
**Nuclear criticality safety — Emergency
preparedness and response**

Sûreté-criticité — Préparation des interventions et intervention d'urgence

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11320 was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 5, *Nuclear fuel cycle*.

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Introduction

Criticality safety programmes at facilities that might use significant quantities and concentrations of fissile material are primarily directed at avoiding nuclear criticality accidents. However, the possibility of such accidents exists and the consequences can be life-threatening. For facilities that are judged to have a credible criticality accident risk, this necessitates advance planning, practice in planned emergency responses, and verification of readiness. Two distinct phases are identified:

- the emergency preparedness phase, which needs to be enforced continuously, and
- the emergency response phase, which needs only to be activated when it is indicated that a criticality accident could be developing, could be occurring or could have occurred.

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Nuclear criticality safety — Emergency preparedness and response

1 Scope

This International Standard provides criteria for emergency preparedness and response to minimize consequences due to a nuclear criticality accident. The criticality safety of operations are evaluated in accordance with ISO 1709.

This International Standard applies to a site with one or more facilities which might contain significant quantities and concentrations of fissile material. The extent to which this International Standard needs to be applied depends on the overall criticality risk presented by the facilities at the site.

This International Standard does not apply to off-site transport and transit storage of packages with fissile material.

This International Standard does not apply to sites with operating nuclear power plants or to facilities with research reactors which are licensed to become critical or near-critical, provided that there are no operations with fissile material external to the reactor for which a credible criticality accident risk exists. This International Standard can be applied to such sites and facilities in specific cases, if supported by site management and by licensing authorities.

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2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 921, *Nuclear energy — Vocabulary*

ISO 1709, *Nuclear energy — Fissile materials — Principles of criticality safety in storing, handling and processing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 921 and the following apply.

3.1 drill

supervised instruction intended to test, develop, maintain and practise the skills required in a particular emergency response activity

NOTE A drill can be a component of an exercise.

3.2 emergency

non-routine situation or event that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment

NOTE 1 This includes nuclear and radiological emergencies, and conventional emergencies such as fires, release of hazardous chemicals, storms or earthquakes. It includes situations for which prompt action is warranted to mitigate the consequences of a perceived hazard.

NOTE 2 A criticality emergency is considered to be both a nuclear and a radiological emergency. It is an emergency in which there is, or is perceived to be, a hazard due to the following:

- the energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction;

— radiation exposure.

NOTE 3 Adapted from the IAEA Safety Glossary, 2007 Edition.

**3.3
emergency coordinator**

person authorized to direct the overall emergency response

**3.4
emergency plan**

description of the objectives, policy and concept of operations for the response to an emergency, and of the structure, authorities and responsibilities for a systematic, coordinated and effective response

NOTE 1 The emergency plan serves as the basis for development of other plans, procedures and checklists.

NOTE 2 Adapted from the IAEA Safety Glossary, 2007 Edition.

**3.5
emergency preparedness**

capability to take actions that will effectively mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment

NOTE Adapted from the IAEA Safety Glossary, 2007 Edition.

**3.6
emergency response**

performance of actions to mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment

NOTE 1 It can also provide a basis for the resumption of normal social and economic activity.

NOTE 2 Criticality emergency response consists of actions taken from the time of identification of a suspected, imminent or actual criticality accident to permanent shutdown of the event.

NOTE 3 Adapted from the IAEA Safety Glossary, 2007 Edition.

**3.7
exercise**

activity that tests one or more portions of the integrated capability of emergency response plans, equipment and organizations

**3.8
facility**

defined area within a defined site where fissile material can be located

**3.9
immediate evacuation zone**

area surrounding a potential criticality accident location that must be evacuated without hesitation if a criticality accident alarm signal is activated

**3.10
risk**

product of probability and consequences for an undesired event or action

**3.11
site**

defined area containing one or more facilities under a single management

3.12**technical staff**

personnel with specific skills and experience who can assist in the implementation of the requirements defined in this International Standard

NOTE Such personnel can include, but are not limited to, criticality safety, health and safety, and facility process support personnel.

3.13**individual**

person involved in developing, or who can be affected by, the emergency plan

4 Emergency preparedness**4.1 Responsibilities****4.1.1 Management responsibilities**

Management shall ensure the following:

- a) staff with relevant expertise are provided;
- b) an emergency response plan is established, exercised and maintained;
- c) immediate evacuation zones and evacuation routes are established;
- d) evacuation routes are clearly identified for evacuees and are unambiguous;
- e) a personnel assembly station (or stations) is designated;
- f) a method is provided for timely accounting of all individuals who were within the immediate evacuation zone at the time of the evacuation;
- g) instrumentation and equipment needed to respond to a criticality accident is provided;
- h) the level of readiness (including training) needed for response to a criticality accident is adequate;
- i) the capability to perform radiological dose assessments for response to criticality accidents is provided;
- j) a communication system for central coordination of criticality site emergency activities is provided;
- k) a nuclear criticality accident dosimetry system is provided;
- l) equipment (e.g. a criticality accident alarm system complying with ISO 7753) and procedures are in place to instigate the emergency response when needed.

4.1.2 Technical staff responsibilities

The technical staff, as formally instructed by management, shall do the following:

- a) identify credible criticality accident locations;
- b) evaluate and characterize credible criticality accidents, including radiological dose prediction;
- c) determine the instrumentation and equipment requirements for emergency response activities;
- d) define the immediate evacuation zone around the potential criticality accident locations;
- e) participate in the planning, conduct, and evaluation of exercises and drills.