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## SAFETY CODES AND GUIDES - TRANSLATIONS

**Edition 12/08**

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Basic Recommendations for Disaster Control in the Vicinity  
of Nuclear Facilities

of 27 October 2008

Rahmenempfehlungen für den Katastrophenschutz  
in der Umgebung kerntechnischer Anlagen

vom 27. Oktober 2008

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**Bundesamt für Strahlenschutz  
Salzgitter**

The German original of this English translation was published in Gemeinsames Ministerialblatt 2008, No. 62/63.  
In case of discrepancies the German text shall prevail.

# Basic Recommendations for Disaster Control in the Vicinity of Nuclear Facilities

of 27 October 2008

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## **1 Introduction**

These Basic Recommendations replace the Basic Recommendations which were jointly approved by the Conference of Ministers of the Interior on 11 June 1999, and the Federal States Committee for Nuclear Energy – General Committee – on 6 April 1999 (cf. announcement dated 9 August 1999 by the Federal Minister for the Environment, Nature Conservation and Nuclear Safety, as published in GMBI 1999, p. 538-587). The revision of the Basic Recommendations dated 1999 was necessary to take account of new developments. Beside formal adaptations to the amended Radiation Protection Ordinance of 2001, this includes especially the new national regulations regarding iodine tablets. Here, the Commission on Radiological Protection revised the iodine instruction sheets. New iodine tablets were purchased and new concepts for distribution were proposed including areas beyond previous planning areas. Furthermore, the Commission on Radiological Protection further developed concepts for medical measures in case of radiological events (as shown in Volume 32 of the publications of the Commission on Radiological Protection) and especially also for the medical measures undertaken in the event of a nuclear power plant accident (as shown in Volume 4 of the publications of the Commission on Radiological Protection). Furthermore, findings of national and international practical planning are introduced into the Basic Recommendations. These include amongst others provisions for incidents taking place rapidly during action planning as well as the further developments of - also cross-national - concepts for the formulation and communication of the radiological situation. In view of the importance of timely, comprehensive and coordinated information, a mandate to prepare and develop of the population to allow for an acceptance of protective measures and therefore ensure an effectiveness of these measures a coordinated information concept is defined.

German nuclear facilities possess safety systems and action plans that are intended to practically rule out the occurrence of a nuclear accident with relevant radiological impacts on the environment. Such a course of events can only occur if the existing graduated safety measures failed to take effect and the additional measures taken to prevent serious nuclear damage and to contain the radiological consequences thereof were unsuccessful. It is for such an event that disaster control plans are drawn up for the vicinity of nuclear facilities. The present Recommendations for the establishments of disaster control plans are for nuclear power plants. They shall be applied analogously to other nuclear facilities (research reactors, interim storage facilities for spent fuel assemblies, fuel element fabrication facilities etc.), if planning for disaster control is necessary.

The primary purpose of all planning activities is to prevent or limit direct consequences of impacts of nuclear accidents on the population. The term "direct consequences" is understood to mean deterministic effects, especially

early effects, and high individual risks which need immediate action by disaster control personnel to mitigate them. The "Radiological Fundamentals for Decisions on Measures for the Protection of the Population against Accidental Releases of Radionuclides" (Resolution of the Federal States Committee for Nuclear Energy – General Committee – on 6 April 1999, GMBI 1999, p. 538) constitute the radiological basis for decisions on disaster control measures.

The present Recommendation does not affect existing responsibilities, organisational structures and regulations for general disaster control; it is however intended to serve as a basis which ensures that, as far as possible, the same principles are applied all over the Federal Republic of Germany as far as special disaster control planning in the vicinity of nuclear facilities is concerned. The Basic Recommendations do not interfere with special *Land*-specific aspects of plans.

Disaster control in the vicinity of nuclear facilities is dealt with by the authorities who are competent under *Land* law. In this context the *Länder* shall ensure that the level of responsibility is commensurate with the importance of the planning tasks and the ordering of protective measures in the event of a disaster. If several disaster control authorities are involved, they shall cooperate closely on the planning and in case of operation, exchange the necessary information, and coordinate announcements, recommended behaviours and protective measures.

The Recommendation applies to German nuclear facilities and to foreign facilities which, in view of their location near the border, call for planning measures as defined in this Recommendation to be undertaken on German territory.

Having regard to the principles set out below (Section 3), special disaster control plans shall be drawn up for the vicinity of nuclear facilities. In addition to disaster control planning by the authorities, the operator of a nuclear facility is obliged pursuant to §§ 51 and 53 of the Ordinance on Protection against Damage and Injuries caused by Ionizing Radiation (Radiological Protection Ordinance) to take precautionary and protective measures of its own, which are set out in the operator's Alerting Rules and Emergency Manual.

General, not locally defined plans according to the Precautionary Radiation Protection Act exist independent to the (local) disaster control planning of the *Länder* in order to limit the radiological exposition of people as much as possible by using appropriate measures in case of incidents with relevant radiological impacts. As in case of a nuclear accident, which requires measures for disaster control, also measures according to the Precautionary Radiation Protection Act have to be taken, a close coordination between the Federation and the *Länder* is necessary in advance. This applies especially to measures which have to be performed outside the planning areas in the event of a nuclear incident.

This does not mean, that in case of a nuclear accident the measures of defending against danger, which become necessary outside the planning area are included in the precautionary radiation protection and therefore have to be performed by the authorities responsible for precautionary radiation protection.

The basic principle that the immediate measures necessary for danger defence have to be performed by the disaster control authorities applies also outside the planning area for measures of disaster control.

In addition, the basic principle applies that all measures necessary to protect the population, after the imminent danger has been averted, must be passed to competence of the authority responsible for precautionary radiation protection. These include particularly such measures whose introduction serves to avoid high stochastic risks and whose abrogation can only be performed after deter-

mination of the harmlessness (prohibition of foodstuffs) or after consideration of social aspects (temporal resettlement).

Note: If the operator informs the supervisory authority according to the Nuclear Safety Officer and Reporting Ordinance about an incident not requiring measures of disaster control but measures for precautionary radiation protection, the supervisory authority will inform the authorities responsible for precautionary radiation protection after checking the relevance. Possible measures will then be initiated by the authority responsible for precautionary radiation protection.

## 2 Coordination of planning by the authorities and measures taken by the operator of a nuclear facility

The operator of a nuclear facility is obliged to take the following measures:

### 2.1 Notifying the disaster control authority

- a) The operator of a nuclear facility shall immediately alert the offices responsible for receiving alerts under the special disaster control plans if the conditions specified for an early warning or an disaster alert (see Section 3.8) are fulfilled (immediate notification).

The operator then shall inform the competent offices continuously about the situation at the facility and its assessment.

- b) The immediate notification shall be made in accordance with a prepared text containing the following information:
1. Keyword: "Nuclear Accident" in facility ..., unit ...
  2. Suggested classification: early warning, disaster alarm
  3. Information for assessing the hazard situation in the vicinity;  
Information about the conditions of dispersion particularly the propagation direction and the wind speed  
Information about the provisional classification under INES  
(If this classification leads to a disproportional delay of the notification delivery, it may be omitted in the primary notification. It shall be delivered at a later stage as soon as possible.)  
If the incident proceeds rapidly (for definition see Annex 1), i. e. a significant release is directly imminent, the quick course shall be announced clearly in the immediate notification. (q. v. Section 3.8.4)
  4. Date and time, name and position of the notifier

Moreover, the operator shall transmit to the disaster control authority immediately all information which may be relevant for assessing the accident and initiating preventive measures (cf. Annex 7.4).

The operator shall inform the offices, which according to the special disaster control plans are responsible for receiving alarm notifications immediately about the development of the situation (cf. 3.3).

- c) Communication links between the nuclear facility and the offices responsible for receiving alarm notifications as well as the disaster control management must be guaranteed even in the event of congestion or failure of the public dial-up system. Technical measures to ensure telephone communication may, for example, take the form of leased telephone lines or other communication links according to state-of-the-art technology which guarantee the same reliability and availability.

## 2.2 Duties of the operator during ascertaining the radiological situation

The operator shall immediately delegate an expert liaison officer for liaison with the office determined for the site in question (cf. 3.3). The duties of the liaison officer are essentially:

- a) To describe the condition of the facility, to elucidate the sequence of the accident and the source term
- b) To present the radiological consequences.

## 2.3 Establishment of an alternative location for the operator's task force management outside the facility

In case it should become necessary to evacuate the nuclear facility, the operator shall establish an alternative location for its task force management outside the facility, which possess various independent means of communication with the disaster control authorities. The communication with the back-up shutdown centre or the partial shutdown centre must be guaranteed. At the alternative location, the documents required for ascertaining the event of the accident as well as the individual radiological protection equipment of the task forces of the operator shall be kept.

## 2.4 Measurements and sampling in the vicinity

The operator of the nuclear facility shall take measurements at predetermined points in the vicinity by means of stationary and mobile equipment. The type and extent of such measurements are laid down in Section 4.3.2.

The measurement results shall be communicated without delay to the offices responsible for determining the radiological situation via the measurement centre.

## 2.5 Cooperation in preparatory disaster control

The operator and the disaster control authorities shall coordinate their plannings.

The operator shall support the disaster control authority not only in fighting the disaster, but also with preparatory disaster control according to § 53 of the Radiation Protection Ordinance.

In particular, the operator shall advise the disaster control authority on the preparation of special disaster control plans under these Basic Recommendations, make available the information required for this purpose, and participate in and support the trainings and other education measures ordered by the disaster control authority.

The supervisory *Land* shall take into account the interests of the neighbouring *Länder* vis-à-vis the operator and coordinate with the neighbouring *Länder* respectively.

## 3 Principles for drawing up special disaster control plans for the vicinity of nuclear facilities

The following general principles regarding content and structure shall be adhered to in the special disaster control plans:

### 3.1 Contents

### 3.2 Evidence of updating

The plans shall be continuously updated and reviewed at regular intervals (in principle once a year) by the authority

responsible for their preparation.

## 3.3 Management organisation

### 3.3.1 Fundamentals and cooperation

The management organisation under the special disaster control plan shall be based on the corresponding disaster control official regulations of the *Länder*, especially as far as the responsibilities as well as structural and process organisation of the staff are concerned.

The structure of the management organisation, the duties and responsibilities of its members and the work processes shall be laid down in special official regulations.

The cooperation of the participating disaster control managements shall be ensured.

If several *Länder* might be affected by the consequences of a nuclear accident, the cooperation and communication across the *Länder* shall be planned, agreed upon and described. This planning shall ensure that decisions are taken based on **one uniform assessment of the situation** that was determined with regards to all available data and information, as well as that the activity of the task personnel is effective.

### 3.3.2 Assessment of the situation

In order to determine and assess the radiological situation by consultants, a location (radiological assessment centre<sup>1)</sup> shall be established. The data and information as well as support devices necessary to determine the radiological situation and to propose appropriate actions shall be available at the radiological assessment centre.

At least the following persons shall be incorporated as consultants at the radiological assessment centre<sup>2)</sup>:

- **one** operator's liaison officer expert in radiation protection who elucidates amongst other things the reports coming from the facility,
- authorized radiation protection experts, e.g. of appropriate agencies or institutions,
- physicians with expertise on radiological protection,
- representatives of the supervisory authority,
- in addition experts of meteorology shall be involved,
- other consultants may be consulted site-specifically or as the situation requires.

For the radiological assessment centre and the group of consultants a structural and process organisation shall be planned and appropriate official regulations shall be established.

If several *Länder* might be affected by the consequences of a nuclear accident, there shall be - if several radiological assessment centres are available - agreed in advance where the collective radiological situation will be primary determined.

### 3.3.3 Technical equipment

The technical equipment of the management establishments shall require in particular a sufficient number of different, mutually independent means of communication (e.g. fax, e-mail).

<sup>1)</sup> The radiological assessment centre in terms of this Recommendation may be but must not coincide with the radiological assessment centre of the *Land* responsible for precautionary radiation protection.

<sup>2)</sup> This Recommendation does not deal with liaison officers of the operator and the representatives of the supervisory authorities with respect to facilities in foreign countries.

### 3.4 Alerting

Rapid and complete alerting of all relevant authorities, units and other institutions needed in the course of the individual alert phases shall be ensured (cf. 4.1).

Graphic alert schemes shall be prepared for the individual alert phases.

### 3.5 Information of the public

1. As part of the disaster control plans a concept for information of the public<sup>3</sup> shall be drawn up. This concept shall guarantee that the information provided is concise, comprehensible and adapted to the situation at the right point in time. The concept shall be coordinated with the authorities responsible for precautionary radiation protection.
2. The concept shall be structured according to the recommendations of annex XIII of the Radiation Protection Ordinance in
  - a. preliminary information about possible emergencies
  - b. current information of the public if an emergency occurred.
3. All responsibilities shall be mandatorily defined as part of the concept. This means, it shall be regulated which institution informs whom at which point in time for which reason about which facts using which communication channel.
4. It shall be defined as part of the concept, which media are used to inform the public. Tools shall be prepared for each of the designated channels of information, e.g. tools for the preparation of press releases, text modules, and equipments for mobile press centres, and prepared internet pages.
5. The concept shall include a mandatory procedure on which the different institutions involved in the limitation of the effects of the emergency coordinate the contents of their information.
6. The concept shall include at least one procedure that allows the citizen to contact the authorities responsible for the disaster control measures.
7. The concept shall be adjusted to site-specific conditions and shall be effective across the borders of the *Länder* if necessary.
8. The suitability of the measures for information of the public shall be proven by trainings.

### 3.6 Specification of marshalling-areas for task personnel

When selecting marshalling areas, adequate transport connections and ease of access for task personnel unfamiliar with the area shall be important aspects.

### 3.7 Subdivision of the vicinity of the nuclear facility

#### 3.7.1 Planning areas

The vicinity of the nuclear facility shall basically be subdivided into the following *zones* in order to localize preparatory measures. If the planning requires a further subdivision, it shall be uniformly performed at one site:

The zones shall be labelled by characters.

Central zone	"(Z)"
Intermediate zone	"(M)"
Outer zone	"(A)"
Distal zone	"(F)"

#### 3.7.2 Central zone

The central zone shall directly surround the nuclear facility. Its limits shall be adapted to take account of local conditions (size of facility, structure of terrain and settlement situation) and shall not exceed a distance of 2 km from the facility.

#### 3.7.3 Intermediate zone

The intermediate zone shall surround the central zone. Its outer limits shall be a circle with a radius of up to about 10 km.

#### 3.7.4 Outer zone

The outer zone shall surround the intermediate zone. Its outer limits shall be a circle with a radius of up to about 25 km.

#### 3.7.5 Distal Zone

The distal zone shall surround the outer zone. Its outer limits shall be a circle with a radius of up to about 100 km.

#### 3.7.6 Subdivision into sectors

The intermediate zone, the outer zone and the distal zone shall be divided into *sectors* of 30° which are consecutively numbered in a clockwise direction, with Sector 1 symmetrically oriented towards the North.

#### 3.7.7 Task maps

Zones and sectors shall be defined and drawn on appropriate task maps (scale 1:25 000 or 1:50 000). Survey maps which are part of the disaster control plan shall be on a suitable scale of the official maps.

#### 3.7.8 Measures to be prepared in the planning areas

All necessary measures shall be prepared for each zone. The plannings for the central and intermediate zone shall include all alert measures 2 according to Section 3.10 on top of alert measures 1. In the outer zone, measuring and sampling points shall be defined and alerting schemes prepared. The distribution of iodine tablets to all persons aged below 45 years shall be prepared in the outer zone and to children and adolescents aged below 18 as well as for pregnant women in the distal zone. In these zones it shall additionally be made sure that the warning not to eat freshly harvested foodstuffs can be immediately disseminated.

There is basically no need for special disaster control plans – relating to the nuclear facility – outside the specified zones.

Unaffected by zone- and sector-specific planning, other measures can be performed if necessary based on general disaster control plans.

### 3.8 Alert Phases

The following alert phases shall be defined:

Early warning  
Disaster alarm

<sup>3</sup>) Suggestions for the constitution of a concept for the public relations are found in the guideline on the information of the public in case of nuclear accidents (cf. Section 6 no. 3).

### 3.8.1 Office responsible for triggering

Triggering the early warning or the disaster alarm shall be the responsibility of the manager of the disaster control authority or his representative, respectively. For this purpose, the following general criteria shall apply:

### 3.8.2 Early warning

An early warning shall be triggered in case of an event in the nuclear facility, where no or only minor impact on the vicinity compared with the criteria for triggering a disaster alarm, has occurred so far, but where the state of the facility nevertheless means that the possibility of impacts occurring which meet the criteria for triggering a disaster alarm cannot be ruled out.

### 3.8.3 Disaster alarm

A disaster alarm shall be triggered when in the event of a nuclear accident a hazardous release of radioactive materials into the vicinity has been detected or is imminent.

### 3.8.4 Criteria

The procedure for triggering an early warning or disaster alarm shall be clearly defined and all parties concerned shall be informed. Attention shall be drawn to the "Criteria for the Alerting of the Disaster Control Authority by Operators of Nuclear Facilities" (Joint Recommendation by the Reactor Safety Commission of 16 October 2003, and the Radiological Protection Commission of 11/12 September 2003, Federal Gazette No. 136a dated 23 July 2004).

In the event of rapidly occurring events, appropriate procedures shall be defined to determine rapid measures for the protection of the population (alerting the population, sheltering, intake of iodine tablets) in the regions of the central zone and truncated small towns in the vicinity of the facility.

## 3.9 Overview of alert measures

### 3.9.1 Subdivision of alert measures

The alert measures shall be subdivided into alert measures 1 and 2 and other measures.

Alert measures 1 comprise all alerts to be carried out upon the receipt of an alarm and any appropriate additional measures.

Alert measures 2 are a defence against acute dangers. Whether and in which areas they are triggered, shall be decided according to the assessment of the facility status and of the radiological situation whereas the reference dose of the Radiological Fundamentals shall be referred to (cf. annex 7.2).

Other measures shall follow the alert measures and shall serve as precautions or to eliminate or mitigate any existing dangers<sup>4</sup>. These measures shall be implemented by the competent authority, in particular in compliance with the Precautionary Radiological Protection Act. Disaster control task personnel may be called in for this purpose. The triggering and the extent of such measures shall depend on the circumstances of the individual case and cannot really be planned in advance.

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<sup>4</sup>) Measures according to the Precautionary Radiation Protection Act may be performed in areas where no measures to defend against acute danger (alert measures 2) are performed, without being dependent on these.

## 3.10 Allocation of measures to the alert phases

### 3.10.1 Measures to be taken in case of an early warning

Alert measures 1:

1. Alerting the competent authorities, offices as well as the Federal Ministry competent for the international reporting obligations,
2. Convening of the disaster control management in the required composition (including cooperation with the office responsible for press and public relations),
3. Establishing the readiness of the remaining members of the disaster control management as well as measuring services and aid organisations,
4. Defining the area that may be at risk, depending on the meteorological situation and its forecasted development on the basis of the zones and sectors,
5. Bringing measuring equipment into service,
6. Informing neighbouring administrative units (including those outside the *Länder* borders) if these may be affected.

The population shall be suitably informed about the facts of the situation and the measures taken by the authorities.

Even in case of an early warning, alert measures 2 as set out in section 3.10.2 may be prepared or, if necessary, taken.

### 3.10.2 Measures to be taken in case of a disaster alarm

Alert measures 1:

1. Alerting the competent authorities, offices and aid organisations as well as the Federal Ministry competent for the international reporting obligation,
2. Convening of the disaster control management,
3. Defining the area at risk, depending on the meteorological situation and its forecasted development on the basis of the zones and sectors,
4. Deployment of measuring services; measurements shall be taken in accordance with a special plan
5. Informing and if appropriate calling in neighbouring administrative units (including those outside the *Länder* borders) if these may be affected. In this situation informing of the population shall also be agreed upon.

Alert measures 2:

1. Warning and informing the population,
2. Controlling, regulating and restricting traffic in accordance with a prepared plan,
3. Requesting sheltering,
4. Distributing iodine tablets in accordance with a special plan,
5. Requesting to take iodine tablets,
6. Evacuation in accordance with a special plan,
7. Establishing and operating emergency stations for decontamination and medical care of the population affected,
8. Decontamination and medical care for task personnel,

9. Warning of the population not to eat freshly harvested foodstuffs,
10. Initiating traffic restrictions for rail, waterway and air traffic if applicable,
11. Informing the water catchment bodies,
12. Blocking contaminated water catchment points.

Further measures:

- Warning the population against the use of water, aquatic sports and fishing,
- Informing waterway traffic, warning against water use,
- Closing heavily contaminated areas.
- Ensuring food supplies,
- Ensuring water supplies,
- Supplying animals with feeding stuff, in special cases transferring or disposing of heavily contaminated or killed animals,
- Decontaminating traffic routes, houses, equipment and vehicles,
- Preventing the circulation of contaminated foodstuffs and feeding stuffs.

### 3.11 Disclosure

With the exception of personal or safety-delicate information, disaster control plans shall be available for inspection by the population at the disaster control authorities or at other suitable offices.

## 4 Implementation notes for alert measures

### 4.1 Alerting

In order to ensure rapid and complete alerting, all alert measures belonging to one and the same alert phase shall be carried out together. Whereby dividing into the management organisation of the disaster control authority, authorities, offices, measuring- and emergency services seems to be appropriate (alerting plan).

Rapid and reliable availability of the persons specified in the alerting plan shall be ensured by appropriate technical equipment (e.g. automatic alert system) and organisational measures (e.g. standby duty).

### 4.2 Designating the areas at risk

On receipt of an alert message with the keyword "Nuclear Accident", one of the first official measures shall be to define the area where alert measures 2 No. 3 to 6 are likely to be implemented (area at risk).

Designation shall be based on the results of ascertaining of the situation. The area at risk shall be designated on the basis of the zones and sectors. It shall be adjusted to the development of the situation.

In case of rapidly occurring events the central zone and truncated small towns in the propagation direction shall be defined as area at risk.

### 4.3 Ascertaining the situation

The situation shall be ascertained at the radiological assessment centre on the basis of the information available at the time on the state of the facility, the meteorological situation and the emission and immission situation. Initially it will be based on forecasts, while later it will increasingly be based on measurements in the vicinity. The radiological assessment centre must be equipped to ascertain the radiological situation, in particular it must have adequate calculating capacity and calculating models suitable for forecast and diagnosis, have access to meteorological data and data of the facility and have constant connections to the measuring centres of the measuring services.

#### 4.3.1 Forecast of the radiological situation

The following shall be used as a basis for a first situation estimation required immediately after the operator has given the alert, along with a forecast of the radiological impacts of the nuclear accident:

- Information from the operator about the alert criteria (general criterion, facility criterion, emission criterion, immission criterion) and compliance with protection goals,
- Estimation of the anticipated source term and its chronological sequence by the operator,
- Continuous information from the operator about the facility status, e.g. about the activity concentration and composition of the containment structure atmosphere, and about possible developments,
- Data on important operating parameters from nuclear reactor remote monitoring system (KFÜ),
- Site-specific meteorological data (e.g. from the KFÜ),
- Weather forecasts and trajectory calculations from the German Weather Service.

The potential radiation exposure for the population shall be estimated by using dispersion calculations. As soon as reliable measuring data and emission data are available from the operator or the KFÜ, these shall be used to improve the forecast

#### 4.3.2 Measurements in the vicinity

At the beginning a complete description of the situation on basis of single measurements is not possible. Therefore, measurements shall be performed to confirm, to supplement or even to correct the forecasts prepared by estimations or with the help of computer models. They are important to check the anticipated source term and the borders of the area at risk as well as to localize any significantly increased local contaminations which may be due to locally limited meteorological events or to carryover of contamination.

Measurements in the vicinity shall be made by stationary and mobile measuring systems, by measurement services of the operator and the independent measuring agencies and if necessary by other measurement services which are appointed from the radiological assessment centre according to their equipment and competence. The measurements shall be performed under defined measuring programmes or under specialized measurement programmes on instruction of the radiological assessment centre. The defined measurements programmes pursuant to the Guidelines for Emission and Immission Monitoring of Nuclear Facilities (REI), the plans of the disaster control and the plans of the Integrated Measurement and Information System for the Surveillance of Environmental Radioactivity (IMIS) shall be coordinated between the competent authorities of the *Länder* in a site-specific manner to avoid double samplings and gaps of surveil-

lance.

During the release phase measurements to check the source term shall be the duty of the measurement services of the operator and their measurement systems.

In the phase following the release phase the detection of elevated contamination and the determination of the area at risk shall be the focus and duty of all the measurement services.

The following installations shall be used for such measurements:

– **Permanently installed online measuring systems**

As a rule, local gamma dose rate measuring points shall be operated as part of the nuclear reactor remote monitoring system (KFÜ) in the disaster control planning area of nuclear power plants. In addition, there are local gamma dose rate measuring points of the measuring network of the Federal Office for Radiation Protection concentrated at a 25 km radius around nuclear facilities. It is usually possible to access the measurement data of this national measuring network via the nuclear reactor remote monitoring system.

– **Mobile measuring systems capable of installation on site**

Permanently installed online measuring systems may be supplemented by mobile measuring systems capable of installation on site. These include mobile local gamma dose rate probes and mobile radioactive aerosol or radioactive iodine measuring stations which can if necessary be set up at suitable locations by expert measuring squads and transmit their measurements to a measuring centre by radio or telephone. The mobile radioactive aerosol and/or radioactive iodine measuring stations may be supplemented by remote-controlled collectors.

– **Measuring services**

Measuring squads and radiation detection squads shall be available as measuring services. Measuring squads shall be provided by the operator of the nuclear facility, the independent measuring agencies for environmental monitoring and, upon agreement, by expert organisations (e.g. Federal Office for Radiation Protection, radiation measuring service of unaffected nuclear facilities, scientific institutions and technical authorities). Radiation detection squads shall be provided by the disaster control authority.

In accordance with the Guidelines for Emission and Immission Monitoring of Nuclear Facilities, the operator's measuring squads shall initially operate in the central zone and in the areas of the intermediate zone primarily affected, whereas the measuring squads of the independent measuring services and expert organisations and the radiation detection squads shall be deployed in the neighbouring sectors of the intermediate zone and in at least five sectors of the outer zone. This assignment may later be adjusted by the radiological assessment centre according to the development of the situation. The radiation detection squads shall be deployed largely for straightforward measuring tasks (mainly local dose rate measurements and possibly also sampling) in order to localize the area at risk and to detect heavily contaminated areas. Therefore measuring vehicles are particularly suitable which are able to continuously collect dose rate measurements and simultaneously determine the

coordinates of the measuring point (NBC-explorer). For rapid ascertainment of the situation, measuring squads of the Federal Office for Radiation Protection may be called in for aerial in-situ gamma spectroscopy from helicopters.

Outside the designated area at risk, large-area radioactivity monitoring shall be provided for by the intensive measurement programme of IMIS (Integrated Measurement and Information System) on the basis of the Precautionary Radiological Protection Act. These measurements may also contribute to the assessment of the situation.

#### 4.3.3 Performance of measurements

To make it possible to assess the impacts of a nuclear accident, both for designating the area actually at risk and for taking decisions on protective measures, the measurements listed in Table 4-1 shall be necessary on a priority basis.

In addition to the measurements listed in Table 4-1, measurements of further items (e.g. vegetation, milk and surface water) shall be made as a basis for decisions on precautionary radiological protection measures (e.g. bans on commercialisation). These are not direct disaster control measures and no further explanation of them is given here.

During the activity of the measuring services the principles for radiation protection shall be considered:

The operation must be justified: Principally measuring services may only be sent into more heavily contaminated areas if the measuring results are absolutely required to ascertain the situation.

The exposure to radiation must be kept as low as possible: The operation in more heavily contaminated areas shall be as short as possible. Priority shall be given to using automatically operating dose rate measuring probes and sampling and measuring instruments for determining the activity concentration in the air. Manual measuring and sampling shall be kept to the absolutely essential minimum.

The dose shall be limited: The personnel shall be instructed on return doses, or specifications shall be given for a maximum stay in the affected area.

Deployment of the measuring services shall be coordinated and planned. Measurements without significance shall be avoided. To this end it is advisable to set up local measuring centres which control the operations of the measuring squads or radiation detection squads, evaluate the results, document the results and report them in pre-defined format to the radiological assessment centre.

The local measuring centres shall be managed by the radiological assessment centre and implement its instructions. There shall be only one radiological assessment centre that determines the measuring purposes, gives the rough controlling of all measuring services and carries out a uniform situation report. Disaster control managements in adjacent locations shall cooperate on those matters. As a general rule it is advisable that the radiological assessment centre is situated in the area of responsibility (e.g. *Land*) in which the affected nuclear plant is situated.

**Table 4-1: Priority Measurements<sup>5</sup>**

Type of measurement <sup>6</sup>	Localisation	Start	Measuring services / measuring stations	Measuring purpose
a) Local gamma dose rate	Z-zone plus sectors mainly affected of the M-zone	immediately	mobile/ stationary measuring stations, nuclear power remote system (KFÜ)/ measuring network for local dose rate determination of the Federal Office for Radiation Protection, measuring squads of the operator	support in situation assessment, determining the need for additional protection measures
	secondary sectors of the M- and A-zone	after the cloud passed	measuring squads and radiation detection squads, NBC-explorers	localization of the area actually at risk, search for more heavily contaminated localizations
b) Activity concentration of the various radionuclides in the air	Z-zone plus sectors mainly affected of the M-zone	immediately	mobile/ stationary measuring stations, measuring squads of the operator	support in situation assessment, determining the need for additional protection measures
	secondary sectors		measuring squads	control the forecasts, determining the need for additional protection measures
c) Area-specific activity on the ground (after the cloud passed)	secondary sectors	after the cloud passed	measuring squads or radiation detection squads	designation of area actually at risk, detection of more heavily contaminated localizations
	total area		measuring via helicopter	ascertaining the situation

Each squad shall have task maps on which the deployment area is divided into zones and sectors. The measuring and sampling sites and, if appropriate, the routes to be used shall be indicated in the task maps, and described separately if necessary.

#### 4.3.4 Sample collecting point and gathering place

The samples collected by the measuring squads and if necessary by the radiation detection squads shall be transferred to a laboratory or a suitable sample collecting point together with completed measurement protocols.

Collecting points of samples must be set up in adequate distance and if possible abeam to the main propagation direction. They must have convenient traffic links and an appropriate infrastructure (communication with the measuring centre including data transfer, sheltering possibilities against the atmospheric conditions and sanitation). Adequate rooms and alternatives shall be determined in advance. It is the duty of the collecting points to transfer the samples as fast as possible to appropriate laboratories also by using the laboratory capacities offered by other *Länder*.

As central contact point for the measuring squads and radiation detection squads a gathering place may be erected. This can coincide with a sample collection point. At gathering places the personal dosimetry and the contamination monitoring of task personnel as well the functional control of the measuring devices shall take place.

Moreover, this shall be the place where additional or supplementary equipment is stored. In addition, devices for first orientating measurements on the delivered samples (determination of the nuclide vector) shall also be possible at this site.

The gathering place shall be chosen so that it is also suitable for a helicopter operation (landing place, tower [vehicle of the flight operation controllers], tank lorry, fire engine, rooms for data evaluation).

#### 4.3.5 Evaluation of the measurement

The results of the measurements performed by radiation detection squads and measuring squads shall be checked by the central measurement centres for plausibility. The verified data shall be transmitted directly or in pre-processed manner to the authorities responsible for the determination of the radiological situation. This shall take place using coordinated procedures (data format, transmitting protocols) in accordance with the General Administrative Regulation on Integrated Measurement and Information System for the Surveillance of Environmental Radioactivity. The radiological assessment centre must have procedures and equipment to collate the data and prepare them for presentation of the situation. Of great importance for the evaluation are graphical presentations on the local and chronological developments of the factors which are necessary for taking decision on any necessary actions and for communication with the public. For the presentation geographical information systems (GIS) shall

<sup>5</sup>) Radiation detection squads and NBC-vehicles for exploring are basically only used in uncontaminated or only slightly contaminated areas. Under the management of the measuring centres they explore the borders to higher contaminated areas with respect to the principles of radiation protection and with respect to the efficacy of their protective equipment.

<sup>6</sup>) Coherent time courses or time-integral measurements show a higher significance than a lot of short-time measurements at different points.

be used if applicable.

All procedures shall be comprised in a measuring and evaluating concept.

#### **4.4 Warning and informing the population**

At the occurrence of a nuclear accident the population shall be warned and informed about its possible consequences (cf. section 3.5). Even an early warning means that the population must be given information and orders about suitable protection measures.

Warning the population affected shall be done by means of siren signals (one-minute wailing sound) or other suitable means which have a function for wakening (e.g. public address announcements). At the same time the population must be informed by the media. Necessary agreements relating to this shall be made. Information shall be provided by means of rapid and repeated official announcements on radio, television or other suitable media

Appropriate specimen texts shall be included in the plans. Examples of text modules can be found in Annex 7.3. Further information shall be initiated by the disaster control management according to the situation.

#### **4.5 Traffic restrictions**

In the case of a disaster alarm, the road traffic entering the area at risk shall be redirected in accordance with prepared plans in order to prevent any endangering of individuals as a result of entering the area at risk as pedestrians or in vehicles. No limitations for individuals leaving the area at risk shall be designed. If there is contamination or radiation exposure the persons affected shall be instructed to go to the implemented emergency stations.

The measures to be taken for other traffic (rail, waterway, air) shall be initiated by the competent agencies on the basis of their own plans upon receipt of information from the disaster control management.

#### **4.6 Sheltering**

Sheltering serves as protection against external irradiation and internal irradiation as a result of inhalation of radioactive substances. The best protective effect while the cloud passes is achieved in closed rooms away from doors and windows, or in basement rooms. It must be possible to hear public address and radio announcements. Supply air systems shall be temporarily switched off.

Sheltering is a simple and effective disaster control measure, but it can only be maintained for a short period.

#### **4.7 Distribution and intake of iodine tablets**

Iodine tablets saturate the thyroid gland with non-radioactive iodine and if taken in time therefore prevent the thyroid gland from accumulating radioactive iodine (iodine prophylaxis).

Only tablets with high iodine content (in the mg area) are suitable for iodine prophylaxis.

Iodine tablets shall be distributed in advance or stored intermediately, respectively.

##### **For all individuals aged below 45 years:**

- in the area from zero to five km: Pre-distribution to all households
- in the area five to 10 km: Pre-distribution to all households or storage nearby the population at diverse sites in the communities (e.g. mayor halls, schools, hospitals, units) - also for task personnel
- in the area from 10 to 25 km: Storage nearby the

population at the communities and in appropriate establishments respectively

**For children and adolescents aged below 18 years as well as for pregnant women:**

- in the area from 25 to 100 km: Storing at several central storages

By means of organisational measures it shall be guaranteed that task personnel and the population affected obtain iodine tablets as early as possible, i. e. if possible before an inhalation, and are informed to have pre-distributed iodine tablets ready.

Distribution routes and methods shall be defined for every planning area.

The population shall be informed about the planned protective measures and be instructed as to when, where and how distribution takes place (cf. annex 7.3, specimen text 3 a).

When selecting distribution points, care shall be taken to minimize the time that people collecting or delivering iodine tablets must spend outside. Establishments shall be selected as distribution points which can easily be approached (e.g. polling stations) in order to avoid long listings in the alarms.

The iodine instruction sheet for the population <sup>7</sup> shall be issued when the iodine tablets are distributed.

The distribution of the iodine tablets is a precautionary measure and does not mean that the intake of the tablets shall occur immediately.

The intake of iodine tablets is only necessary when after the assessment of the situation a significant release of radioactive iodine is actually threatened and the intervention reference levels might be exceeded.

The population affected shall then be instructed to take the iodine tablets explicitly via the media (e.g. by radio or public address announcement) (cf. annex 7.3, specimen text 3 b).

#### 4.8 Evacuation

Evacuation within the meaning of these Recommendations is the rapid organised transfer of people from an area at risk to a safe area (receiving communities), where they will be accommodated, fed and cared for on a temporary basis.

Evacuation is an effective protective measure, especially if it is carried out before the passage of the radioactive cloud.

To realize evacuation, plans shall be drawn up and contain the following information:

- a) communities or parts of communities affected including the numbers of persons to be evacuated taking into account structural factors, e.g. hospitals, old people's homes, schools, kindergartens, prisons,
- b) if necessary, subdivision of the evacuation area into evacuation districts,
- c) designation of gathering points,
- d) transportation capacity for collective transport (nature of means of transport, number of seats, accessibility),
- e) local means of information (e.g. public address vehicles),

cles),

- f) evacuation routes,
- g) traffic control measures,
- h) information of the population about the location of emergency centres,
- i) measures for accommodation, care and supply of the evacuees in the receiving communities,
- j) special arrangements for the evacuation of schools, hospitals, homes, and other establishments containing people who have to be evacuated by public transport,
- k) measures for securing the evacuation area,
- l) establishing a person tracing service.

The population shall be informed of the start of evacuation by means of prepared messages (cf. annex 7.3, specimen text 4). These messages shall provide information about the hazard situation, the protective measure and the probable duration of the evacuation, and also include information required for a rapid evacuation (e.g. collecting points, evacuation routes and receiving communities, recommendation to use if possible alternative private accommodation etc.). Furthermore, announcements shall include information that are important for the residence outside the living quarters (e.g. taking medication and personal documents with them, etc.). If a contaminated area is evacuated, emergency centres shall be named.

#### 4.9 Decontamination

Decontamination of affected persons shall be carried out at emergency centres (cf. publication of the Commission on Radiological Protection, volume 4) set up at a sufficient distance from the nuclear facility or in the receiving premises provided. Buildings suitable for this purpose (e.g. indoor swimming pools, gymnasiums, schools) shall be listed.

Decontamination of vehicles of the population which might be contaminated shall be carried out in a car-wash plant whereas the washing water is discharged to the public drainage. The contamination of the interior space is not a direct danger according to the recommendation of the Commission on Radiological Protection (Recommendation on assessment of contamination values to control the surface of vehicles in transboundary traffic according to the Precautionary Radiation Protection Act). The contamination control of the vehicles at a later point in time shall be offered to the population. The evaluation of the contamination shall be performed according to the recommendation of the Commission on Radiological Protection mentioned above.

Decontamination of task personnel and task vehicles may be carried out at separate decontamination points that are erected e.g. nearby the gathering place.

Within the framework of administrative assistance, suitable units of the Federal Armed Forces may also be called in for decontamination purposes.

#### 4.10 Medical care and treatment

Initial medical care of affected persons shall also be performed at the emergency centres (for details cf. publication of the Commission on Radiological Protection, volume 4). At these centres, physicians with expertise on radiological protection shall determine what additional measures are necessary from a medical point of view, and these shall then be carried out on an outpatient basis or within the scope of inpatient therapy at general or spe-

<sup>7</sup>) The iodine data sheet for the population according to section 6 No. 7 includes information exceeding the information in the package insert.

cial hospitals.

#### 4.11 Warning the population against eating freshly harvested foodstuffs

In all planning areas the population in the mainly affected sector and two of its neighbouring sectors respectively (opening angle at least 150°) shall be instructed preventively not to eat any freshly harvested foodstuffs and not to feed livestock with freshly harvested fodder until a definite decision of the competent precautionary radiation protection authority based on measurement is made.

Individual arrangements regarding the prohibition of commercialization and the disposition of contaminated foodstuffs and feedstuffs shall be made in the framework of precautionary radiological protection.

#### 4.12 Informing water catchment bodies

The water catchment bodies located in the area at risk shall be informed.

### 5 Notes on additional measures by the disaster control authority including trainings

In addition to the measures mentioned above, further preparations shall be made, in order to ensure effective working of the disaster control. These preparations shall be carried out in cooperation with other technical authorities and offices if necessary.

1. Radiation detection squads shall be established, equipped and educated in accordance with uniform principles. Service instructions shall be drawn up for their deployment. To ensure operational readiness trainings shall be held at regular intervals following education (cf. section 2.5).
2. Alerting plans and deployment plans for the task personnel, the measuring services and the other aid organisations by these services and organisations shall be prepared at the request of and in consultation with the disaster control authority.
3. The individuals required for consulting the disaster control management, in particular radiation protection consultants and physicians with expertise on radiation protection, shall be instructed about the intended roles and activities in the disaster control management. They shall be included in informal meetings on the plan and in trainings. The same shall apply to physicians deployed at emergency centres. If demand cannot be met with individuals qualified by special professional activity, adequate individuals shall be recruited and prepared for the planned activities by continuing education measures.
4. Measures to protect task personnel and other individuals employed in case of a nuclear accident shall be established.  
  
Information on the subject can be found in the Radiological Fundamentals, the official regulations for the fire brigade FwDV 500 as well as the guideline LF 450 for the police.
5. The administrative offices, institutions and other establishments which are able to carry out sample analyses and incorporation measurements in case of a disaster shall be listed (cf. section 6, No.13).
6. Organisational preparation of a courier service for the transfer of samples from the sample collecting points to the laboratories.

The use of police, Federal Police and Federal Armed Forces helicopters shall only be scheduled after a prior agreement.

7. Agreements concerning intermediate storage of all contaminated objects resulting from the activities of the disaster control forces.
8. When accidents occur in international nuclear facilities close to the German border, it must be possible to take the same measures to protect the population as with German facilities. Therefore, in case of nuclear facilities close to the border, efforts shall be made to reach agreements with the neighbouring countries which provide that
  - a) the warnings and alerts are transmitted without delay to the competent German authorities,
  - b) all information needed for preventing danger reach the relevant disaster control management,
  - c) liaison officers are exchanged in the case of a nuclear accident,
  - d) the disaster control plans of the neighbouring states are coordinated and tested in joint trainings,
  - e) mutual support of all measures necessary for danger defence is able between the task services of the disaster control in the states affected,
  - f) rapid information is provided in cases of events with no radiological significance which might cause anxiety in the population, and
  - g) mutual information about administrative messages to inform the population occurs.

The same shall apply to the neighbouring countries in cases where German nuclear facilities are located close to the border.

9. Alert and incident trainings shall be performed. Participants, kind, extent and intervals of the trainings shall be determined by a training plan. Neighbouring *Länder* shall made agreements on this.

Additionally, agreements on this shall be made with neighbouring states concerning the performance of common trans-boundary trainings.

A feedback from the trainings shall be assured.

### 6 Additional documents to the special disaster control plans

The special disaster control plans shall be accompanied by the following appendixes consisting of at least the following documents in its relevant version:

1. The presented document "Basic Recommendations on Disaster Control in the Vicinity of Nuclear Facilities",
2. Radiological Fundamentals for Decisions on Measures for the Protection of the Population in the case of accidental Releases of Radionuclides,
3. The guideline on information of the public in case of nuclear emergencies - Recommendation of the Commission on Radiological Protection - approved in the 220th meeting of the Commission on Radiological Protection on 5 and 6 December 2007,

4. The guideline for the expert consultant on radiation protection of the disaster control management in the event of nuclear emergencies, Report of the Commission on Radiological Protection, volume 37,
5. Medical measures in the event of nuclear accidents, Publication of the Commission on Radiological Protection, volume 4,
6. The nuclear accident, Publication of the Commission on Radiological Protection, volume 32,
7. Application of iodine tablets as iodine prophylaxis for the thyroid gland, Recommendation of the Commission on Radiological Protection of 24 and 25 June 2004,
8. Criteria on alerting the disaster control authority by the operators of nuclear facilities, Report by the Commission on Radiological Protection, volume 39,
9. Extracts from the alerting rules included in the operational manual as well as of other manuals scheduled for emergencies which also contain responsibilities and contact persons of the disaster control management and their accessibility,
10. Individual regulations of the *Länder* on establishment and operation in emergency centres,
11. List of physicians who have volunteered for service in emergency centres (physicians with expertise on radiation protection according to the publication of the Commission on Radiological Protection, volume 4),
12. List of suitable medical facilities, e.g. hospitals with nuclear medicine or haematology department,
13. List of "Assistance Facilities in cases of Nuclear Accidents",
14. Guideline on specification of contamination values to control surfaces of vehicles in transboundary traffic according to the Precautionary Radiation Protection Act, Recommendation of the Commission on Radiological Protection 1996,
15. DIN 25700 Measuring the surface contamination at vehicles and their loadings in exceptional situations with relevance to radiation protection,
16. Information brochures valid for the site according to § 53 para. (5) of the Radiation Protection Ordinance,
17. International nuclear event scale for significant events at nuclear facilities (source: Handbook on nuclear safety and radiation protection, section 3.56)

## 7 Annexes

### 7.1 Definitions Relating to the Basic Recommendations

The definitions listed in the following table shall give information about available detailed and background information to the planner and the disaster control management.

Beside definitions for the presented terms also references of supplementary documents and sources are included for this reason.

Moreover, connections to the documents listed in the annex of the disaster control plan can be made.

Keyword	description, hint
NBC explorer	NBC explorers are vehicles provided by the Federation with measuring equipment to rapidly explore contaminated areas and objectives (NBC: nuclear, biological, chemical)
alerting	Alerting is the information of individuals and authorities including the request to fulfil their respectively designated role. The alerting can occur via different information channels (e.g. paging systems, telephone, telefax, sirens). The request is often coded (e.g. by means of keywords, sequence of acoustic signals).
alerting criteria	Alerting criteria are specifications for the operators of nuclear facilities. When they are reached or exceeded, the disaster control authority shall be alerted.  The criteria are subdivided in general (dosis) criteria, facility criteria, emission criteria and immission criteria.  Volume 39 (2004) of the Commission on Radiological Protection: Criteria for alerting the disaster control authorities by the operators of nuclear facilities.
alerting measure	Alerting measures are measures related to an alert phase.  Alerting measures 1 especially have the objective to establish the working capacity of the disaster control management and the measuring services, to assert and assess the situation as well as to inform the population.  Alerting measures 2 have the objective to defend against acute danger for live and health of the population and include in particular measures such as "sheltering", "distribution and intake of iodine tablets" as well as "evacuation".
alerting rules	According to the safety standard KTA 1201 of the Nuclear Safety Standards Commission, alerting rules are part of the operating manual of the operator, which contain the instructions for emergencies regarding alerting, planning, behavioural rules, measures, and equipment as well as regarding the communication with external offices. The alerting rules are supplemented by regulations of the emergency manual and other manuals provided in cases of emergency.
alert phase	The alert phase summarizes all alerting and measures to be performed when an alarm is received. In the Basic Recommendations presented here two alert phases are defined, i.e. early warning and disaster control alarm. Alert phases are proposed in the alarm message by the operator and are verified by the disaster control management.
Nuclear Safety Officer and Reporting Ordinance	Nuclear Safety Officer and Reporting Ordinance is the short term for Ordinance on the Nuclear Safety Officer and the Reporting of Accidents and other events. In this Ordinance the obligation to report accidents and incidents is specified. The Ordinance contains amongst others criteria and time limits for reportable events. According to the Nuclear Safety Officer and Reporting Ordinance the obligation to report exists independently of the alarm messages pursuant to section 2.1 of this Recommendation.
sheltering	"Sheltering" is a measure to reduce external radiation by means of shielding and to reduce inhalation of possibly contaminated breathable air.  Radiological Fundamentals, chapter 4.1
propagation calculation	Propagation calculations describe the airborne transport of radioactive substances considering the wind direction, the turbulence in the atmosphere, the wind speed as well as the precipitation. (There are also propagation calculations for streaming water and ground water, but these are generally not used for disaster control).  Guideline for the expert consultant for radiation protection of the disaster control management, chapter 3

Keyword	description, hint
outer zone	The outer zone is a circular planning area in which in addition to measurements to determine the radiological situation, the distribution of iodine tablets to all individuals aged below 45 years as well as the warning of the population not to eat freshly harvested feedstuff shall be prepared. The outer zone of nuclear power plants has an internal radius of about 10 km and an external radius of about 25 km. In general, the measures in the outer zone are carried out relating to the propagation direction (oriented on the sectors).
Alternative location for the operation controllers	The alternative location for the operation controllers is an establishment of the operator to accommodate the crisis management group of the operator in case of an evacuation of the facility
General Administrative regulation on Integrated Measurement and Information Systems for the Surveillance of Environmental Radioactivity	General Administrative regulation on Integrated Measurement and Information Systems for the Surveillance of Environmental Radioactivity as amended on December 13, 2006 (BAnz. 2006, No. 244a)
decontamination	Decontamination is the elimination or reduction of a contamination  A distinction is made between decontamination of persons, equipment and objectives/ vehicles and of buildings (urban/rural).  Radiation Protection Ordinance, § 3 para. (2), No. 8 Radiological Fundamentals, chapter 4.1 Issue 4 of the Commission on Radiological Protection, chapter 4.3 Guideline to determine contamination values for controlling of vehicle surfaces DIN 25700 Measurements of surface contaminations at vehicles and their loadings in special situation with radiological relevance
deterministic effect	Deterministic effects occur as a consequence of high energy depositions by ionizing radiation by which cells are damaged or killed in a number significant to their functioning.  These effects can be transient or permanent.  Deterministic effects occur only above a threshold level.  Amongst others, deterministic effects occur as radiation injury of the skin (erythema) and the acute radiation syndrome with its possible complex symptoms (haematological, gastrointestinal, (muco)cutaneous, cerebrovascular).  Radiological Fundamentals, chapter 3.2 Issue 32, chapter 5.5 of the Commission on Radiological Protection
effective dose	The effective dose $E$ is the sum of the organ doses $H_T$ multiplied with the respective tissue weighting factors $W_T$ in relevant organs and tissues $T$ .  The weighting factors take into account the different radiation sensibilities of organs and tissues.  The unit of the effective dose is Sievert (Sv).  Radiation Protection Ordinance, § 3 para. (2), No. 9 character b Issue 32 of the Commission on Radiological Protection Radiological Fundamentals, chapter 3.4
Intervention reference level	Intervention reference levels are planning values for the anticipated dose, when they are reached, the initiation of protective measures shall be considered.  The Radiological Fundamentals contain intervention reference levels for the measures "sheltering", "Intake of iodine tablets", "evacuation", "temporarily resettlement" and "resettlement".  Radiological Fundamentals, chapter 4.3 Extract cf. annex 7.2
Intervention level	Intervention levels are values which are applied in the event of an anticipated dose to initiate protective measures.  Radiological Fundamentals, chapter 4.3

<b>Keyword</b>	<b>description, hint</b>
task personnel	<p>Task personnel are individuals that are deployed in the event of a nuclear accident to deal with the consequences of the accident.</p> <p>They include facility staff, individuals who are used due to their general professional qualification for special duties (e.g. measuring, transports, repairs, construction works) as well as security and emergency personnel (e.g. police, fire brigades, ambulance men, physicians).</p> <p>Special dose limits are defined for task personnel.</p> <p>Radiological Fundamentals Volume 4 of the Commission on Radiological Protection Official regulations for the fire brigade FwDV 500: Devices at NBC-deployment Guideline LF 450 for the police: Dangers by chemical, radioactive and biological materials</p>
absorbed dosis	<p>The absorbed dosis is the ratio between the energy transferred by ionizing radiation on material of a volume element and the mass of this volume element. The unit of the absorbed dose is joule per kilogram (J/kg); the special unit denomination is Gray (Gy).</p> <p>Radiological Fundamentals, chapter 3.4</p>
evacuation	<p>Evacuation means the rapid, organised or assisted clearing of an area. Evacuation does not include a statement about the duration of the clearing.</p> <p>Radiological Fundamentals, chapter 4.1</p>
exposure pathway	<p>Radioactive substances dispersed into the environment can lead to radiation exposure of people via different pathways.</p> <p>The most important exposure pathways are: external irradiation by the radiological cloud, external irradiation by contaminated ground, inhalation of radioactive substances, and ingestion of radioactive substances.</p> <p>Radiation Protection Ordinance, § 3 para. (2), No. 13 Radiological Fundamentals, chapter 2 Radiological Fundamentals, chapter 4.4</p>
expert consultant on radiation protection	<p>The expert consultant on radiation protection has expertise on radiation protection and advises the disaster control management on questions concerning radiation protection and on decisions about protective measures.</p>
expert consultants for the disaster control management	<p>Expert consultants for the disaster control management are a group of competent representatives with expertise in different fields of activities (e.g. radiation protection, police, medicine, meteorology) that advises the disaster control management and supports their decisions.</p>
distal zone	<p>The distal zone is a circular planning area in which the dispersion of iodine tablets to children and adolescents aged below 18 years as well as to pregnant women and the warning of the population not to eat freshly harvested foodstuffs shall be prepared. In case of nuclear power plants the distal zone has an inner radius of about 25 km and an outer radius of about 100 km; it can be subdivided if necessary regarding the organisation of the distribution of iodine tablets. Measures in the distal zone are performed according to the propagation direction (oriented at the sectors).</p>
dose commitment	<p>The dose commitment is the dose accumulated during the period of time when radioactive substances remain in the body after their incorporation. To calculate the dose commitment a time of 50 years is assumed for adults and a time starting at the present age up to the age of 70 years is assumed for children.</p> <p>Radiological Fundamentals, chapter 3.4 Radiation Protection Ordinance, annex VI Part D</p>
area at risk	<p>The area at risk is the area in which one or several of the measures "sheltering", "intake of iodine tablets" or "evacuation" must be considered to defend against acute danger in accordance with the results of the ascertainment of the radiological situation and as result of the exceedance or possible exceedance of intervention reference levels.</p>
total dose	<p>The total dose is the dose resulting as sum of the dose contributions of all exposure pathways.</p> <p>Radiological Fundamentals, chapter 2</p>

<b>Keyword</b>	<b>description, hint</b>
tissue weighting factors	<p>With the tissue weighting factors <math>\omega_T</math>, the individual organ (equivalent) doses <math>H_T</math> are weighted relating to their relative contributions to the stochastic radiation effect in order to determine the effective dose <math>E</math>.</p> <p>These factors <math>\omega_T</math> reflect the different sensibilities of the different organs, tissues and parts of the body compared to the stochastic radiation effects (cancer induction, triggering of genetic damages).</p> <p>Volume 32 of the Commission on Radiological Protection</p>
IMIS	<p>German abbreviation for "Integriertes Mess- und Informationssystem zur Überwachung der Radioaktivität in der Umwelt" (Integrated Measurement and Information System for the Surveillance of Environmental Radioactivity).</p> <p>Precautionary Radiation Protection Act, § 4</p>
INES	<p>Abbreviation of "International Nuclear Event Scale". The international scale for important events at nuclear facility (INES) shall allow a comprehensible classification of incidents at nuclear facilities in order to inform the public about the relevance of these incidents in correlation to safety engineering and at the same time support communication between experts, media and the public. The scale ranges from level zero (events without safety-related significance) to level 7 (major accidents).</p> <p>Handbook on nuclear safety and radiation protection, section 3.56</p>
ingestion	Ingestion is the incorporation of radioactive substances via foodstuffs.
inhalation	Inhalation is the incorporation of radioactive substances via breathable air.
in-situ-gamma-spectroscopy	The in-situ-gamma-spectroscopy is a measurement performed to analyse the nuclide-specific composition especially of the deposited radiological substances at the location using mobile measuring devices.
integration time	<p>The integration time is the period that is used as a basis for calculating the doses according to the exposure pathways and intervention levels to be considered.</p> <p>For external exposure the duration of stay inside the radiation and for internal exposure the duration of stay of the emitter in the body/tissue shall be taken as a basis.</p> <p>Radiological Fundamentals, chapter 3.1 and 4.4.1</p>
iodine tablets	<p>Potassium iodide tablets with a high iodine content (in the milligrams range) to saturate the thyroid gland with iodine (iodine prophylaxis) to avoid the thyroid gland accumulating radioactive iodine.</p> <p>Important: This should not be confused with tablets intended for the prevention of iodine deficiencies, which contain about a thousand times less iodine (in the micrograms range). These are not suited for an iodine blockade.</p> <p>Iodine instruction sheets, Radiological Fundamentals, chapter 4.1</p>
catalogue of support measures in the event of nuclear accidents	Listing of addresses and communication links to consultants and organisations that can take on an advisory function or supporting duties especially in measurement techniques and decontamination not only in case of nuclear accidents, but also in case of events with radioactive substances outside the nuclear technology. The catalogue is published by the GRS (Gesellschaft für Anlagen- und Reaktorsicherheit) by order of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and it is distributed only to the competent authorities.
disaster control measures	<p>Measures instructed by the disaster control management to defend against acute and direct dangers for life and health.</p> <p>In the context of nuclear disaster control, the measures "sheltering", "distribution and intake of iodine tablets" and "evacuation" including their dedicated supporting measures are known as disaster control measures.</p> <p>Radiological Fundamentals, chapter 4.4</p>
nuclear reactor remote monitoring system	The nuclear reactor remote monitoring system is a data acquisition and evaluation system of the nuclear supervisory authority with which technical and radiological data from the facility as well as data from the vicinity of the nuclear power plant are collected, transferred online to the authority and with which the data are evaluated at the authority for the purpose of surveillance.

Keyword	description, hint
nuclear accident	A nuclear accident is a course of events resulting in serious radiological impact on the vicinity of the relevant nuclear facility or where such an impact is threatened. Such a course of events can only occur if all graduated security measures existing per design at a nuclear facility do not respond during an initiating event. In terms of this definition impacts are serious if in the vicinity an effective dose of 10 mSv and a dose at the thyroid gland of 50 mSv in children and adolescents aged below 18 years as well as in pregnant women is reached or exceeded (according to the general dose criterion in the alert criteria).
contamination, radioactive	A contamination is a impurity with radioactive substances. a) surface contamination: Impurity of a surface with radioactive substances. A distinction is made between not strongly adherent, strongly adherent and infiltrated via the surface activity. The unit of the quantity to be measured is the area-related activity in Becquerel per square centimetre; b) surface contamination not strongly adherent: Impurity of a surface with radioactive substances where a further dispersion of the radioactive substances can not be ruled out.  Radiation Protection Ordinance, § 3 para. (2), No. 19 Radiological Fundamentals Volume 32, chapter 7.1 of the Commission on Radiological Protection Volume 4, chapter 4 of the Commission on Radiological Protection
measuring services	The measuring services perform radiological measurements as part of the measuring programs in the vicinity. It is distinguished between the measuring squads (q. v.) and the radiation detection squads (q. v.) with different measuring tasks and application areas.
measuring network	Measuring networks are systems for automatic recording, transfer and storage of radiological (where necessary also meteorological) measuring data of probes at stationary or mobile measuring points. Measuring networks are part of systems for surveillance, e.g. of the nuclear reactor remote monitoring system and of the Integrated Measurement and Information System for the Surveillance of Environmental Radioactivity.
measuring point	Measuring points are locations determined in advance or in an event at which (radiological) measurements are performed.
measuring squads	Measuring squads are established by the operator of the nuclear facility, by the independent measuring offices for the surveillance of the vicinity and upon agreement by expert organisations (e.g. Office for Radiation Protection, radiation measuring services of nuclear power plants not affected, scientific institutes and technical authorities). Their main measuring objectives are the verification of dose and contamination estimation determined by calculation and the location of the area at risk. Another important task is the determination of the nuclide vector as a basis for the forecast of the further radiation exposure.
measurement centre	Measurement centres are establishments to manage the measuring services and to record the measuring results and to analyse the samples. They work on the basis of measurement programs and on instructions received from the radiological assessment centre. The measuring results are forwarded from the measurement centre to the radiological assessment centre.
intermediate zone	The intermediate zone is a circular planning area in which the alert measures 2 are to be prepared. In case of nuclear power plants the intermediate zone has an inner radius of about two km and an outer radius of about 10 km. Measures in the intermediate zone are generally performed according to the propagation direction (oriented at the sectors).
emergency manual	The emergency manual (of the operator) describes measures and procedures implemented using present technical devices of the internal accident management in order to control an event beyond design (nuclear accident) or to limit its radiological impacts. The emergency manual supplements in these cases the part of the operating manual in which the control of a design basis accident.
accident and emergency unit	An accident and emergency unit is an establishment for primary emergency treatment and decontamination of persons who remained in a nuclear facility during an accident or in the affected area during or after the passage of the radioactive cloud.  Volume 4, chapter 4 of the Commission on Radiological Protection
organ dose	The organ dose is the product of the mean absorbed dose in an organ, tissue or part of the body and of the radiation weighting factor $w_R$ . The values of the radiation weighting factor $w_R$ are dependent on type and quality of the radiation (photons, electrons, neutrons, protons, alpha particles).  Radiological Fundamentals, chapter 3.4 Radiation Protection Ordinance, § 3 para. (2), No. 9 character d

Keyword	description, hint
sampling	Sampling is the collecting of probes from environmental area such as air, ground, vegetation, surface water and ground water according to standardized procedures. Location, time and if necessary the circumstances of the sampling are documented in the measurements protocols together with a sample identification and an identification of the sampler. The samples are brought via the sample collecting points to the mobile or stationary laboratories and there the samples are also measured according to standardized procedure. The measuring results together with the data of the measurement protocols are reported to the measurement centre for evaluation and assessment.
sample collecting point	The sample collecting point is an establishment for the receipt of environmental samples (cf. sampling) and for the transfer of the samples to laboratories with suitable technical expertise. The duties of the collecting point include amongst others the disposition, i.e. the decision which of the laboratories has the necessary equipment and necessary capacity and availability, as well as the organisation of the sample transport.
source term	The attributes of an accidental release are known as a source term. These include in particular the anticipated or actual activity, nuclide-specific or with the help of reference nuclides (e.g. I 131, Xe 133, Cs 137) or groups of nuclides (inert gases, iodine, suspended solids) as well as the temporal course of the release. In a further sense, source term attributes also include release conditions such as level of release, impact of buildings, thermal energy.
radiological assessment centre	<p>A radiological assessment centre is an establishment to determine and assess the radiological situation and to advise the disaster control management.</p> <p>At the radiological assessment centre data of the facility (e.g. plant status, emission of radiological substances), meteorological data and measuring data of the vicinity are summarized, processed and interpreted.</p> <p>The radiological assessment centre controls the measuring squads directly or via measuring centres.</p> <p>The radiological situation is a report of the present state and the anticipated development of the accident situation and its expected impacts.</p> <p>The radiological assessment centre is established at the location of the disaster control management or another suitable location (e.g. supervisory authority) and has the necessary equipment for evaluation and communication.</p> <p>It can be established together with the assessment centre of the <i>Land</i>, which some <i>Länder</i> have established additionally for crisis management according to the Precautionary Radiation Protection Act.</p> <p>The expert consultant on radiation protection based at the location of the disaster control management relies on the situation assessment carried out by the radiological assessment centre.</p>
evacuation district	Evacuation district is an area listed in the evacuation plans and that is defined by means of geographical features (e.g. district with a name of its own, bordered by streets of houses, railway lines and/or rivers. The population situated in an evacuation district is addressed separately if necessary (e.g. due to evacuation start).
Guideline concerning Emission and Immission Monitoring of Nuclear Installations	The Guideline concerning Emission and Immission Monitoring of Nuclear Installations contains basic principles and objectives of surveillance as well as provisions concerning the environmental area to be monitored, type of measurements and samplings, detecting limits to be kept, measuring points and frequency of measuring. The surveillance is carried out in separate measuring programs not only during normal operation but also in case of an incident/accident by the operator of the nuclear facility and by independent measurement offices (in general governmental offices).
gathering place	<p>The gathering place is an establishment where task personnel, in particular the measuring squads and the radiation detection squads assemble before and during their deployment. As a rule the gathering place is at the same time the sample collecting point.</p> <p>At the gathering place personal dosimetry and contamination control of task personnel as well as the functional control of the measuring devices is performed. Moreover, additional and/or alternative equipment is kept there. Devices to perform a primary measurement for orientation (determination of the nuclide vector) at the delivered samples shall also be kept at this location.</p>
meeting point	Meeting points are locations listed in the evacuation plans, where those people meet who are evacuated by means of transportation organised by the disaster control management.

<b>Keyword</b>	<b>description, hint</b>
rapidly occurring event	A rapidly occurring event is a course of events at a nuclear facility, during which due to an accident a noteworthy release can or does occur rapidly, i.e. in a period of less than six hours. If such an event occurs early after the initiating event so that there is not enough time for an analysis by the radiological assessment centre, the disaster control management must upon advice of the operator initiate rapid measures to protect the population. Such a situation is only possible if the operator reports an event classified as "disaster alarm" without issuing a report beforehand containing the classification "early alarm".
protection factor	The protection factor is the ratio between the dose at unprotected stay to the dose at protected stay.  Catalogue of measures, volume 2, chapter 8.5.2 Radiological Fundamentals, chapter 4.1, table 4.2 Volume 4 chapter 3.2 of the Commission on Radiological Protection
threshold dose	A threshold dose is a dose below which no deterministic effect is expected.  Different deterministic effects are related to different threshold doses.  Radiological Fundamentals, chapter 3.1 Volume 32, chapter 5.1.3 of the Commission on Radiological Protection
Sievert (Sv)	Sievert is the unit of the organ dose, the equivalent dose and the effective dose.
fission product	A fission product is a nuclide generated by nuclear fission or radioactive decay of the nuclides resulting from nuclear fission.
stochastic effect	Stochastic effects are radiation damages or injuries for which the probability of their occurrence increases in relation to increasing dose but their severity is not dependent on the dose.  Consequences of stochastic effects can be cancer (somatic stochastic damage) or genetic diseases of the progenies (genetic stochastic damage).  Radiological Fundamentals, chapter 3.1
radiation exposure	Radiating exposure is the impact of ionizing radiation on the human body.  Whole body exposure is the impact of ionizing radiation on the whole body.  Partial body exposure is the impact of ionizing radiation on single organs, tissues or parts of the body.  External radiation exposure is the impact of radiation sources outside the body.  Internal radiation exposure is the impact of radiation sources inside the body.  Radiation Protection Ordinance § 3, No. 30
physician with expertise on radiation protection	A physician with expertise on radiation protection is a physician with further training on radiation protection and further aspects of disaster control and emergency medicine.  It is not a designation of an area of expertise according to the regulation on further education of the physicians.  Volume 4, chapter 3 of the Commission on Radiological Protection
principles of radiation protection	The principles of radiation protection are:  The justification of each radiation exposure,  The obligation to limit and to reduce the dose,  Avoiding unnecessary radiation exposure.  Radiation Protection Ordinance, chapter 2, §§ 4 to 6
protective radiation protection measures	Protective radiation protection measures are measures to keep the radiation exposure of people and the radiological contamination of the environment in the events with possibly not negligible radiological impacts as low as possible, considering the state of science as well as all of the circumstances. These measures include mainly prohibitions and restrictions regarding foodstuffs, feedstuffs, pharmaceuticals and waste, controls and restrictions of transboundary traffic as well as recommendations for the behavioural patterns of the population. Also resettlements are regarded as protective radiation protection measures.  Precautionary Radiation Protection Act, §§ 1, 6 to 9

<b>Keyword</b>	<b>description, hint</b>
radiation detection squads	Radiation detection squads are deployed to perform measuring tasks like local dose rate measurements and simple samplings (e.g. samples of ground and vegetation). Generally they are provided by units of the disaster control / the fire brigade. The main objective of their measurements is to verify that inside their application area the intervention levels are not exceeded.
radiation effects	Radiation effects are effects of the energy absorption of radiation in the tissue which leads to ionization and/or excitation processes of the biomolecules.  Radiological Fundamentals, chapter 3.1, 3.2 Column 32, chapter 5.1.2/ 5.1.3 of the Commission on Radiological Protection
resettlement	A resettlement is the medium-term to permanent movement of the population from a contaminated area into an uncontaminated or only low contaminated area.  The temporary resettlement is limited to a period of a few weeks up to several months; the population affected can thereafter return to its housing areas; decontaminating measures in housing areas and on land areas can reduce the time of temporary resettlement. The infrastructure and all production facilities and utility services can be used after the measure finished.  The long-term resettlement for an indefinite period is necessary if a high dose rate in the area affected due to the contamination with long-living radionuclides is only reduced slowly. As a consequence the population affected must be settled newly in other areas and must be integrated in the social and economic live. In this case new housing must also be provided.  Radiological Fundamentals, chapter 4.1
information	Information of different target groups (e.g. population, authorities) about a circumstance, in general without request to do something.
pre-distribution (of iodine tablets)	The pre-distribution of iodine tablets is the pre-distribution to the households in the proximate vicinity of nuclear power plants independent of an incident occurring. This measure shall ensure that in case of an incident iodine tablets are quickly available to the affected population. In the case of an incident it should be possible to take the tablets before an inhalation of radioactive iodine occurs.  According to the Pharmaceuticals Act, a pre-distribution can only be carried out by pharmacies (§ 43 of the Pharmaceuticals Act) or central entities (§ 47 of the Pharmaceuticals Act).  As a rule the pre-distribution must be supplemented by further distributing activities in the event of an incident, as pre-distributed iodine tablets might have been lost in the households or the tablets have never been collected.
warning	Information for the population including the request to take the protective measures stated in the warning. For warning broadcasts different information channels can be used on their own or in combinations (e.g. telephone, stationary or mobile loud-speakers, sirens, public address announcements at the radio).
central zone	The central zone is a planning area in which all alert measures 2 are to be prepared. In case of nuclear power plants the central zone has a radius of about 2 km. Measures in the central zone are particularly urgent, because of the proximity of the facility and in general the measures are performed independent of the propagation direction.

## 7.2 Intervention reference levels for the initiation of measures

Extracts of:

“Radiological Fundamentals for Decisions on measures for the Protection of the Population against Accidental Releases of Radionuclides”, approved by the Federal States Committee for Nuclear Energy – General Committee – on 6 April 1999 (The editorial adaptation was noted with approval on the 223. meeting of the Commission on Radiological Protection on 13 May 2008)

### Intervention reference levels for the measures sheltering, intake of iodine tablets, evacuation, long-term resettlement and temporary resettlement

measure	intervention reference level		
	organ dose (thyroid gland)	effective dose	integration time and exposure pathways
Sheltering		<b>10 mSv</b>	external exposure on <b>seven days</b> and effective dose commitment by radionuclides inhaled during this period
Intake of iodine tablets	<b>50 mSv</b> children and adolescents aged below 18 years as well as pregnant women, <b>250 mSv</b> individuals 18 to 45 years old		organ dose commitment of the thyroid gland from radioactive iodine inhaled during a period of <b>seven days</b>
Evacuation		<b>100 mSv</b>	external exposure on <b>seven days</b> and effective dose commitment from radionuclides inhaled during this period
Long-term resettlement		<b>100 mSv</b>	external exposure in <b>one year</b> from deposited radionuclides
Temporary resettlement		<b>30 mSv</b>	external exposure in <b>one month</b>

If in case of long-lasting releases the time taken for the passage of the radioactive cloud in individual areas is greater than seven days, the integration time shall be extended accordingly.

More time is available for decisions regarding the measures temporary and long-term resettlement than for decision regarding the disaster control measures sheltering, intake of iodine tablets and evacuation.

Under the overall system of intervention reference levels as set out in the table, the countermeasures shall take place

- against the total radiation exposure associated with the passage of the radioactive cloud including inhalation and dose commitment at a level of not more than 10 mSv effective dose in seven days (sheltering/ Intake of iodine tablets),
- against the overall external radiation exposure from deposited radionuclides at a level of about 30 mSv effective dose in one month (temporary resettlement), and
- against external exposure from deposited isotopes of caesium at a level of 100 mSv effective dose in the first year (long-term resettlement)

In order to be independent of local variations in protection factors, an uninterrupted outdoor presence of 24 hours

per day is assumed in the application of the intervention reference levels specified.....

The here derived intervention reference levels are (...) generally applicable numerical values. In case of an incident they are used as intervention level (start level), which must be changed if serious reasons are existent, e.g. if the defined classification of measures and areas conflict with serious influencing factors.

Intervention levels that are higher than the intervention reference levels can be justified if the performance of measures would mean great disadvantages or the avoidable dose is low.

Intervention levels below the intervention reference levels are not justified by radiological reasons.

At radiation doses below the intervention levels, the population must be informed about the risk of radiation using of suitable reference values.

The application of different intervention reference levels in different regions shall be avoided.....

### 7.3 Specimen texts to inform the public in case of a nuclear accident

#### Specimen texts to inform the public in the event of a nuclear accident

General information:

The following specimen texts are elements that can be combined in relation to the course of events

They are available for the following situations:

- Announcement about a failure in the nuclear power plant at early warning
- Instruction for sheltering in case of imminent release
- Instruction for sheltering in case of occurred release, if necessary without early warning
- Distribution of iodine tablets
- Intake of iodine tablets
- Evacuation
- All-clear

Situations are imaginable in which several actions are considered at the same time, e.g. sheltering and intake of iodine tablets. In such a case, the specimen texts shall be meaningfully combined. Possible solutions for the thereby occurring conflict situations (e.g. a person staying inside cannot collect iodine tablets at the pharmacy!) must be clearly provided.

The expressions in brackets { } shall be replaced by event-relevant information.

It was consciously avoided to use technical terms like "central zone" so the people affected won't feel threatened. In addition it was attempted to use a colloquial terminology. This may lead to a less exact, but a more easily understandable message.

#### 1 Message for an accident at a nuclear power plant (early warning, but no release occurred yet)

Attention, this is a very important official message from {disaster control authority X located in Y}. It is addressed especially to persons located in {district, region}.

An accident occurred at the nuclear power plant {XY}. So far no radioactive material has been released. Therefore, at the moment you are in no danger and there is no need to take any actions. If a dangerous release occurs, you will be informed immediately. Please pay attention to the further messages broadcasted via this station.

A task force management was established at {local government of the district}. The task force management is permanently in close contact with the responsible staff at the nuclear power plant. They will inform you about further developments. The next message will be sent not later than {xyz}

This and further information can be retrieved continuously on video text {page no. xyz, television station}. {Information about the situation can also be found at the internet www.xyz.de.}

Please inform your neighbours.

- end of the official message -

### 2 Calling for sheltering

#### a) no release occurred but is expected

Attention, this is a very important official message from {disaster control authority X located in Y}:

An accident occurred at the nuclear power plant {XY}. So far no radioactive material has been released. But it is expected that a release will occur in {X} hours.

Therefore, the inhabitants of the communities

- {- Römerdorf including the district Dudenberg,
- Talhausen and
- Niederspeier}

are requested to go indoors as a precautionary measure as well as to close windows and doors.

Do not take iodine tablets yet. If this becomes necessary, we will inform you in due time.

As precaution measure, bring pets and livestock indoors or into stables if this is possible in a short time.

We will inform you immediately about changes of the situation.

This and further information can be retrieved continuously on video text {page no. xyz, television station}. {Information about the situation can also be found at the internet www.xyz.de.}

Please inform your neighbours.

- end of the official message -

### 2 Calling for sheltering

#### b) release occurred, (population was perhaps not forewarned)

Attention, this is a very important official message from {disaster control authority X located in Y}:

An accident occurred at the nuclear power plant {XY} and radioactive material has been released.

Therefore, the inhabitants of the communities

- {- Römerdorf including the district Dudenberg,
- Talhausen and
- Niederspeier}

are requested to go indoors immediately and to close windows and doors. Please turn off any ventilation and air conditioning systems. Stay as far as possible inside the building. Do not allow your children to play outside.

Do not eat freshly harvested fruits or vegetables; do not use fresh milk. Do not use water from open wells, lakes or rivers.

Do not feed animals using foodstuff stored outside until now.

When entering the house, dispose of outerwear and shoes worn today outside; store these outside the house and thoroughly wash uncovered bodily parts using running water. The toys of our children used outside must not be taken inside the house.

{Do not take any iodine tablets yet. If this becomes necessary, we will inform you in due time.} {Please take iodine tablets now.}

This and further information can be retrieved continuously on video text {page no. xyz, television station}. {Informa-

tion about the situation can also be found at the internet [www.xyz.de](http://www.xyz.de).)

Please inform your neighbours.  
- end of the official message -

### 3 Message about iodine saturation of the thyroid gland

#### a) Distribution of iodine tablets

Attention, this is a very important official message from {disaster control authority X located in Y}:

Due to an accident at the nuclear power plant {XY}, it has to be assumed that radioactive material has been released. To protect the population, iodine tablets are distributed as a precautionary measure.

We will inform you in due time as soon as the intake of iodine tablets becomes necessary.

All inhabitants aged 45 years and below in the communities

{- Römerdorf including the district Dudenberg,  
- Talhausen and  
- Niederspeier}

are requested to collect iodine tablets now {at the distribution places/ at the pharmacies}. Please select one adult to collect the iodine tablets for the whole household and any neighbours that require help.

Inhabitants living close to the nuclear power plant and who have already got iodine tablets, please have them handy, but only take them after been requested to do so. If you do not find the iodine tablets, you can get replacement tablets at the distribution places mentioned.

You can get the best protection from iodine tablets, if you take them at the right time. On the iodine tablets package insert you find information when iodine tablets are most effective and why persons aged over 45 years should not take them.

This and further information can be retrieved continuously on video text {page no. xyz, television station}. {Information about the situation can also be found at the internet [www.xyz.de](http://www.xyz.de).)

Please inform your neighbours.

- end of the official message -

### 3 Message about iodine saturation of the thyroid gland

#### b) intake of iodine tablets is advised

Attention, this is a very important official message from {disaster control authority X located in Y}:

After an accident at the nuclear power plant {XY} {a release of radioactive material has occurred/ a release of radioactive material will occur soon}. Therefore, the intake of iodine tablets is necessary.

Inhabitants aged 45 years and below in the communities

{- Römerdorf including the district Dudenberg,  
- Talhausen and  
- Niederspeier}

are requested to take their iodine tablets now. As prescribed in the package insert persons older than 45 years should not take these tablets. Please take note of further information at the package insert and adhere to the in-

structions regarding dose, especially in case of children. Do not take a higher dose!

We urgently recommend the intake of iodine tablets for children and adolescents younger than 18 years and for pregnant women located in {communities in the western part until the district border and in the rural district Weinstraße}.

This and further information can be retrieved continuously on video text {page no. xyz, television station}. {Information about the situation can also be found at the internet [www.xyz.de](http://www.xyz.de).)

Please inform your neighbours.

- end of the official message -

### 4 Message during evacuation

Attention, this is a very important official message from {disaster control authority X located in Y}:

{A considerable release of radioactivity from the nuclear power plant {XY} can not be ruled out/ has occurred}. Therefore a {precautionary} evacuation is necessary in the following communities:

{- Römerdorf including the district Dudenberg into the acceptance area Landau  
- Talhausen and Niederspeier into the acceptance area Kandelf}.

{Local governments of the acceptance areas take over assistance duties such as accommodation, food, consolidation of families.} {In case of evacuation after release: emergency stations have been set up in {Landau, Kandelf}. Please go there and you will be checked for any possible contamination.}

If you want to leave the region on your own, please go first to the acceptance regions mentioned. {Your children are evacuated out of school or Kindergarten {origin, destination} {Pick up your children at the Kindergarten or at the school in advance.}

Traffic control measures are being set up.

If you have no personal transport, please go to the designated gathering places. {These are at the schoolyards of the Grund- and Hauptschule of the communities mentioned, in Talhausen additionally the parking place at the swimming pool}. You are picked up from these places.

Take with you only the most important documents (e.g. passports), required medicine as well as supplementary clothing and toiletries.

Before leaving your accommodation, make sure to switch off any unused electrical devices and turn off the water taps. Lock your flat; the police secure the region.

Please offer assistance to neighbours in need of help.

Supply your livestock in the stable with feedstuff and water; make feedstuff available for helping persons who will feed your livestock at a later time. {As soon as possible your livestock will also be evacuated.} Take your pets with you.

This and further information can be retrieved continuously on video text {page no. xyz, television station}. {Information about the situation can also be found at the internet [www.xyz.de](http://www.xyz.de).) Switch on your radio inside your car {broadcast station}.

Please inform your neighbours.

- end of the official message -

## 5 Message for cancellation of protection measurements

Attention, this is a very important official message from {disaster control authority X located in Y}:

The message applies to all persons in the vicinity of the nuclear power plant {name of the nuclear power plant}, who are affected by the measure { . . }.

*{The registered accident is under control}. {According to the statements of the supervisory authority no {more} releases are threatened.} {The release of radioactive material was stopped. This is affirmed by measurements performed by the authorities.}*

*{Currently, measuring squads are performing measurements. These measurements serve to determine if and to which extent radioactive materials are in the environment}.*

This information can also be retrieved on video text {page no. xyz, television station}. In addition the measurement results are published there. *{Information about the situation and the measurement results can also be found at the internet www.xyz.de.}*

- end of the official message -

### 7.4 Information that must be provided by the operator of a nuclear power plant to the disaster control management in the event of a nuclear accident

The following information must provide by the operator to the disaster control management after the announcement of an incident including the categorisation early warning and disaster alarm:

I. Information that enables decision-making on preparing and performing precautionary disaster protection measurements (warning and information of the population, sheltering, distribution of iodine tablets, evacuation) before the beginning of the release of radioactive material:

- Estimated point in time when release starts (handling time)
- Prognosis of the release time schedule
- Expected amount of release and the possible composition of the emission (noble gases/ iodine/ aerosols)
- Statements with respect to the possible release way (release via the stack, or other expected ways including the amount of release)
- Meteorological data at the site
- Status of the plant with respect to compliance of protection objectives (control of the reactivity, cooling of the fuel elements and enclosure of radioactive material)

All this information shall be updated when changes occur.

II. Information that supports the decision- taking of the disaster control management at the beginning and during the emission of radioactive material:

- Statements regarding the way of release (stack or other way of release including the amount of release)
- Probable time schedule of the release

- Statements on the power of the source and on the composition of the emission (noble gases/ iodine/ aerosols)
- Meteorological data at the site
- Results of immission measurements performed by the measuring squads of the operator
- Status of the plant with respect to the protection objectives, control of reactivity, cooling of fuel elements and enclosure of radioactive material
- Until this task is taken on by the expert consultant: prognosis of the radioactive contamination of the region affected (effective dose as well as organ dose of the thyroid gland)

All this information shall be constantly up-dated.

The collection of measuring results necessary for information of the disaster control management, the transfer of this information from the plant to the disaster control authority or supervisory authority, respectively, must be guaranteed even after release of radioactive material occurred and as long as relevant statements from the plant are relevant to the emergency response and are to be expected.

The on-site measuring data, their collection and processing that are necessary to obtain the above mentioned information, shall be determined in detail and in advance by the operator in agreement with the licensing and supervisory authority in the operating instruction taking into account the alarm criteria (cf. issue 39, reports of the Commission on Radiation Protection).