# **ENVIRONMENTAL CODES OF PRACTICE**

**Storage and Management of Insecticides Stock** 

# LIST OF ABBREVIATIONS

DDT	Dichloro Diphenyl Trichloroethane
DMO	District Malaria Officer
IRS	Insecticide Residual Spray
KTS	Kala Azar Technical Support
MOIC	Medical Officer Incharge
MSDS	Material Safety Data Sheet
MTS	Malaria Technical Support
NVBDCP	National Vector Borne Disease Control Programme
РНС	Primary Health Center
PPE	Personal Protection Equipment
SP	Synthetic Pyrethoids
VBD	Vector Borne Diseases

# ENVIRONMENTAL CODES OF PRACTICE -2 STORAGE AND MANAGEMENT OF INSECTICIDES STOCK

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## **Document Revision and Approval History**

(All revisions must be approved. Revision and Approval can be internal source or the client)

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### **Document Distribution List**

#	Name/ Company	Purpose

# ECOP 2 - STORAGE AND MANAGEMENT OF INSECTICIDES STOCK

### **1** INTRODUCTION

This Code provides guidance for those involved in management and storage of insecticides used in the National Vector Borne Disease Control Programme. These are practical guidance for storage and inventory management practices.

### 2 PUPROSE AND SCOPE

The Codes of Practice have been designed to provide necessary guidance for identification of storage, development of new store/renting practices to be adopted for storage and inventory maintenance.

### **3 STATUS OF THIS CODE**

To ensure safe storage of chemicals, the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 was enacted by the Government of India and later amended in 1994 and 2000. Insecticides currently used for IRS are hazardous chemicals as per the provision of the rule. Therefore, the storage facility for these chemicals should abide by the purpose of this rule.

### **4 DUTIES AND RESPONSIBILITIES**

The District Malaria Officer would be responsible for the storage and management of all the insecticides at the district. He would be assisted by the VDB Consultant & storekeeper in maintaining the inventory. At the time of IRS, when insecticides are stored at the PHC, the MoIC of the respective PHC along with the respective MI/KTS/MTS/Store-in-charge would be responsible. During the spraying operation, the squad leader would be responsible for the storage of the insecticides.

### **5 GUIDANCE NOTES FOR MANAGEMENT AND STORAGE**

The storage of insecticides should preferably take place in a warehouse/storage area dedicated for the purpose. However, the storage space may also be taken on a temporary basis on rent. The guidelines, thus, are meant for both own storage and hired storages.

### 5.1 SITING OF STORAGE AREAS

### **BASIC CRITERIA FOR ALL INSECTICIDE STORES**

Stores may range from major buildings or stores within buildings to small self-contained or prefabricated stores. In all cases, stores should be:

- suitably sited
- of adequate capacity
- soundly constructed
- capable of containing 110% of the total amount of insecticides likely to be stored at any time
- dry and protected from humidity
- well lit and ventilated
- marked with appropriate warning signs and secure against theft
- equipped, organised and staffed to accommodate intended contents.

### 5.1.1 Siting of New Store

The storage site should be located:

 Away from the dense habitation, schools, shops, food markets, animal feed depots and general stores (generally 100 metres away), water body and drinking water source. Preferably, structures located in the periphery of settlement areas should be used as store.



### FIGURE 1. LOCATION OF WAREHOUSE AWAY FROM SETTLEMENT

- Preferably, the PHCs should not be used as a store. However, in case it is used as a store it should be at an isolated location which would not interfere with the normal working area of the PHC.
- The store should not be located in an area with a likelihood of flooding. In case an entire area is flood prone, the insecticides can be stored in the adjoining PHCs. Alternatively, a storage facility can be selected at the highest point in the locality.

• The place should be easily accessible to vehicles from at least two sides.

### FIGURE 2. WAREHOUSE NOT TO BE LOCATED NEAR A WATERCOURSE, WATER TABLE IN THE LOCATION SHOULD BE LOWER





### 5.2 SITING OF RENTED STORE

In case it is not possible to construct a dedicated store, a store may be taken on a rent basis. Such a store, however, has to ensure that it meets the environmental and health safety requirements specified.

**Siting:** The DMO/VBD Consultant/ MI is responsible for selection of the building that is to be rented for storage purpose at the district level. The MPWs/KTS/MTS are responsible for selection of the storage facilities at the sub-district. For selection of the location site, the following guidelines need to be adhered to:

- Ensure that schools and Anganwadi centres are not rented as storage facilities.
- Isolated location, away from dense habitation, schools,

### FIGURE 3. STORAGE OF DDT IN ANAGAWADI CENTRES



shops, food markets, animal feed depots and general stores.

- The building should be located away from water bodies or a drinking water source and should also avoid low-lying areas.
- The site should have suitable access for delivery vehicles.

### 5.3 SIZE OF STORAGE FACILITY (CONSTRUCTION/RENTING)

For the construction or renting of storage facility, the minimum floor areas of the storage facility should be as follows:

**District-level store**: Should be at least adequate to store one year's peak stock of insecticides and empty bags, containers and PPE. (Example: for 100 bags of 50 kg each, 450 sq ft is required).

**Sub-district store**: Storage facility should be able to stock up bags, PPE and empty bags/containers (for example considering peak storage of 50 bags of 50 kg each, storage area should be around 350 sq ft).

**Storage facility at village level:** The storage facility should accommodate one week's insecticide stock (approximately 20 sq ft estimated).

### 5.4 CONSTRUCTION OR STRUCTURAL REQUIREMENT OF STORAGE AREAS

Both in case of construction of new storage and for renting a storage facility, the following guidelines should be adhered to:

- Condition of the storage facility: The store should be protected from water or excessive moisture. There should not be any dampness in the walls.
- Walls: lf a storage facility is to be constructed, it should be ensured that the walls enclosing the insecticide storage area should be made of brick and cement mortar, plastered with cement on both sides. The interior surfaces should be smooth and capable of easily cleaned. being



FIGURE 4. INSECTICIDES STORAGE WITH PROPER

PRECAUTIONS

The walls of the existing storage facilities should not contain any cracks and fissures.

- **Doors:** Doors should be of an appropriate height and width to enable insecticides handling on the premises. There should also be an emergency exit.
- **Ventilators:** Ventilators should be built near the roof to provide alternate means of ventilation and lighting. The ventilators should be shaded and barred against unauthorised entry.
- **Roofing:** The roof of the structure should be well maintained to prevent leaks and made of incombustible material, preferably concrete.
- Floors: Floors should be resistant to the passage of liquids, have a slip-resistant surface, and capable of being easily cleaned. However, for stores where the structure has already been constructed, the floor should be of concrete; or thick polythene sheet is to be spread on the floor before keeping the bags/containers of insecticides. Wooden planks over the plastic sheets are especially good if it is found that the floor is prone to dampness in the rainy season. If wooden planks are not available, bricks should be used.
- Loading and unloading area: The site should provide suitable access for loading and unloading of delivery vehicles. Loading and unloading areas should be cemented. These areas should also preferably be covered so that in case there is any spillage, it does not get washed off.
- Bunding capacity and prevention of contamination of watercourses: Ramps should be provided at the doors to prevent water from entering the store.
- Ventilation: The structure should be well-ventilated to prevent temperatures from getting too high, beyond 40 degree Celsius. Exhaust fans mounted on the side walls should have duct works to allow exhaust of air at a level of 15 inches above the floor. Assuming that mixing activities does not take place within the storage building, a reasonable level of ventilation is six-seven air changes per hour. The exhaust should ideally be of 20-25 cm diameter and should be wired to allow activation by an external switch. The exhaust opening should be covered.
- Fire protection: The storage must have an ABC type fire extinguisher loaded near the exit doors for fire protection. Smoking, fires and welding activities are to be avoided within the storage premises.
- **Electrical requirements:** Use plastic, dust-proof and water-proof electrical boxes and switches.
- **Lighting:** Vapour-proof fluorescent or incandescent lighting fixtures should be used for lightening up the storage area. The store should be well lit with natural or electric lighting (200 lux) to permit container labels to be read easily.
- Prevent accidental or unauthorised access to the storage area; consider measures like keeping the store locked.
- **Washing facility:** A static or piped water supply, with soap, should be made available for washing hands and face and also for decontamination of personnel accidentally splashed by insecticides.

• **Absorbent material:** A bag of saw dust or sand should be kept within the store so that it can be used as an absorbent material.

# FIGURE 5. SCHEMATIC DIAGRAM OF THE WAREHOUSE AND THE SPRAY IN-CHARGE'S OFFICE



### 5.5 CONDITION OF BUILDING FOR RENTING

The DMO/ VBD Consultant/MPWs should assess the condition of the building before renting the building or renewing the contract of the rent. The building should be assessed based on the following criteria:

 Dilapidated buildings should not be selected as storage facilities. decrepit lf buildings are to be selected, the DMO/VBD Consultant/MPWs should ensure that the owner renovates the facility, wherever necessary, before taking it on rent. Following are the criteria for building selection:

### FIGURE 6. IN APPROPRIATE STORAGE CONDITION



- The roof should not be leaking.
- The walls should not have damps or contain any cracks and fissures.
- Locking arrangements should be provided in all doors to check unauthorised entry into the facility.

- o Should have ventilators in the opposite sides of the walls for cross-ventilation.
- Must have an ABC type fire extinguisher loaded near the exit doors for fire protection.
- Should be well lit with natural or electric lighting (200 lux) to permit container labels to be read easily.

### 5.6 STORAGE PRACTICES

• Stock should be arranged to use the oldest first ("first expiry first out" principle) and to prevent expired stock from accumulating.



FIGURE 7. STORAGE PRACTICE



- Containers should be arranged to minimize handling and, thus, avoid mechanical damage giving rise to leakages.
- The bags/containers should be stored about one and half feet away from the walls.
- The storeroom should be dedicated only for the storage of the IRS insecticides. If empty containers/bags are stored simultaneously, it is always better to install a partition (on wooden frame). The PPE should

### FIGURE 8. STORAGE PRACTICE



not be stored along with the insecticides.

- Hazard warning signs (one displaying skull and crossbones) should be prominently displayed both inside and outside the storeroom.
- Separate stacks of different insecticides should be maintained bags and containers should be stacked separately. A 3 ft aisle should be maintained on all sides of the stack and insecticides should not be kept piled up to a great height. The oldest stock should be lined up first such that these can be used up first. The stocks should be added up sequentially so that the oldest stock can easily be removed and newer stocks added easily. Separate space for storing empty containers and out-of-date stock awaiting disposal should be maintained (Figure 10).





- Storage stacks for bags and containers should not exceed a height of 4 ft to avoid the use of ladders. Containers storage should not exceed a height of 4 ft on each pallet or brick layer.
- Containers and cartons should be stacked at safe heights ensuring that they are stable. The safe height depends on container material (Table 1).

Package type	Number of layers on basal pallet	Palletized: number of packages on each pallet			
Steel drums (200 l)	1	3-4			
Steel drums (smaller than 200 l)	2	3-4			
Fibre drums (200 I)	1	3			
Fibre drums (smaller than 200 l)	2	3			
Plastic drums (200 I)	1	2			
Plastic drums (smaller than 200 l)	2	2			
Paper sacks	4-5	3			
Plastic sacks	4-5	3			
Fibre case containing tins	4-6	3-4			
Fibre case containing soft packages (plastic bottles, sachets)	4-6	2			
Wooden cases	2-4	3-4			

### **TABLE 1. STACKING OF CONTAINERS**

Source: FAO Pesticide and Stock Control Manual

- The stock should be inspected regularly for any kind of deterioration such as • caking of powders, sedimentation or gelling of liquids and discoloration through oxidation. Records of such inspections should be maintained.
- The insecticide store must always be locked to avoid theft/pilferage (for insecticide usage in agricultural activities) and unauthorised access.

### FIGURE 10: THEMATIC LAYOUT OF STORAGE PRACTICE

### FIGURE 11: STORAGE OF DIFFERENT INSECTICIDES





 Insecticides should be kept away from other commodities. Medicines, test kits or other hospital equipment for human use should not be kept in an insecticide store.

### 5.7 RECORD KEEPING

To assist in management of risk from insecticides, accurate records should be kept of all aspects related to the assessment and control of chemical storage and use. Records should be made according to prepared forms so that they can be easily compiled and understood.

• **Register:** A register is a listing of all insecticides that are being stored, transported and used in the activity. The following tabular form can be used as a template to maintain stocks of insecticide at the district and PHC.

Insecticide Register Book													
	Insecticide Name												
		Incomir	ng Insecti	cide				Outgoing Insecticide					
Date	Particular					ک ک		Particular				Ś.	
	Name of Manufacturer	Pack Size	Batch No.	Expiry Date	Units Number	Total Quantii	Date	Name of Manufacturer	Pack Size	Batch No.	Expiry Date	Units Number	Total Quantit

- The Stock Register must be updated within 24 hours of any transaction, i.e., all receipts, issues, returns and balances.
- Records should be kept at a place which is easily accessible to personnel authorised to access records.

• MSDS for a chemical (except for DDT) should be kept and updated at the workplace while that chemical remains in use.

### 5.8 HEALTH AND SAFETY PRACTICES FOR STORAGE WORKERS

 The storage workers should wear their personal protective equipment during handling of the insecticides (loading, unloading and stock-keeping). This should consist of gloves, mask, full shirts and trousers/aprons, goggles and shoes. The protective gear should be washed with detergent and dried before they are stored/reused. In case PPE's are not available during loading/unloading, the personnel should wear full sleeve shirts and pants, cap and should cover their faces with a towel.

As a precautionary measure, the following aids would be required:

- Fire extinguisher: Active fire protection ABC device should be available at storage facilities to extinguish or control small fires, often in emergency situations.
- First-aid kit: Availability of first aid kit is mandatory at storage facility. The following are minimum requirements of a first-aid kit:
- Soap
- Band Aids
- Gauze
- Antibiotic Cream
- Eye wash
- Hydrocortisone Cream/Calamine
- Aspirin
- Specific Antidote for the insecticides
- The contact number of the nearest physician should be available at the storage site for earliest contact in case of any emergency.

### 5.9 **REGULAR MONITORING AND MAINTENANCE**

At the district level, rented storage facilities should be monitored periodically by the DMO/VBD Consultant. Similarly, at the PHC, the rented storage facility should be monitored time to time by the Medical Officer-in-Charge. The monitoring of the facility should include:

• The walls, floors and the roofing of the storage facility should be such that there are no leaks from the roof, no cracks and fissures in the walls and no spills.

### 5.10 SPILL MANAGEMENT

The spill should be contained and the spilled material collected and reused to the extent possible. In case the material cannot be reused, it should be stored in a safe container and the State Pollution Control Board should be consulted for disposal. A supply of absorbent sawdust or sand should be kept in a container in the store where they can easily be reached for use in case of an emergency.



### FIGURE 12: CLEANING OF DDT SPILL IN STORE

Any worker engaged in spill management should be properly equipped with PPEs. This should consist of gloves, mask, apron, goggles and shoes. The protective gear should be washed with detergent and dried before they are stored/reused.

### 5.10.1 Solid Spills

In case of spillage of wettable powders or granules, it should be mixed with absorbent — e.g. saw dust or sand — and swept. The swept material should be collected in a container and reused later.

### 5.10.2 Liquid Spills

Liquid spills should not be washed with water and should be mixed with absorbent, e.g. saw dust or sand and swept. The swept material should be collected in a container.

### 5.10.3 Leaks

Leaking containers should be repacked in an intact container. Old containers of various types and sizes can be used for this purpose.

### 6 **REFERENCES**

- Food & Agricultural Organisation (1996), Pesticide Storage and Stock Control Manual, FAO of United Nations under the project GCP/INT/572/NET available at http://www.fao.org/ag/AGP/AGPP/Pesticid/Disposal/common/ecg/103809\_en\_No \_3\_\_\_Storage.pdf (accessed on 12.07.11)
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- Ministry of Environment & Forest, Gol, (2000), Manufacture Storage & Import of Hazardous Chemicals Rules, 1989 (amended 1994, 2000); available at www.cpcb.nic.in/.../(28)HAZARDOUS%20CHEMICALS%20RULES.doc (accessed on 15.07.11)

### The ECoP series also Contain:

- 1. Transport of Insecticides for IRS activities
- 3. Community Responsibility During IRS
- 4. Use and Maintenance of Personal Protective Equipment (PPE)
- 5. Indoor Residual Spraying (IRS)
- 6. Disposal of waste water, empty bags/ Containers and bio-medical wastes





# National Vector Borne Disease Control Programme (NVBDCP)

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