AERB SAFETY GUIDELINES NO. AERB/SG/EP-4

PREPARATION OF OFF-SITE EMERGENCY PREPAREDNESS PLANS FOR NON-NUCLEAR INSTALLATIONS

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This document is subject to review, after a period of one year from the date of issue, based on the feedback received

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FOREWORD

The Atomic Energy Regulatory Board (AERB) constituted by the Government of India vide S.O. 4772 dated November 15, 1983 was entrusted with the responsibility of enforcing safety and regulatory functions envisaged under the Atomic Energy Act, 1962. AERB is thus responsible for enforcing safety in nuclear-related activities within India as well as for enforcing the provisions of the Factories Act, 1948 in units of the Department of Atomic Energy. In discharging these responsibilities, AERB has been drawing up codes, guides, standards and manuals to facilitate the work of the concerned organisations in implementing the necessary safety regulations.

One such safety regulation pertains to the drawing up of emergency preparedness plans (EPP) where required, for various installations of the Department of Atomic Energy. For this purpose, four Safety Guidelines have been issued by AERB for the guidance of the concerned organisations, to enable them to draw up the necessary EPP. The present document provides guidelines to enable the "Preparation of Off-Site Emergency Preparedness Plans for Non-Nuclear Installations."

The other three documents issued by AERB provide safety guidelines for the preparation of:

(a) site emergency preparedness plans for nuclear installations;

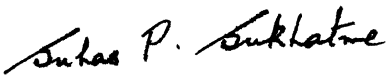
(b) off-site emergency preparedness plans for nuclear installations; and

(c) site emergency preparedness plans for non-nuclear installations.

In India, the "Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989", the "Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996" and the subsequent amendments issued under the Environment (Protection) Act 1986, lay down the regulations pertaining to emergency planning and preparedness. The present document takes into account these statutory requirements.

This document has been prepared by the staff of AERB and other professionals. AERB thanks all individuals who helped in its drafting and finalisation.

The list of persons who participated in the committee meetings for preparing this document, along with their affiliations, is included for information.



(Suhas P. Sukhatme)
Chairman, AERB

DEFINITIONS

Accident

Unplanned and unintended event giving rise to injury, ill-health, death and damage to property and environment or other losses.

Effect Distance

Distance up to which any adverse consequences of an accident would be felt.

Emergency

A situation, which endangers or is likely to endanger the safety of the facility, the site personnel or the environment, and the public.

Occupier

Occupier of an installation means one who has or who has been given the ultimate control over the affairs of the installation.

Off-Site Emergency

Accident condition/emergency situation involving excessive release of radioactive materials/hazardous chemicals from the plant into public domain calling for intervention.

Off-Site Emergency Director

A specifically designated officer (e.g. the Collector/District Magistrate) with adequate authority to control and co-ordinate all Off-Site Emergency actions in public domain.

Safety Code/Standard

A document issued under the authority of AERB and mandatory for AERB approved operations.

Safety Guide

A document supplementing Safety Codes/ Safety Standards recommending a set of procedures that might be followed in implementing them. These are issued under the authority of AERB.

Toxic Material

Material that causes ill health or fatality at or above a specified concentration.

CONTENTS

1. INTRODUCTION

1.1 General

These Guidelines outline the requirements for preparation of Off Site Emergency Preparedness Plans (OSEPP) for a non-nuclear installation[1] of the Department of Atomic Energy, hereinafter referred to as the Facility. The scope of these Guidelines includes all non-nuclear installation, which are required to have an OSEPP under the provisions of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, the Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996 and the subsequent amendments as applicable. The rules specify the nature of information that shall be furnished in OSEPP as well as the essential criteria or issues that need to be addressed in the Plan. The Annexure to this document contains a list of chemicals currently used in DAE units along with threshold quantities, which if exceeded, require the preparation of OSEPP.

The OSEPP sections of the Facility should correspond to the sections in this Guidelines wherever applicable.

Section 1 of OSEPP should outline the objectives of the Plan, the definition of an off- site emergency; the basis on which the Plan has been drawn up a brief introduction to the Plan itself and its need, the agency which prepared it and the agency which reviewed/approved it.

In addition, it shall list names of all officials who have been provided with a copy of the Plan, the date of issue, and the planned date of review and revision of the Plan.

1.2 Scope

This section should describe the scope of the Plan and the facilities included. It shall specifically list the agencies and organisations responsible for drawing up the Plan, for providing inputs and for implementation of the Plan.

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1 Unit(s) of the Department of Atomic Energy other than nuclear power plants/nuclear power projects/nuclear research reactors.

2. DESCRIPTION OF THE FACILITY AND SITE

This section should describe the Facility and the site. The site should describe its geographical, meteorological and demographic characteristics. The details essential in this section are listed below.

2.1 Description

This sub-section should briefly describe the various systems and components of the Facility, the nature of materials handled and the processes involved. It should also include the Material Safety Data Sheets (MSDS) of hazardous substances handled in the Facility. It should be supplemented by a plan of the Facility giving its layout, access roads, location of tank farms containing hazardous substances, emergency control centre(s), assembly points, security points and other details which may have relevance in controlling emergencies.

2.2 Site Location

This sub-section should indicate the State, District, and Taluka level divisions. It should specify the location with respect to the nearest natural and man-made features such as rivers, lakes, embankments, dams, railway line, roads, etc. including activities connected with land and water use such as agricultural/cattle farm. It should include details of nearby installations like factories, oil/ gas pipelines, defence installations, airports and other vital installations. It should also include those installations, where, if an emergency were to occur, it would have a bearing on the functioning of the Facility.

2.3 Site Area Maps

All maps pertaining to OSEPP should be provided as a separate Annexure to the Plan and its list given in this sub-section. All maps should be drawn to scale and include the following information:

(i) facility or plant boundary lines,

(ii) site boundary,

(iii) effect distance based on maximum credible accident scenario,

(iv) principal structures in the facility or plant,

(v) principal storage sites for hazardous materials (inflammable/toxic substances), radioactive materials, and conventional waste dump yards,

(vi) industrial, commercial, institutional, recreational or residential structures within the effect distance,

(vii) topography of the area,

(viii) highways (national, state, district), railways, waterways that traverse or are adjacent to the site,

(ix) routes of evacuation including alternate routes if the main routes are blocked due to adverse weather conditions, accidents, traffic jams or other causes,

(x) locations of police stations, fire stations, hospitals including primary health centres and dispensaries in the vicinity of the facility, and

(xi) other assembly points identified by the facility for use in emergency.

2.4 Demographic Characteristics

This sub-section should indicate the nature and details of demographic data and the base year of census to which the data apply. The data itself should be enclosed as separate Annexures and include population distribution within the effect distance, transient population, population density, population centres, and special groups if any, for each of the sectors identified in tabular form. It should also describe the housing colonies, sensitive institutions i.e. schools, hospitals, types of housing and cattle/ livestock.

2.5 Site Meteorology

This sub-section should provide meteorological data at various times of the year and include wind rose diagrams, weather conditions, and monsoon and fog conditions. It should also include data on humidity and temperature inversion for the last 10 years.

3. ORGANISATION AND RESPONSIBILITIES

This section of OSEPP should describe the overall organisational structure during normal working conditions and that which will come into force during an off-site emergency situation. It shall include the following:

3.1 Organisation Details

This should describe the organisation-structure, hierarchy of emergency response personnel, their designations, and the alternate officials.

3.2 Contact Details

This should give the names and all contact details (address, telephone, fax, electronic mail) of all emergency response personnel including alternate officials.

3.3 Responsibilities

This sub-section should list the responsibilities assigned to personnel engaged in or likely to be engaged in emergency response activities. These should include:

(i) responsibilities of state/district level authorities from the Off-Site Emergency Director downwards, having a role in emergency response and control;

(ii) responsibilities assigned to the occupier and his designated officials both during and outside normal working hours including the specified authority vested in them to ensure proper discharge of responsibilities;

(iii) responsibilities assigned to supporting organisations, if any, other than plant/state/district authorities.

3.4 Resource Groups[2]

This sub-section should include details of the resource groups and their responsibilities and should cover:

(i) communication,

2 Groups of people who have the resources/training to carry out the duties set upon them to cope with an emergency.

(ii) public announcements and media-briefing,

(iii) monitoring of toxic releases into the environment,

(iv) medical care including administration of antidotes,

(v) security/maintenance of law and order, and

(vi) evacuation/transport and sheltering of people and livestock where required.

3.5 Mutual Aid

This sub-section should deal with types of accidents where external organisations would be involved in remedial action and responsibilities assigned to them should be mentioned. Inter-relationship of the facilities in multi-facility sites should also be highlighted.

4. ACCIDENT SCENARIOS

This section should describe various accident scenarios that have been considered while drawing up OSEPP. It is recognised that it may not be possible to include all scenarios in this section. However, it is essential that a wider range of possibilities are postulated and planned for. These scenarios shall cover the effect distances and the criteria on which these distances are arrived at.

For example, a sample (but not exhaustive) list of events which could lead to an off- site emergency are:

(a) sudden and complete rupture of pressure vessel,

(b) guillotine breakage of pipe work connected to vessels,

(c) holes or cracks in piping and vessels,

(d) failure of flange joints, and

(e) failure of the glands and seals of pumps,

The above mode(s) of failure can lead to an off-site emergency due to toxic release/ fire like:

(i) excessive leakage of hydrogen sulphide from a H_2S-H_2O based heavy water plant,

(ii) excessive leakage of ammonia from a NH_3-H_2 based heavy water plant or from its adjacent fertiliser plant,

(iii) excessive release of beryllium or its compounds from the beryllium plant,

(iv) excessive leakage of chlorine from a unit handling chlorine e.g. the Nuclear Fuel Complex, and

(v) excessive leakage of any flammable material and subsequent fire which can spread outside the site boundary.

5. COMMUNICATIONS

This section should describe the normal communication system that would function at the Facility and the communication system set up for handling emergencies. The communication system intended for off-site emergency should be exclusively used for emergency purposes and should not be used for routine day-to-day communications. The system should be tested periodically and shall have the capability for round-the-clock notification to the Local/District/State emergency crisis groups and provide linkage to DAE and other governmental organisations including AERB and other services such as local emergency team and fixed/mobile medical support facilities.

5.1 System Description

This sub-section should describe of the communication systems at the plant and the emergency control centres and should cover the following:

(i) organisation structure for communication - the designated official including alternate(s),

(ii) manpower - to maintain the communication systems including functional responsibilities,

(iii) equipment - including availability of alternate system(s), and

(iv) contact details - including the nature of contact for emergency control centres.

5.2 System Requirements

This sub-section should give details of the two emergency control centres, one at the Facility and the second outside the site boundary. The one outside the site boundary should preferably be beyond the effect distance and the location shall be based on the least probable worst meteorological condition. There shall be a direct communication link between the emergency control centres, the fire station and the plant control room. The emergency control centres should be equipped with at least two external and two internal telephone lines of which one each shall be dedicated solely to outgoing calls.

5.3 System Features

This sub-section shall describe the communication system for activating the off-site emergency control centre and shall ensure the availability of the following:

(i) list of plant personnel authorised to issue emergency messages or announcements;

(ii) list of officials at the Facility to be contacted in the event of an off-site emergency;

(iii) list of officials outside the Facility including district authorities to be contacted in the event of an off-site emergency;

(iv) responsibilities and authority of the communication system personnel;

(v) mechanism by which the contact details of all concerned officials are kept updated; and

(vi) standardisation of various messages that would be transmitted to officials both inside and outside the Facility.

5.4 Testing of the Communication System

This sub-section of OSEPP should give details of the manner in which each mode of communication would be tested to ensure a high level of reliability. This should cover communication links within the Facility as well as communication links to external agencies and emergency response groups. The communication testing procedures should specify the manner of testing, the links to be tested and the frequency with which they will be tested.

5.5 Redundancy in Communication Links

This sub-section is to ensure an in-built redundancy in the communication system by way of availability of at least two modes of communication at all levels connected with off-site emergency response. The availability of infrastructure for ensuring backup electric power supply where required should also be indicated.

6. RESOURCES

This section of OSEPP should describe the resources available to the Off-Site Emergency Director during an off-site emergency. These should cover the following:

(a) mechanism for announcement including public address systems and sirens (both fixed and mobile),

(b) monitoring and sampling of releases,

(c) emergency shelters at the Facility,

(d) first-aid facilities (including alleviation mechanism),

(e) mechanism for distribution/administration of antidotes where applicable (e.g. amyl nitrite, sodium nitrite etc.),

(f) transport, vehicles and fuel,

(g) fire-fighting facilities/personnel,

(h) rescue teams,

(i) hospital,

(j) traffic diversion and control,

(k) emergency control centres,

(l) emergency equipment,

(m) information centre,

(n) evacuation and sheltering of public, and civil supplies where require, and

(o) clean-up and restoration.

The duties and responsibilities of personnel entrusted with each of the above should be described.

The list of equipment, instruments, drawings, documents, furniture and supplies of protective equipment to be kept in designated areas, intended mainly for use during emergencies shall be listed in this section. The official responsible for maintenance of these items should also be specified. The system for periodic testing, maintenance and replacement of equipment (in case of obsolescence) should be clearly laid down and the responsibility for its implementation indicated.

7. DECLARATION AND TERMINATION OF AN OFF-SITE EMERGENCY

This section of OSEPP should list the sequence of actions to be taken for declaration of an off-site emergency. The notification should be made only by the designated authority namely the Off-Site Emergency Director (OED), or his/her authorised representative, who should also be the designated authority for terminating the same. It should be ensured that an announcement is also made in the regional language.

The steps or actions described in this section should be clear, unambiguous and coherent. These should include the specific conditions under which off-site emergency would be declared and notified and the conditions under which it will be terminated. This should also include the mechanism for communicating the notification of declaration and termination to all designated officials responsible for taking specific actions in response to such communications.

This section should also explain the audible signal codes for declaration and termination of off-site emergency.

8. ACTION PLAN FOR RESPONDING TO OFF-SITE EMERGENCY

This section is one of the essential components of OSEPP. It should give clear directions to the officials listed in sections "Organisations and Responsibilities" and "Resources" - especially those who have been designated to carry out the response action plans. In this regard it shall be ensured that the control room of the Facility has a display of names and contact details of key designated officials and that this display is updated.

This section should list out the sequence of actions to be taken by each resource group or person or agency on being notified about off-site emergency. It should be comprehensive and give all actions to be taken up to the stage of termination of off-site emergency. This should be supported by an action flow chart for this purpose. There should be a mechanism to ensure that all persons involved in the control of off-site emergency understand their duties and responsibilities.

This section should also include a specific sub-section which will address the mechanism set up or proposed to be set up to handle post-accident situations like clean-up and recovery of affected land and facilities.

9. MAINTENANCE OF OFF-SITE EMERGENCY PREPARDENESS PLAN

This section should describe the system of maintenance of OSEPP to ensure that it is kept in a state of readiness. It should address the following areas:

(a) updating contact details of emergency response personnel (including external agencies and emergency response groups),

(b) testing of equipment at the off-site emergency control centre(s), first-aid areas and monitoring equipment (both stationary and mobile),

(c) testing of equipment in emergency vehicles as well as testing of vehicles themselves,

(d) testing of emergency communication system,

(e) periodic replacement of antidotes and medicines where applicable,

(f) appropriate training programme for all personnel at the Facility as well as district officials aimed at ensuring that those agencies/ individuals involved in emergency management understand the purpose and scope of the action plans,

(g) conducting mock-exercises and their periodicity, obtaining feedback and taking corrective measures,

(h) updating and revision of plan,

(i) interaction with district authorities, and

(j) maintenance of relevant records.

For each of the items listed above, details regarding the designated official responsible for implementation, updating and revision actions if and when required, powers delegated and procedures adopted should be listed.

10. PUBLIC AWARENESS PROGRAMME

This section of OSEPP should give the detailed public awareness programme. It is recognised that the Facility will have a public awareness programme by which information will be disseminated to the public. In addition to general information about the Facility, its safety features and safety aspects of the plant, it shall include the following:

(a) the mechanism for involving the public in the off-site emergency exercises;

(b) the mechanism for dissemination of information to the public in the event of an actual off-site emergency;

(c) the authorities designated to disseminate such information; and

(d) the nature and content of the information that would be disseminated.

ANNEXURE-I

LIST OF CHEMICALS CURRENTLY USED IN DAE UNITS ALONG WITH THE THRESHOLD QUANTITIES WHICH IF EXCEEDED REQUIRE THE PREPARATION OF OSEPP.

NAME OF CHEMICAL	THRESHOLD QUANTITY [1]
AMMONIA	50 t
AMMONIUM NITRATE [2]	350 t
BERYLLIUM	10 kg
CHLORINE	10 t
HYDROGEN	2 t
HYDROGEN CHLORIDE (LIQUIFIED GAS)	25 t
HYDROGEN FLOURIDE	5 t
HYDROGEN SULPHIDE	5 t
FLAMMABLE GASES [3]	15 t
HIGHLY FLAMMABLE LIQUIDS [4]	1000 t
FLAMMABLE LIQUIDS [5]	25 t

1 The quantity of the hazardous chemical specified in Part-I of schedule 3 of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.

2 Ammonium nitrate and mixtures of ammonium nitrate where nitrogen content derived from the ammonium nitrate is greater than 28% by weight and to aqueous solutions of ammonium nitrate where the concentration of ammonium nitrate is greater than 90% by weight.

3 Chemicals which, in the gaseous state at normal pressure and mixed with air, become flammable and the boiling point of which at normal pressure is 20°C or below.

4 Chemicals which have a flash point lower than 23°C and the boiling point of which at normal pressure is above 20°C.

5 Chemicals which have a flash point lower than 65°C and which remain liquids under pressure, where particular processing conditions, such as high pressure and high temperature, may create major accident hazards.

BIBLIOGRAPHY

1. The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 under the Environment (Protection) Act, 1986

2. The Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996 under the Environment (Protection) Act, 1986

3. Technology and Environment - UTA International Journal, Vol. 1, 1996

4. AERB Safety Manual - Site Emergency Plan for Nuclear Installations (AERB/M/NISD-1), 1986

5. AERB Safety Manual - Off-Site Emergency Plan for Nuclear Installations (AERB/M/NISD), 1988

LIST OF PARTICI PANTS

COMMITTEE TO PREPARE SAFETY MANUAL ON ON-SITE AND OFF-SITE EMERGENCY PLANS FOR CHEMICAL PLANTS

Dates of Meeting	:	23 February, 1999 31 March, 1999 2 June, 1999 1 July, 1999 5 August, 1999

Members participating in the meeting :

Shri T. Subbaratnam (Chairman)	:	Formerly Consultant, AERB
Shri P.K. Ghosh	:	AERB
Shri K. Muralidhar	:	DAE
Shri V. Raghuraman	:	HWB
Shri M. Raghavayya	:	BARC
Shri T.N. Krishnamurthi	:	Formerly AERB
Shri R. Bhattacharya (Member-Secretary):		AERB
Shri N.M. Chodankar (Invitee)	:	AERB

LIST OF SAFETY GUIDELINES ON EMERGENCY PREPAREDNESS PLANS

Safety Series No.	Title
AERB/SG/EP-1	Preparation of Site Emergency Preparedness Plans for Nuclear Installations
AERB/SG/EP-2	Preparation of Off-Site Emergency Preparedness Plans for Nuclear Installations
AERB/SG/EP-3	Preparation of Site Emergency Preparedness Plans for Non-Nuclear Installations.
AERB/SG/EP-4	Preparation of Off-Site Emergency Preparedness Plans for Non-Nuclear Installations.