

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

Issued in August, 2000

**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 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 Site Emergency Preparedness Plans for Non-Nuclear Installations"

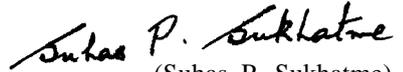
The other three documents issued by AERB provide safety guidelines for the preparation of:

- (a) site emergency preparedness plans for nuclear installations;
- (b) off-site emergency preparedness plans for nuclear installations; and
- (c) off-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 consequence 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 (OED)

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.

Site Emergency

Accidental condition/emergency situation in the plant involving radioactivity transgressing the plant boundary but confined to the site or involving the release of hazardous chemicals/explosion, whose effects are confined to the site with off-site consequences expected to be negligible.

Site Emergency Director

A specifically designated officer with adequate authority to control and coordinate all site emergency actions.

Toxic Material

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

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1. INTRODUCTION

1.1 General

These Guidelines outline the requirement for the preparation of Site Emergency Preparedness Plans (SEPP) for a non-nuclear installation¹ of the Department of Atomic Energy, hereinafter referred to as the Facility. For this purpose, the term Site Emergency covers emergency alert, personnel emergency and plant emergency conditions which also need to be included in SEPP. The scope of these Guidelines includes all non-nuclear installations which are required to have a SEPP as per statutory requirements by the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, the Chemical Accident (Emergency Planning, Preparedness and Response) Rules, 1996 and the subsequent amendments to the same as applicable. It specifies the nature of information that shall be furnished in SEPP as well as the essential criteria or issues, which will 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 SEPP.

The SEPP sections of the Facility should correspond to the sections in these Guidelines wherever applicable.

Section 1 of SEPP should outline the objectives of the Plan, the definition of a Site Emergency, the basis on which the Plan has been drawn up, a brief introduction to the Plan itself, the need, the agency which prepared it and 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 the revision of the Plan.

1.2 Scope

This section should describe the scope of the Plan and the facilities included. It should incorporate the information necessary to ensure that regulatory requirements have been met. It shall specifically list out the responsibility of the Occupier in preparing and implementing SEPP. The scope should extend to termination of the site emergency and, where applicable, to intimating the Off-Site Emergency Director.

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 of SEPP should describe the Facility along with the site. Site description should include 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 major systems and components of the Facility, the nature of materials handled and the processes involved. It should be supplemented by a plan of the Facility giving its layout, access roads, location of tank farms containing hazardous substances, control room(s), emergency control centre, fire station, assembly points, security points and other details which may have relevance in controlling emergencies.

2.2 Site Location

This sub-section should specify the location with respect to the nearest natural and man-made features such as rivers, lakes, embankments, dams, railway line, roads, etc. It should include details of nearby installations like factories, oil/gas pipelines, defence installations, airports and others whose operations are either critical for the country or those that involve large numbers of personnel. 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 SEPP should be provided as a separate Annex to the Plan and its list given in this sub-section. All maps shall be drawn to scale so that distances can be measured. The maps should include the following information:

- (i) facility or plant boundary lines;
- (ii) site boundary;
- (iii) principal structures in the Facility; and

- (iv) principal storage sites for materials, inflammable materials, toxic substances, radioactive material, conventional waste dump yards etc.

2.4 Other Site-Specific Details

This subsection should give the following details for the site boundary:

- (i) ownership of land, if not already under to control of "Occupier";
- (ii) control of activities other than those of the Facility being described;
- (iii) arrangements for traffic control;
- (iv) access control details; and
- (v) location of personnel assembly areas.

3. ORGANISATION AND RESPONSIBILITIES

This section should describe the overall organisational structure which will come into force during a site emergency. It shall include the following:

3.1 Organisation Details

Organisation-structure, hierarchy of emergency response personnel right from Site Emergency Director downwards, their designations and alternative officials.

3.2 Contact Details

Names and contact details (address, telephone, fax, electronic mail) of all emergency response personnel.

3.3 Responsibility

Responsibility assigned (during normal working hours and beyond) to the designated officials and the specific authority vested in them to ensure that the assigned responsibilities can be carried out.

3.4 Resource Groups²

This should cover in detail the following resource groups:

- (i) communication,
- (ii) public announcements,
- (iii) monitoring of toxic releases into the environment,
- (iv) emergency shelters at the Facility,
- (v) transport for evacuation of plant personnel,
- (vi) medical care including administration of antidotes, and
- (vii) security/maintenance of Law and Order.

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

3.5 Mutual Aid

This should deal with types of accidents where external organisations would be involved in remedial actions and their responsibilities. This would also include responsibilities taken up by the facility for rendering such assistance to external organisations. Inter-relationship of the facilities in multi-facility sites should also be highlighted.

4. ACCIDENT SCENARIOS

This section should describe the various accident scenarios considered while drawing up SEPP. It is recognised that it would not be possible to include all scenarios in this Section. However, it is essential that a wide range of possibilities are postulated and planned for.

Though an emergency could be caused by a number of factors, such as, equipment failures, human errors, sabotage, etc., it would normally manifest itself in one or more of the three forms: as a fire, as an explosion, and as a release of toxic substances. The scenarios envisaged should include events involving flammable materials, release of toxic substances and those where a fire could give rise to toxic releases. 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 a Site Emergency are:

- (a) sudden and complete rupture of pressure vessel,
- (b) guillotine breakage of pipe work connected to vessels,
- (c) small 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 a Site Emergency due to toxic release/ fire like:

- (i) leakage of hydrogen sulphide from a H_2S-H_2O based heavy water plant,
- (ii) leakage of ammonia, potassium amide in ammonia, or hydrogen gas from a NH_3-H_2 based heavy water plant,
- (iii) release of beryllium or its compounds from the beryllium plant,
- (iv) leakage of chlorine from a unit handling chlorine e.g. the Nuclear Fuel Complex,
- (v) leakage of hydrogen fluoride from a unit handling HF, and
- (vi) leakage of any flammable material and subsequent fire.

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 site emergency response shall be exclusively used for emergency purposes and shall not be used for routine day-to-day communications.

5.1 System Description

The description of each communication system 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 the Emergency Control Centre.

5.2 System Requirements

There shall be a Site Emergency Control Centre at the Facility which should have direct communication links with the fire station, and the control room. This centre should be equipped with at least two external and two internal telephone lines, of which one each shall be dedicated solely to outgoing calls.

There should be adequate alarm points from which an emergency alarm can be raised. Details of the alarm system shall be furnished.

5.3 System Features

The Communication System for activating the Site Emergency Control Centre shall ensure the availability of the following:

- (i) list of officials authorised to issue emergency messages or announcements,

- (ii) list of officials (at the Facility) to be contacted in the event of a site emergency,
- (iii) list of officials (outside the Facility) to be contacted in the event of an emergency,
- (iv) responsibilities and the authority of the communication system personnel,
- (v) mechanism by which contact details of all concerned officials are kept updated, and
- (vi) standardisation of various messages that would be transmitted to officials outside the facility.

5.4 Testing of the Communication System

SEPP 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. The communication testing procedures shall 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

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

6. RESOURCES

This section should describe the resources that would be available to the Site Emergency Director during a site emergency at the facility. These should cover the following:

- (a) mechanism for announcement,
- (b) monitoring and sampling of releases,
- (c) emergency shelters at the Facility,
- (d) first-aid facilities,
- (e) clean-up facility,
- (f) security points,
- (g) mechanism for distribution and administration of antidotes where applicable (e.g. amyl nitrite, sodium nitrite),
- (h) transport, vehicles and fuel,
- (i) fire-fighting facilities/personnel,
- (j) hospital facilities,
- (k) rescue teams,
- (l) site emergency management group,
- (m) mutual aid,
- (n) emergency control centre, and
- (o) emergency equipment.

Against each of the above, details about the quantity or number, the location and specifications shall be provided. The designated officials who have the authority to draw upon these resources should be clearly indicated. The system for periodic testing, maintenance and replacement of equipment (in case of obsolescence) should be described and the responsibility for its implementation indicated.

7. DECLARATION AND TERMINATION OF SITE EMERGENCY

This section should list out the sequence of actions during the declaration of a Site Emergency. The declaration or notification should be made only by the designated authority namely the Site Emergency Director (SED) or his/her authorised representative, who should also be the designated authority for terminating the same. It would also specifically indicate how the audible signals should be interpreted for declaration and termination of an emergency. It should be ensured that announcements are also made in the regional language.

The steps or actions described in this section should be clear, unambiguous and coherent. It should include the specific conditions under which 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 the designated officials who are responsible for taking specific actions in response to such communications.

8. ACTION PLAN FOR RESPONDING TO SITE EMERGENCY

This section is one of the essential components of SEPP. It shall be written in a logical, consistent and clear manner without room for any ambiguity whatsoever for the officials listed in Section titled "Resources" and 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 on duty, and that this display is updated on a day-to-day basis.

This section should also list out the sequence of actions to be taken by each resource group, person or agency on being notified about the site emergency. It should include actions necessary for an orderly and phased shutdown of the facility when required. It should be comprehensive and should give all actions right until the site emergency has been terminated. This shall also include specific actions to be taken in the event of site emergency leading to an off-site emergency.

9. MAINTENANCE OF SITE EMERGENCY PREPAREDNESS PLAN

This section should describe the system of maintenance of the site emergency preparedness plan 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 resource groups);
- (b) testing of equipment at the Site Emergency Control Centre, monitoring equipment and equipment in the clean-up facility and first aid area;
- (c) testing of equipment in emergency vehicles as well as testing of the 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 joint training programme covered by mutual aid aimed at ensuring that the agencies/individuals involved in emergency management understand the purpose and scope of the action plans;
- (g) conducting mock-exercises at stipulated intervals, obtaining feedback and taking corrective measures;
- (h) updating and revision of the Plan; and
- (i) maintenance of relevant records.

For each of these items listed above, the corresponding sub-section shall describe the designated official responsible for ensuring compliance, the powers delegated for this purpose and the procedure that will be adopted.

ANNEXURE-I

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

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 a 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 as liquids under pressure where particular processing conditions, such as high pressure and high temperature, may create major accident hazards.

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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 PARTICIPANTS

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

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**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.