned tasks. Do not allow any temporary workers to handle or pack vaccines unless they have been trained to do so.

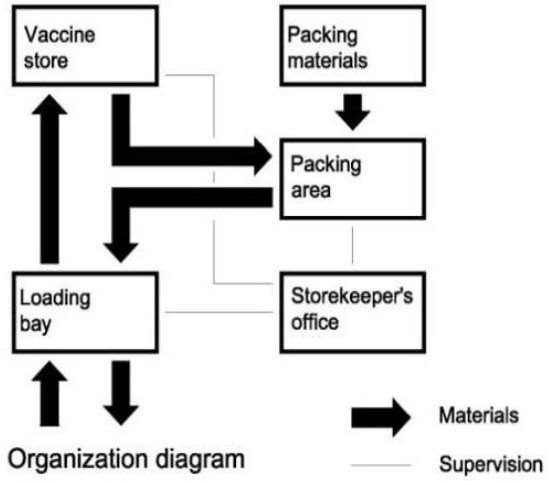
Activity	By whom	Procedure and methodology
3. Prepare ice packs/cool water packs/warm water packs	• Cold Chain Officer/Assistant	• **Establish requirement:** Calculate the number of ice packs/cool water packs/warm water packs needed for each delivery. Calculate how long it will take to prepare these. If ice packs or cool water packs are needed every working day, there must be two complete sets of ice packs; one set in use and the other set being prepared for the following day. • **Prepare ice packs:** Place the required number of water packs in a freezer room or freezer which is kept at a temperature between -5°C and -25°C. Leave them until they are fully frozen. If an ice pack fast freezer is used to freeze the ice packs, move the fully frozen ice packs to a conventional freezer or to cold boxes for storage purposes. • **Prepare cool water packs:** Place the required number of water packs in a cold room or refrigerator which is kept at a temperature between +2°C and +8°C. Leave them to stabilise for a minimum of 12 hours. • Cold rooms: Do not allow the temperature of the cold room to rise above +8°C during the cooling process. DO NOT allow water packs to touch the vaccines. • Refrigerators: Use a dedicated refrigerator. DO NOT freeze water packs in a refrigerator which contains vaccine.
4. Pre-condition cold boxes for cool water or warm water packs	• Cold Chain Assistant/ Officer	• a. Use the correct size and number of ice pack for the chosen cold box. Line the cold box exactly as described on the instructions on the inside of the cold box lid. • b. Pack the vaccine cartons in the cold box with the vial caps uppermost. • c. Use newspaper or other loose packing to ensure that the load cannot shift during transport. • d. Place a packing list in the box on top of the contents. • e. Label the box with the final destination. • f. Close the lid and engage the catch. • g. Keep the cold box in the packing room, or in a covered holding area, until all other boxes in the consignment have been packed. • h. Keep the cold box away from direct sunlight during transport.
5. Observe hand hygiene	• Supervisors • All workers responsible for handling vaccine.	• a. Wash hands thoroughly before handling vaccine cartons and vaccine vials.
6. Packing vaccines that are not damaged by freezing	• Cold chain Assistant/ Officer	The following vaccines are not damaged by freezing. They can safely be packed and transported using fully frozen ice packs at all times of the year. • OPV • BCG • MR

Activity	By whom	Procedure and methodology
7. Packing freeze-sensitive vaccines using conditioned ice packs	• Cold chain Assistant/ Officer	The following vaccines are damaged by freezing and must always be packed as described below: • Pentavalent (DTP-HepB-Hib or DTP-HepB+Hib) • TT Use this packing method at all times of the year and for all transport routes. Condition the required number of frozen ice packs as described. • Use the correct size and number of fully conditioned ice packs for the chosen cold box. Line the cold box exactly as described on the instructions inside the cold box lid. • Pack the vaccine cartons in the cold box with the vial caps uppermost. • Use newspaper or other loose packing to ensure that the load cannot shift during transport. • Place a packing list and freeze indicator device in the box on top of the contents. • Label the box with the final destination. • Close the lid and engage the catch. • Keep the cold box in the packing room, or in a covered holding area, until all other boxes in the consignment have been packed. • Keep the cold box away from direct sunlight during transport.
8. Packing diluents	• Cold Chain Assistant/ Officer	• Pack inner diluent cartons in stout cardboard boxes or plastic crates. • Use newspaper or other loose packing to ensure that the load cannot shift during transport. • Place a packing list in the box on top of the contents. • Label the carton with the final destination. • Keep diluent cartons away from direct sunlight during transport.
Note: If diluents are frozen, the glass ampoule is likely to break, so must never exposed to temperatures below 0°C. In cold climates they should therefore be packed in cold boxes with cool water or warm water packs in the same way as freeze-sensitive vaccines.		

Annex 1 – Packing area

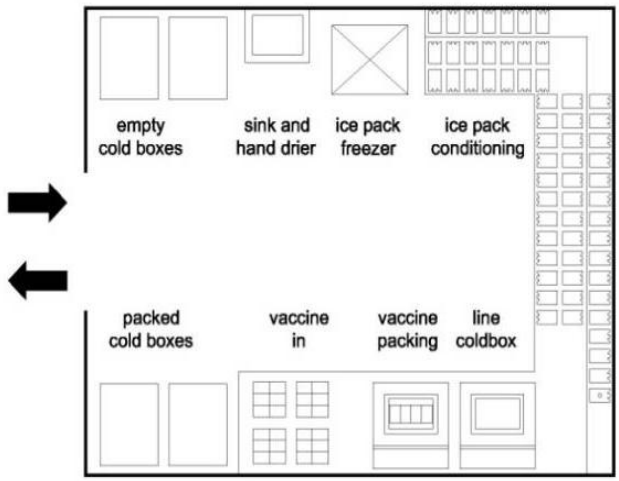
The vaccine packing area should connect to a direct route between the vaccine store and the vehicle loading area. Ensure that the space is large enough to process the maximum anticipated daily throughput of vaccine and to accommodate the maximum number of personnel employed to pack vaccine for dispatch. Provide curtains or blinds as necessary to exclude direct sunlight . Ensure that the area can be kept cool (15° to 25° C) when vaccine packing is taking place.

The packing area should be laid out so as to encourage a logical flow of work. Vaccines should be moved as little as possible in order to minimize the risk of breakage. There should be a sink in the packing area for hand-washing and provision for hygienic hand-drying. The diagram below shows a typical arrangement for a small store. The layout can be adjusted to suit local demand .



Organization diagram

Notes:
1) Size of packing area depends upon number of icepacks and ice pack freezers required for maximum daily workload.
2) Provide adequate layout space for icepack conditioning. 25 icepacks require about 1.0 m2 of work surface.
3) The vaccine packing room should be air-conditioned in hot climates and heated in cold climates. Working temperature between 15 and 25 centigrade.
4) Direct sunlight should be excluded using external shading, curtains or blinds.



Layout of packing area

Notes:
1) The worktop should be about 0.75 metres above floor level.
2) If additional space is required for ice pack conditioning install shelves between 25 to 30 cm wide at 30 cm centres above the work surface.
3) Space for ice pack conditioning is NOT needed if cool water packs are used.

CHAPTER XXII

Using Vaccine Vial Monitors

Primary Objective:

By the end of this session, the participants will be able to describe how to read, interpret VVM colour changes and how to act correctly when a colour change is observed.

Enabling Objectives:

By the end of this session, the participants can:

- Explain the use of vaccine vial monitors.
- Preparatory procedures for transporting vaccine from store.
- Describe procedures required when vaccines are received at lower level store.
- Explain the activities to be done at the time of vaccine administered.

Instruction of Using Vaccine Vial Monitors

Activity:	Using Vaccine Vial Monitors
Responsibility:	Cold Chain Section Chief, Cold Chain Assistant/Officer, EPI Supervisor/Officer
Objective:	How to read and interperte Vaccine Vial Monitors
When?	At the time of vaccine transport or supply
Required materials:	• VVM poster, • ISR form, • Issue Form(ma.le.fa:48), • Registration form(ma.le.fa:46)

1. Using Vaccine Vial Monitors

By whom	Location	Procedure and methodology
Section Chief-Cold Chain	• Central Vacccine Store (Teku)	Check VVM status and complete the Vaccine Arrival Report as described in Vaccine arrival procedures.

2. When vaccines are issued by a store

By whom	Location	Procedure and methodology
Cold Chain Assistant/ Officer	• All stores which issue vaccine to lower level stores	a. Check VVM status and expiry dates for each type and batch of vaccine during preparation of the issue voucher. b. Fill the ISR form, Issue Form(ma.le.fa:48) accordingly. c. Generally make sure that any vaccine which shows the most VVM exposure is issued first . d. Record VVM status for each vaccine and each batch on the issue voucher.

3. When vaccines are received by a lower level store

By whom	Location	Procedure and methodology
• District (Public) Health Officer • Cold Chain Assistant/ Officer • EPI Supervisor/ officer • All the staffs of office and Chief	• Lower level stores and health facilities	a. Check a sample of each batch of each vaccine received. Record VVM status on the arrival voucher. Compare the observed VVM status with the VVM status recorded on the issue voucher and report any differences to the supplying store. b. Hand over ISR Form to Health Facility Chief and maintain the file at least for 3 years in related District health Office c. Fill the registration form(ma.le.fa:46) and submit to district health officer. Record the details for at least three years in district health office. Stage 2 vaccine is only sent to district. d. Ensure that vaccine which shows the most VVM exposure is clearly identified so that it can be issued as soon as possible to lower level stores or health facilities.

4. When vaccines are administered		
By whom	**Location**	**Procedure and methodology**
Health worker	• Health facility immunization session or outreach session	• Immediately before opening the vial, check that the VVM status is usable and check that the expiry date has not passed. If both these checks are OK, use the vaccine. • If the VVM status is unusable OR the expiry date has passed, Do not use the vaccine. Put it to one side until the end of the session and then dispose off it safely.

Annex 1 – Understanding VVMs

- What is a VVM?

A VVM is a heat sensitive label which is placed on a vaccine vial to register cumulative heat exposure over time. The VVM is a circle with a small square inside it. The square contains a heat-sensitive dye.

- How does it work?

The combined effects of time and temperature cause the inner square of the VVM to darken, gradually and irreversibly:

- The lower the temperature, the more slowly the inner square changes colour.

- The higher the temperature, the faster the inner square changes colour.

- What are its limitations?

The VVM does not directly measure vaccine potency but it does give information about the main factor that affects potency: heat exposure over a period of time.

Many liquid vaccines are also damaged by exposure to freezing. The VVM does **not** register information about freezing.

- What are the VVM stages?

There are only two VVM stages. The **usable** stage is where the square is lighter than the circle. The **unusable** stage is where the square matches the colour of the circle, or is darker. The point at which the colour of the square exactly matches the colour of the circle is called the **end point.**

How to read a VVM

Usable stage

The square is lighter than the circle.
If the expiry date is not passed,
USE the vaccine

Unusable stage

The square matches or is darker than the circle.
DO NOT USE the vaccine
Inform your supervisor

- Why are VVMs important?

The VVM shows whether the vaccine vial has been exposed to excessive heat over time and it indicates whether the vaccine is likely to have been damaged by this exposure. Once the indicator reaches the **end point**, the vaccine should no longer be used.

- What types of VVM are available and how are they used?

Some vaccines are more sensitive to heat than others. For this reason there are currently four different types of VVM designed to match vaccines with differing heat stability. For example, VVM 2 is used with OPV because this is the most heat-sensitive vaccine; this VVM reaches its discard point after only 2 days at

37°C. In contrast, hepatitis B vaccine is very heat-stable and the VVM 30 is used; it takes 30 days to reach its discard point at 37°C. The table below describes the four VVM reaction rates by category of heat stability.

VVM reaction rates by category of heat stability

Category	Time to end point at +37°C	Time to end point at +25°C	Time to end point at +5°C
VVM: TT/Td High stability	30 days	193 days	> 4 years
VVM : DPT, HepB,Hib,BCG Medium stability	14 days	90 days	> 3 years
VVM:MR,JE Moderate stability	7 days	45 days	> 2 years
VVM Least stable(Polio)	2 days	Not applicable	225 days

Note that vaccines made by different manufacturers can have different heat stability characteristics and will be assigned to different VVM categories by WHO. For example, one manufacturer's BCG might use a VVM 30 while another type of BCG may need a VVM14.

- Where is the VVM located?

VVMs are fixed to the vial or ampoule label of liquid vaccines which can be used in subsequent sessions under the Multi-dose Vial Policy (MDVP). Where the vaccine cannot be used in subsequent sessions – for example, lyophilized vaccines such as MMR – the VVM is fixed to the vial cap or the neck of the ampoule. The VVM may also be fixed to the cap of mono-dose vials.

CHAPTER XXIII

When and how to conduct the Shake Test

Primary Objective:

By the end of this session, the participants will know when to do the Shake Test and what to do if you find vaccine that has been damaged by freezing.

Enabling Objectives:

By the end of this session, the participants can:

- Explain when to do Shake test.
- Procedure nad methods to do Shake Test.(when, how)
- Explain procedures for sampling methodologies.
- Explain sampling procedures for incoming shipments from vaccine supplier.
- Explainsampling procedures forvaccine that is already in the supply chain.
- Explain activity for disposal of freeze damaged vaccine and frozen control samples.

Instruction on When and how to conduct the Shake Test

Activity: When and how to do the Shake Test?

Responsibility: Chief of Cold Chain, Cold Chain Assistant/ Officer

Objective: When to do the Shake test and procedure to deal with damaged vaccine.

When? As needed

Required materials: Freezer or refrigerator with freezing compartment

Activity	By whom	Vaccine	Precuation
1.Applicability of the Shake Test	▪ Section Chief of Cold Chain ▪ Cold Chain Assistant/ Officer	• DPT-Hep B-Hib liquid • TT/Td • HepB • PCV	• After freezing, the bonds between the aluminium adsorbent and the antigen in a vaccine are broken. Separated adsorbent tends to form larger, heavier granules that gradually settle at the bottom of the vial when this is shaken. • Sedimentation occurs faster in a vaccine vial which has been frozen than in a vaccine vial from the same manufacturer which has never been frozen. • When carried out correctly the Shake Test has been shown to have 100% sensitivity and 100% specificity and 100% positive predictive value .
2. When and how to do a Shake Test	• Section Chief of Cold Chain, • Cold Chain Assistant/ Officer	• If a freeze indicator or other temperature monitoring device shows a freeze alarm, or if you suspect that freezing has occurred, then the shake test must be done to confirm the status of the vaccine. Follow the Shake Test Protocol exactly as described in Annex 1. • Individual batches of vaccine may behave differently from one another. Therefore the procedure should be repeated with all suspect batches. Follow the appropriate sampling methodology as set out in Section 4.4 to ensure that all of the damaged vaccine is identified and that none of this damaged vaccine is distributed or used. • The Shake Test need not be conducted under the following circumstances: ➢ When solid frozen vaccine vial(s) have been found. ➢ With DPT vial(s) when a homogeneous solution cannot be obtained after vigorous shaking. In such cases, the white lumps or sediment cannot be separated from the walls of the glass vial. This happens only with DPT vials that have been exposed to sub-zero temperatures, but without freezing occurring.	

Activity	By whom	Procedure and methodology
3.Sampling methodologies	▪ Section Chief of Cold Chain ▪ Cold Chain Assistant/ Officer	The method for selecting the test sample depends upon two factors: • The number of vials you suspect have been frozen. • Whether the vaccine has been accepted from the vaccine supplier and has entered in the country supply chain.
4.Sampling incoming shipments from the vaccine supplier	▪ Section Chief of Cold Chain ▪ Cold Chain Assistant/ Officer	When vaccine arrives from the vaccine supplier it must be inspected and approved before it can be accepted into the country supply chain. International shipments arranged by UNICEF Supply Division will always have an electronic shipping indicator in each and every shipping container. Shipments ordered direct from an international or in-country manufacturer or supplier may not contain electronic or other freeze indicators. **Proceed as follows:** **CASE 1:** When there is a shipping indicator in every container: • Mark and isolate any shipping container(s) where the electronic shipping indicator shows a freeze alarm.(Keep the shipping containers in the cold chain). • Inspect each suspect container individually following the sampling procedure described in Annex 1. Draw the correct number of sample vials from locations throughout the suspect container(s), including the middle of the container(s). Remember to prepare a frozen control sample for each individual vaccine batch. • Send the shake test results to the vaccine supplier. In the case of UNICEF-procured or donated vaccine, supply the shake test results to UNICEF or to the donor for a final decision on what to do with the consignment. • If the decision is taken to dispose of the vaccine by Cold Chain Chief, discard all vaccine in the affected container(s). **CASE 2:** When there are no shipping indicators in the shipment, or if shipping indicators are not supplied in every container: a. Mark and isolate the entire shipment but keep it in the cold chain. b. Follow the sampling procedure described in Annex 1 for all vaccine in the shipment. Draw the correct number of sample vials from locations throughout the suspect shipment, including the middle of the container(s). Remember to prepare a frozen control sample for each individual vaccine batch. c. Send the shake test results to the Chief of Cold Chain and supplier. d. Damaged vaccines are replaced by supplier. e. If the decision is taken to dispose of the vaccine, discard all vaccine in the shipment.

Activity	By whom	Procedure and methodology
5. Sampling vaccine that is already in the supply chain	▪ Section Chief of Cold Chain ▪ Cold Chain Assistant/ Officer	• **Small numbers, single batch**: If there are only a small number of vials to be tested, and these are all from the same batch, then you should test all the vials against the control sample. A typical example would be a single refrigerator or cold box where freezing is suspected. In this case, discard all vials that fail the test and keep those which pass the test. b. **Small numbers, more than one batch:** If there are a small number of vials to be tested, but there is more than one batch or more than one type of freeze-sensitive vaccine, then you will need to repeat the shake test for each batch and for each vaccine. In this case, discard all vials that fail the test and keep those which pass the test. Remember: you must also prepare a frozen control sample for each batch and for each vaccine. c. **Large numbers**: If there are a large number of suspect vials, for example, in a cold room or a large refrigerator, you should follow the sampling procedure described in Annex 2. Draw the correct number of sample vials from locations evenly distributed throughout the suspect load. If any vials in the sample fail the Shake Test, all the suspect vials must be discarded, including those that have not been tested.
6. Disposal of freeze-damaged vaccine and frozen control samples	▪ Section Chief of Cold Chain, ▪ Cold Chain Assistant/ Officer	After you have completed the test(s) described above, discard all freeze-damaged vials and all control samples as described in safe disposal of damaged or expired vaccine. You should never issue a vaccine vial that has deliberately been frozen as a control sample for a Shake Test; these vials must always be kept separated from the general stock. There are two cases to consider. CASE 1: You may want to keep the control sample and use it for further tests. This only applies while you still hold stocks of the same batch of the same vaccine. CASE 2: If the control sample batch has all been issued, the sample must be set aside for final disposal. Proceed as follows: • Use the stock control system to 'issue' the control sample(s) for the shake test. This ensures that the vials are properly accounted for. • If the control sample is to be kept for further tests: Place the control sample in a closed plastic container in a cold room or vaccine refrigerator, clearly marked: 'CURRENT SHAKE TEST CONTROL SAMPLES'. • If the control sample batch has all been issued: Place the control sample in a closed plastic container outside the cold room, clearly marked: 'SHAKE TEST CONTROL SAMPLES FOR DISPOSAL– DO NOT USE''.

Annex 1: Shake test protocol

<table>
<tr><td colspan="2">NOTES:
1) This protocol must not be altered. There is only one correct way to conduct a Shake Test.
2) The test procedure described below should be repeated with all suspect batches. In the case of international arrivals, the shake test should be conducted on a random sample of vaccine. However, if there is more than one lot in the shipment, the random sample must include a vial taken from each and every lot.</td></tr>
<tr><td colspan="2">1. Take a vial of vaccine of the same type and batch number as the vaccine you want to test, and made by the same manufacturer.</td></tr>
<tr><td colspan="2">2. Clearly mark the vial as “FROZEN.”</td></tr>
<tr><td colspan="2">3. Freeze the vial in a freezer or the freezing compartment of a refrigerator until the contents are completely solid.</td></tr>
<tr><td colspan="2">4. Let it thaw. Do <u>NOT</u> heat it!</td></tr>
<tr><td colspan="2">5. Take your “TEST” vial from the batch that you suspect has been frozen.</td></tr>
<tr><td colspan="2">6. Hold the “FROZEN” vial and the “TEST” vial together in one hand.</td></tr>
<tr><td colspan="2">7. Shake both vials vigorously for 10-15 seconds.</td></tr>
<tr><td colspan="2">8. Place both vials on a flat surface side-by-side and start continuous observation of the vials until test is finished.
(NOTE: If the vials have large labels, which conceal the vial contents, turn both vials upside down and observe sedimentation in the neck of the vial.)</td></tr>
<tr><td colspan="2">Use an adequate source of light to compare the sedimentation rates between vials.
IF,</td></tr>
<tr><td>9. The TEST vial sediments slower than the FROZEN vial,

THEN,</td><td>10. Sedimentation is similar in both vials
OR
The TEST vial sediments faster than the FROZEN vial
THEN,</td></tr>
<tr><td>11. Use the vaccine batch.</td><td>11. <u>Vaccine damaged</u>: Notify your supervisor. Set aside all affected vaccine in a container marked “DAMAGED VACCINE FOR DISPOSAL– DO NOT USE’’</td></tr>
<tr><td rowspan="2"></td><td>12. Discard all affected vaccine once you have received permission to do so.</td></tr>
<tr><td>13. Fill in the Loss/Adjustment Form.</td></tr>
</table>

Annex 2: Sampling method

Any pharmaceutical system should have a quality control plan in place which describes the sampling procedure to be used in cases such as the one given in the example below.

This annex shows how to use a quality control sampling system such as MIL-STD-105D or E[2]. This USA military standard has been used for many years as a sampling procedure. Other similar systems are also described by ANSI and ISO.

Example:

A batch of Hepatitis B Vaccine is held at the central store. The temperature records show that the vaccine may have been frozen during storage.

The batch consists of 15,000 vials. It is impossible to do the shake test on all the vials and a representative sample must therefore be tested. How many vials should be tested in order to indicate the status of the batch?

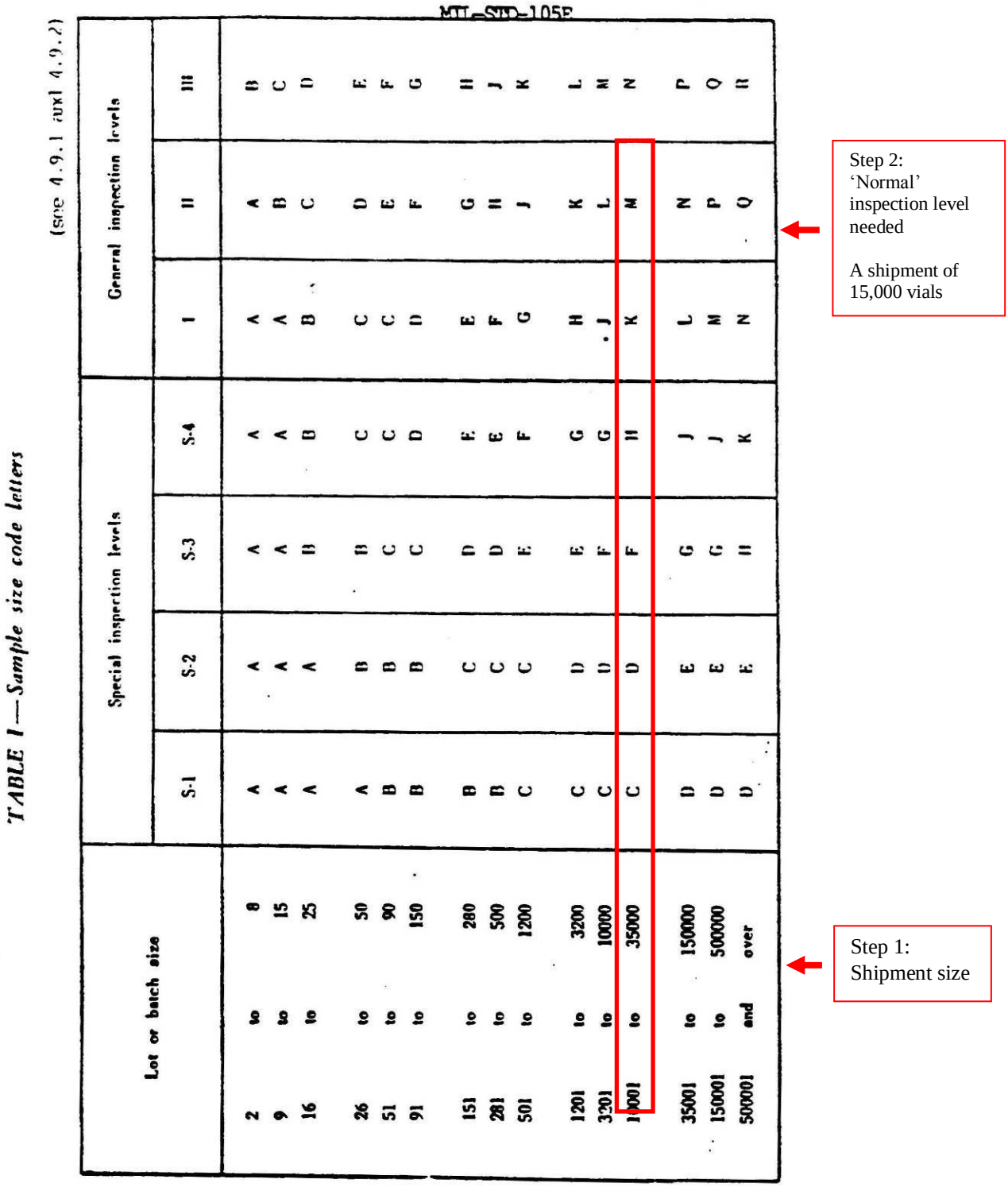
Notes on sampling:

a. It is assumed that a 'normal' inspection level will be adequate.
b. For freeze sensitive vaccines, freezing is a critical defect and therefore the acceptance/rejection criteria will always be 0 and 1. This means that you can accept the shipment if zero vials in the sample fail the test, but you must reject the shipment if one or more vials in the sample fails.

[2] MIL-STD-105D has been superseded by MIL-STD-105E which in turn has been superseded by MIL-STD-1916.

Step 1: Refer to Table 1 on page 13 of the Standard. Find the appropriate size range for the shipment in the *Lot or batch size* column as shown in the example below.

Step 2: Find the matching sample size code in the *General Inspection Levels* column II as shown in the example.



MIL-STD-105E

TABLE I—Sample size code letters (See 4.9.1 and 4.9.2)

Lot or batch size	Special inspection levels				General inspection levels	
	S-1	S-2	S-3	S-4	I	II	III
2 to 8	A	A	A	A	A	A	B
9 to 15	A	A	A	A	A	B	C
16 to 25	A	A	B	B	B	C	D
26 to 50	A	B	B	C	C	D	E
51 to 90	B	B	C	C	C	E	F
91 to 150	B	B	C	D	D	F	G
151 to 280	B	C	D	E	E	G	H
281 to 500	B	C	D	E	F	H	J
501 to 1200	C	C	E	F	G	J	K
1201 to 3200	C	D	E	G	H	K	L
3201 to 10000	C	D	F	G	J	L	M
10001 to 35000	C	D	F	H	K	M	N
35001 to 150000	D	E	G	J	L	N	P
150001 to 500000	D	E	G	J	M	P	Q
500001 and over	D	E	H	K	N	Q	R

Step 2: 'Normal' inspection level needed

A shipment of 15,000 vials

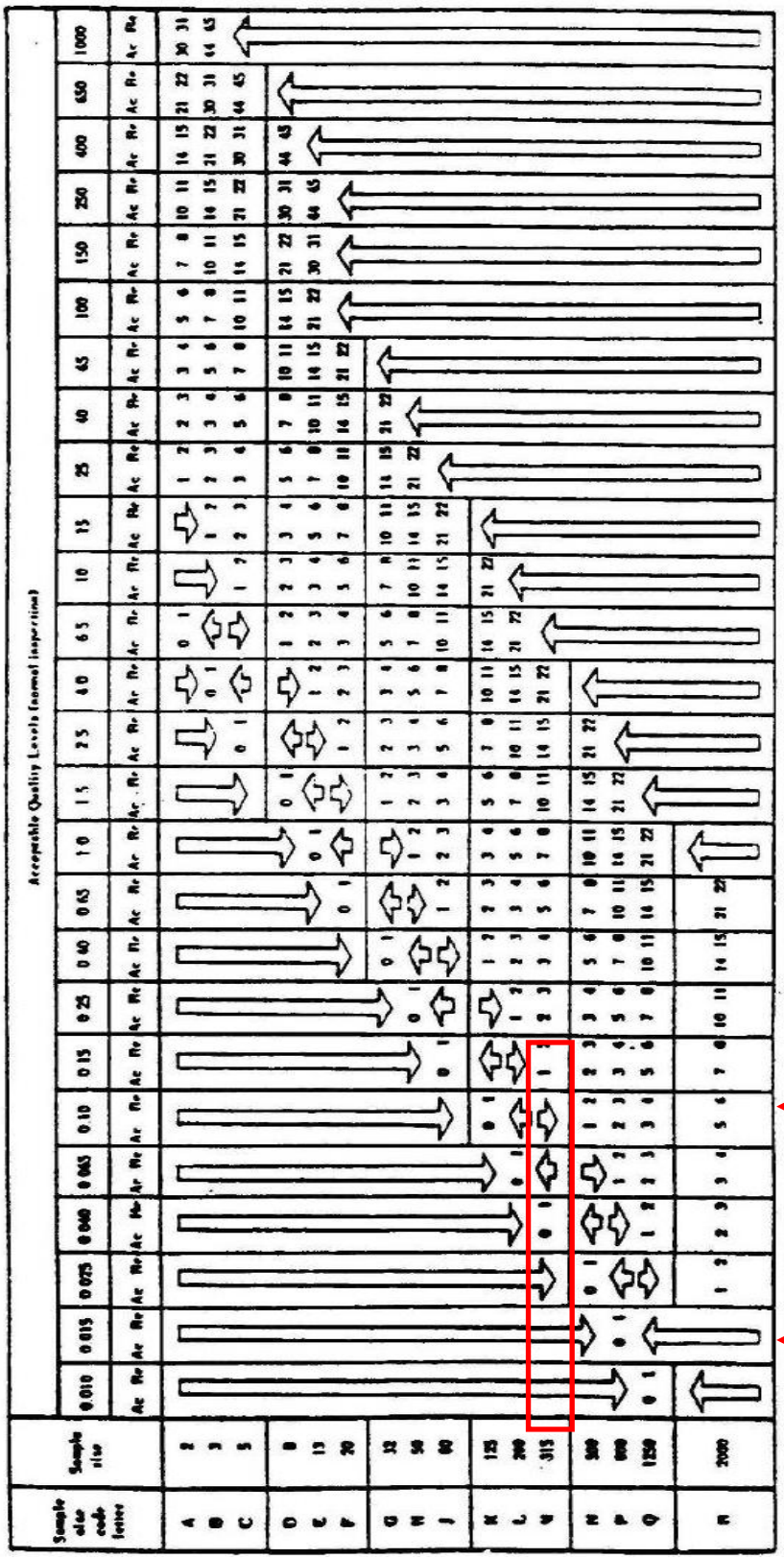
Step 1: Shipment size

Step 3: Use Table II-A on page 14 of the Standard to determine sample size and acceptance/rejection criteria.

MIL-STD-105E

TABLE II-A—Single sampling plans for normal inspection (Master table)

(see 4.9.3 and 4.9.4)



In this example, a randomly selected sample of 315 vials must be tested and 0 vials are allowed to fail the test.

Acceptance/ rejection criteria

Sample size

CHAPTER XXIV

Conditioning frozen icepacks

Primary Objective:

By the end of this session, the participants will be able to describe how icepack conditioning should be carried out and when conditioned icepacks should be used. Further the procedures when frozen icepacks are used to line cold boxes or vaccine carrier that contain freeze sensitive vaccines, they must always be “conditioned” before hand to minimize the risk of damage to the vaccine is also discussed in this session.

Enabling Objectives:

By the end of this session, the participants will be able to describe:

- What conditioned icepacks is.
- How to know when an ice pack is conditioned.
- When to use conditioned ice packs
- How to condition ice packs.

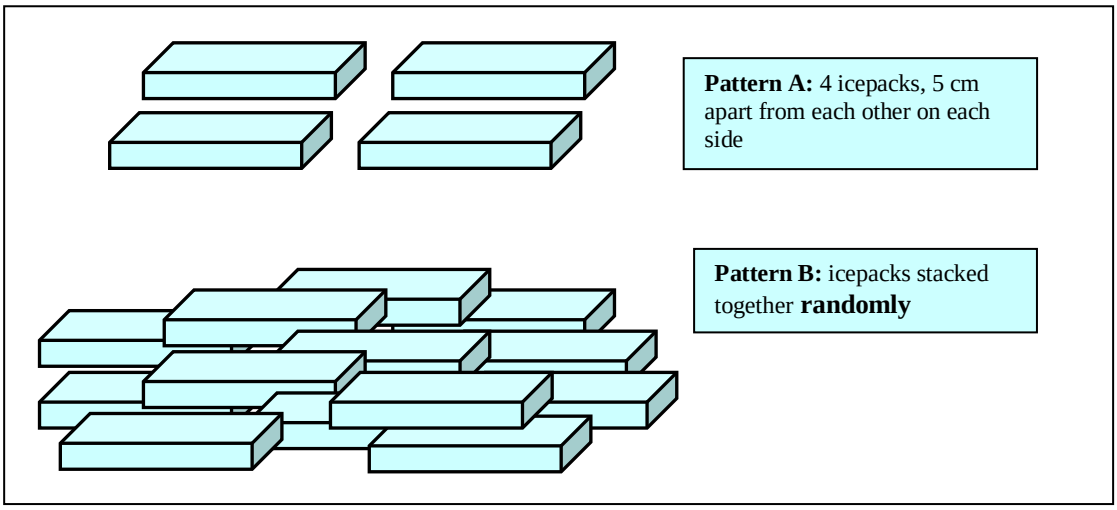
Instruction of Conditioning frozen icepacks

Activity:	Conditioning frozen icepacks
Responsibility:	Cold chain Assistant/ Officer, EPI Supervisor/ Officer, Office Assistant
Objective:	Conditioning frozen icepacks
When?	As needed
Required materials:	Frozen icepacks. Large table or other work surface on which to lay out the icepacks.

Description	Procedure
1.What is a conditioned icepack?	• When an icepack is removed from the icepack freezer, its temperature may be as low as -20°C. If you use these icepacks immediately there is a risk that you will damage freeze-sensitive vaccines. • A 'conditioned' icepack is an icepack that has been left outside the freezer for long enough to stabilize at 0°C. This point is reached when the ice inside the icepack begins to melt.
2. How do I know when an icepack is conditioned?	An icepack is conditioned as soon as the ice core inside the pack is surrounded by a small amount of liquid water. • You can check this by shaking the icepack. If you can feel the ice moving inside the pack, it is fully conditioned. This process takes time – up to 30 minutes or more, depending upon the temperature of the room.
3.When to use conditioned icepack?	Conditioned icepacks must ALWAYS be used whenever you pack the following freeze-sensitive vaccines in a cold box or vaccine carrier: • Pentavalent vaccines (DPT), Hep-B, Haemophililius- b and TT/Td
	You must also use conditioned icepacks whenever you pack a load of vaccines which contains freeze-sensitive products mixed together with: • MR, BCG, OPV, JE, IPV
	• You donot need to use conditioned icepacks when you are packing OPV on its own.
4. How to condition icepacks	• Calculate how many icepacks are needed for the vaccine consignment. The underside of the lid of the cold box or vaccine carrier usually has a diagram showing the number required for that type of box or carrier. • Remove the correct number of icepacks from the freezer. • Lay the icepacks on the designated table or works surface in a single layer leaving a 5 cm space all round each pack. • Check progress every 10 minutes by shaking a sample of icepacks as shown below. • Wait until all the icepacks are conditioned; then use them to line the cold boxes and/or vaccine carriers. Pack the vaccine.

Annex 1 – Icepack conditioning learning guide

1. Prepare frozen icepacks a day before the training. Make sure that you have minimum of one icepack for each participant. Store them in a cold box immediately you remove them from the freezer.
2. Explain what a 'conditioned' icepack is.
3. Explain which vaccines must be packed with conditioned icepacks.
4. Distribute one icepack to each participant.
5. Ask each participant to mark one of the icepacks with a sign that they can recognize, using a permanent marker pen.



6. Ask participants to place the icepacks on the table top as shown in the diagram above.
7. Twice, during the course of the session, ask the participants to go and check their icepacks. The second check should only be carried when all the icepacks in the **Pattern A** arrangement are fully conditioned. The trainer should check that conditioning is complete before inviting the participants to check for themselves.
8. Make sure that every participant handles a fully conditioned icepack and understands that there must always be some liquid water inside the pack.
9. When the exercise is over, explain to participants that conditioning takes time and requires patience and that the time required depends upon room temperature.
10. Make sure that all participants fully understand the process and know which vaccines must always be packed with conditioned icepacks.

CHAPTER XXV

Storing goods in the dry stores

Primary Objective:

By the end of this session, the participants will be able to describe the preparatory activities needed to establish a well-organized dry store.

Enabling Objectives:

By the end of this session, the participants will be able to describe that:

- All the products are safely stored within the temperature and humidity levels specified for the product type.
- Diluents, syringes and other products with a limited self life can easily be located and distributed in Earliest-Expiry-First-Out (EEFO) order.
- Expired or damaged products marked for disposal are kept separate from usable stock.

Instruction of Storing goods in the dry stores

Activity:	Storing goods in the dry stores
Responsibility:	Store Keeper, Office Assistant or Cold Chain Assistant/ Officer
Objectives:	Storing goods in the dry stores
When?	As needed
Required materials:	• Pallets • Duct tape • Floor paint.

General procedures: Diluents, syringes and safety boxes are supplied in cardboard cartons. These should be stacked on pallets in the dry storage area. This keeps the cartons off the floor, which may be dirty or damp.

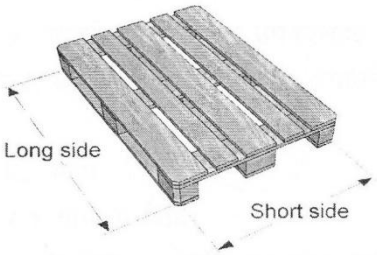
Activity	By whom	Procedure and methodology
1. General procedures	• Office Assistant	• Obtain the required number of pallets and stack them in a dry place in the store for use when required. Pallets must be clean, dry and in good condition. • • Mark out an area for each pallet bay on the floor of the dry store. Use paint or duct tape for the markings and make sure that the marked area matches the dimensions of the pallets. Leave a space of at least 10 cm between each pallet. Number each bay so that product locations can be assigned and products can be located easily. Allow sufficient aisle width to permit the use of the available pallet handling equipment. See Annex 1.
2.Storing diluents, syringes and safety boxes	• Store keeper	a. Stack all diluents, syringes and safety boxes on pallets, in pre-assigned pallet bays. b. Stack diluents by batch number and expiry date. Clearly label the cartons to show the name of the vaccine with which the diluent was supplied and the manufacturer, presentation, batch number and expiry date. c. Stack syringes by type and by expiry date. Clearly label the cartons to show syringe type, syringe capacity, syringe manufacturer and expiry date. d. Stack safety boxes by arrival date and by size so that they can be distributed on a First-In-First-Out (FIFO) basis. Clearly label the safety boxes by size.

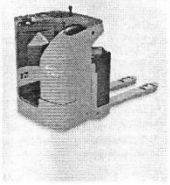
Activity	By whom	Procedure and methodology
3.Storing expired or damaged vaccines, diluents and syringes	• Store keeper • Cold Chain Assistant/Officer	a. Assign a separate well-ventilated room for these products. Clearly mark the assigned storage bay(s): 'PRODUCTS FOR DISPOSAL' so that items placed here cannot be confused with useable stock. b. Store products until they can be removed from the store for final disposal.
4.Storing electronic devices with non-replaceable batteries	• Store keeper	a. Store these products on shelves in a locked room. Label the products by type and by production date or by expiry date . b. Distribute products by expiry date or by production date. Ensure that all devices are distributed for final use within 12 months of arrival in the store . c. Ensure that replacement stocks are obtained so as to avoid stockouts.
5.Storing spare parts, stationary and other items	• Store keeper	a. Store these products on shelves in a locked room. Label the products by type. b. Distribute products as needed. Ensure that replacement stocks are obtained so as to avoid stockouts. In the case of spare parts, the Mechanical Engineers are responsible for requesting replacement items.

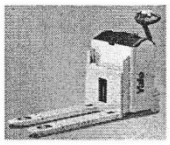
Annex 1 – Pallet and aisle width data

Pallet type	Length	Depth	Pallet standing (note 1)			Pallet racking (note 2)	
			Working aisle width (hand truck)	Working aisle width (ride-on truck)	Working aisle width (tiller truck)	Working aisle width (long side)	Working aisle width (short side)
EUR 2 or 3: 1.2m x 1.0m	1.20	1.00	1.90	2.60	2.90	2.70	2.90
EUR 6: 0.8m x 0.6m	0.80	0.60	1.50	2.20	2.50	2.50	2.60
EUR pool: 1.2m x 0.8m	1.20	0.80	1.90	2.60	2.90	2.70	2.90
ISO: 1.067m x 1.067m	1.07	1.07	1.90	2.60	2.90	2.85	2.85
ISO: 1.1m x 1.1m	1.10	1.10	1.90	2.60	2.90	2.85	2.85
ISO: 1.14m x 1.14m	1.14	1.14	1.90	2.60	2.90	2.90	2.90
ISO: 1.219m x 1.016m	1.22	1.02	1.90		2.90	2.75	2.90

All dimensions in metres







Notes:

1) The first column gives data for hand pallet trucks. The second column is for powered ride-on or sit-on units. Aisle widths assume that pallets are accessed from their **short** side. Special equipment is required to access from the **long** side.
2) Pallet racking aisle width data are based on the use of **reach trucks**. **Stacker trucks** give narrower aisle widths, but the equipment is more specialized.
3) In all cases, the aisle widths given assume that the pallet truck has access to the short side of the pallet.
4) Aisle widths are for planning purposes only and are based on requirements for typical pallet trucks. Check the actual requirements for the available equipment.

Mid-Term Evaluation

Name:…… Designation:……

Health Facility :…… District:…….. Time : 30m

You can use training manual of Effective Vaccine Management participant's handbook or reference books to answer the following questions.

1. Which of these options have no relation with Vaccine Clearance?

   a. Representative of Civil Aviation
   c. Electronic Engineer
   b. Represnentative of Cargo
   d. Immunization Officer

2. Which of these documents (advance prepared docunment) is not required in pre-shipment?

   a. Shipment Airway Bill
   c. Lot release Certificate
   b. Commerical Invoice
   d. **Letter from Child Health Division**

3. After receiving vaccine, which of theses options do not need checking and approval.

   a. Size of the vaccine vials
   c. **Expired Date**
   b. Size of van and truck used for transportation
   d. Numbers of vaccine vials

4. Which of these documents is not related with the vaccine shipment?

   a. Invoice
   c. Release certificate
   b. Packing list
   d. **List of vaccine with price rate**

5. How many days earlier do we need to inform about vaccine arrival to cold chain or vaccine distribution division?

   a. 3
   c. 7
   b. 5
   d. 12

6. When do we have to reach Tribhuvan International Airport before vaccine arrival for vaccine collection?

   a. 1 hour
   c. **3hours**
   b. 2 hours
   d. 4 hours

7. Which one of these informations is not necessary to mentioned for vaccine arrival report?

   a. Batch Number
   c. Every batch with Vial result
   b. No. of transported carton with every batch
   d. **Source of vaccine**

8. Which one of these processes is not related to product arrival procedures?

   a. Advance notice information
   c. Transportation details
   b. Collection of shipment
   d. **VAR to Health Ministry**

9. Which of these is not necessary to email or fax the documents for product arrival procedures?

   a. **Photocopy of distributor's passport**
   c. Photocopy of packing lists
   b. Photocopy of airway bills
   d. Photocopy of invoice

10. Which of these have no connection with products?

   a. Electronic materials
   c. Syringe
   b. Safety box
   d. **Vaccine**

11. Who is responsible for checking accunacy of equipements yearly?

   a. **Mechanical engineer or cold chain staffs**
   c. Director
   c. Staffs of cold chain section
   d. Loader and packer

12. Which of these things do not relate to personal security policies?

   a. Briefing work duities to another friend of office
   c. Checking the key
   b. Checking the door
   d. **Checking the torch**

13. How do you maintain/ manage to solve with unexpected problems while generator is functioning?

   a. **Procedures for emergency mainatinance and care**
   c. Immediately call to police office
   b. Carrying generators to the cool place for 2 hours
   d. Make a call to the generator production company and ask for solutions

14. Which of these activities do not come under regular routine maintainance of cold room and freezer rooms?

   a. Listening to cooling unit
   b. Checking the bulb and door daily
   b. Observation of cold room
   c. **Checking the expire date of all vaccines**

15. Besides, looking after cold room and freezer room daily which of these is essential?

a. Placing vaccine correctly
c. Confirming the floor, walls or racks of freezer room is not iced
b. Managing vaccine and diluetes properly
d. **All above**

16. What is the exact temperature for all diluents while health facility and outreach session?

a. **+2 to 8 Degree**
d. -8 to-10Degree
b. -2 to -8 Degree
d. +25 to +40Degree

17. Which one of this information is included in conducting physical stock count?

a. Incoming stock
c. Present stock
b. Distribution stock
d. All above

18. How many employees are required for conducting physical stock count?

a. 1
c. 3
b. **2**
e. 4

19. The ampules are likely to break in vaccines and diluents. Which of these opitions will be applied first if it breaks?

a. Thermal jacket
c. Wear glasses
b. **Use gloves**
f. Wear boots

20. What is the first thing to do before handling with vaccine vials and vaccine carton?

a. Wash your face properly
c. **Wash your hands properly**
b. Wear clean clothes
d. Wear jacket

21. Which is the most important activity done before using refrigerated van?

a. Preparing vehicle log book
c. Cooling refrigerated compartment
b. Preparing refrigerator compartment
d. All from above

22. Who is responsible to distribute packed vaccine and diluents?

a. Chief-Vaccine Distribution Section
c. Refrigerator Technician
b. **Cold chain Officer/Cold Chain Asssistant**
d. Office Assistance

23. After vaccine arrival, when vaccine is reached to the store from refrigerated van, what do we need to recheck from these options?

a . Quantity
c. VVM
b. Expiry date
d. All from above

24. Which information is missing in ISR form?

a. VVM
c. Vaccine received from UNICEF and other source
b. Expiry date
d. **Quantity**

25. Which vaccine will be damaged by freezing or cooling?

a. BCG
c. MMR
b. OPV
d. **TT**

26. Which vaccine needs Shake Test?

a. TT
c. **DPT-HepB+liquid, TT/Td, Heb B PCV+**
b. MR
d. JE

27. Why do we use conditioned icepacks for?

a. Heat sensitive vaccine
c. Diluents
b. **Freeze sensitive vaccine**
d. Syringe

28. How to know when ice packs are conditioned?

a. Dropping the ice packs
c. Smelling the icepacks
b. **Shaking the icepacks**
d. Feeling the icepacks

29. Which goods cannot be stored in dry stores?

a. Syringe
c**. Vaccine**
b. Safety box
d. Vaccine equipments and other immunization supplies

30. Diluents, syringes, and safety boxes must be stored correctly stacked on ……in the dry storage area.

a. **Pallets**
c. Plastic
b. Mat
d. Table

Participants Reflection on EVM Training

Training Centre:_____

A. Please Rank using the following scale by circle (1= Poor, 2= Fair, 3= Good, 4= Very good, 5= Excellent)

1. Overall process of the training	1 2 3 4 5
2. Overall Logistical Management	1 2 3 4 5

B. Please suggest the following by circle (1= Poor, 2= Fair, 3= Good, 4= Very good, 5= Excellent) Group work

Overall Time for	**Presentation**	**Discussion**	**Group exercise**
	1. 2. 3. 4. 5	**1. 2. 3. 4. 5**	**1. 2. 3. 4. 5**

C. Please rank the following by circle (1= Poor, 2= Fair, 3= Good, 4= Very good, 5= Excellent)

1. Behavior of the facilitators	1 2 3 4 5
2. Methodology of the training	1 2 3 4 5
3. Better understanding of the EVM	1 2 3 4 5
4. Updated knowledge	1 2 3 4 5
5. Updated skill	1 2 3 4 5
6. Any other (please specify)	1 2 3 4 5

D. Do you have any suggestions to make the training better? Please write in bullet form.

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