Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

National Emergency Response Plan

Use of nuclear wapons at a greater distance from Austria

Vienna, 2023

Legal notice

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1 Introduction

1.1 Purpose

The aim of radiological emergency management is to protect the population and the environment in the event of a radiological emergency. In order to ensure this, the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, involving all federal ministries concerned (see Chapter 2.2), must set up an emergency management system in accordance with the Austrian Radiation Protection Act 2020 [StrSchG 2020] and take appropriate administrative precautions to maintain such a system. The emergency management system shall be designed according to the results of an assessment of possible emergency exposure situations and shall enable effective response to radiological emergencies.[1]

> An important cornerstone of the emergency management system is the national emergency response plan, which consists of several parts. The national emergency response plan provides the working basis for off-site emergency management at the federal level and ensures a coordinated emergency response of all organizations involved.

In accordance with StrSchG 2020, the national emergency response plan was drawn up by the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology with the involvement of all federal ministries concerned.

[1] EURATOM 59/2013 Art. 97(2): The emergency management system shall be designed on the basis of the results of an assessment of possible emergency exposure situations and shall enable an effective response to emergency exposure situations related to activities or unforeseen events [EURATOM 59/213].

1.2 Scope

The scope of the national emergency response plan is limited to the off-site emergency management of radiological emergencies at the federal level. In accordance with StrSchG 2020, the provincial governors draw up emergency response plans for their area of responsibility. The interfaces to the emergency response plans of the Austrian Provinces are an important part of the national emergency response plan. The national emergency response plan consists of several parts that address different possible types of radiological emergencies.

> This part of the national emergency response plan deals with the effects of the use of nuclear weapons at a greater distance from Austria.

Note: In addition, individual chapters deal with the effects in the vicinity of the detonation site.

1.3 Legal basis

The legal basis at national and international level is summarised in Annex 1.

2 Basics for emergency preparedness

2.1 Categorisation of possible emergency exposure situations

2.1.1 Possible scenarios

Only scenarios at a greater distance in which Austria is not affected by the direct effects of the use of tactical nuclear weapons (primary effects: pressure wave, heat radiation, NEMP (nuclear electromagnetic pulse), direct radiation), but by an atmospheric transport of radioactively contaminated air masses to Austria, are considered. The Technical Annex provides a categorisation of nuclear weapons and an up-to-date assessment of the likelihood of their use.

Scenario 1: Use of tactical nuclear weapons in Ukraine

The most likely scenario at present is the use of tactical nuclear weapons with an explosive yield of 20 to 150 kt close to the ground in Ukraine. The nearest places in Ukraine are about 400 km from the Austrian border. Austria is thus in the far range of atmospheric transport of radioactively contaminated air masses.

Scenario 2: Use of tactical nuclear weapons at a NATO base in Europe where nuclear weapons are also stored

Currently, the use of strategic nuclear weapons outside Ukraine is considered very unlikely. Scenario 2 is therefore only partially taken into account in this part of the national emergency response plan.

Table 1: NATO air bases with nuclear weapons storage systems (as of 2019)

State	Air Force Base	Status	Shortest distance to Austria. Border (km)
Belgium	Kliene Brogel	11 storage systems, 10-20 bombs B61-3/4	500
Germany	Fliegerhorst Büchel	11 storage systems, 10-20 bombs B61-3/4	340
Germany	Ramstein Air Base	55 storage systems, currently no weapons stored	260
Greece	Araxos	11 storage systems, currently no weapons stored	1,070
Great Britain	Lakenheath	33 storage systems, currently no weapons stored	830
Italy	Aviano	18 storage systems, 50 bombs B61-3/4	75
Italy	Ghedi Torre	11 storage systems, 10-20 bombs	160
Netherlands	Volkel	11 storage systems, 10-20 bombs B61-3/4	470
Turkey	Balikesir	11 storage systems, currently no weapons stored	1,260
Turkey	Incirlik Air Base	25 storage systems, 60-70 bombs B61-3/4	1,940
Turkey	Akinci (Mürted)	11 storage systems, currently no weapons stored	1.520

Source: BMK, BMLV ABC Defence Centre (as of 2019)

The two air bases in Italy and the Ramstein air base in Germany are the closest to Austria. A nuclear attack on a NATO base would most likely lead to further use of nuclear weapons.

2.1.2 Assessment of the impact of tactical nuclear weapons use

Regardless of the location of nuclear weapons, the effects of the use of tactical nuclear weapons with different yields and detonation heights can be assessed. Effects depending on the distance from the detonation point are:

- Direct effects (primary effects) in the immediate vicinity of the detonation point (distances of several 1000 m),
- Effects due to the atmospheric transport of radioactively contaminated air masses and deposition (secondary effects) at short-range (distances of several 10 to about 100 km),
- Effects due to the atmospheric transport of radioactively contaminated air masses and deposition (secondary effects) in the long-range (distances of about 100 to several 1000 km).

The size of the short-range area depends above all on the yield of the nuclear weapons used, the detonation height and the weather conditions.

Note: In the subsequent assessment of the effects of nuclear weapon detonations, scenarios with a yield of 10 kt and 100 kt were taken into account to illustrate the dependence on the magnitude of the yield. However, tactical nuclear weapons can have a greater yield of up to 150 kt but a factor of 1.5 higher yield does not significantly change the results.

2.1.2.1 Primary effects at the detonation site (damage radii – several 1000 m)

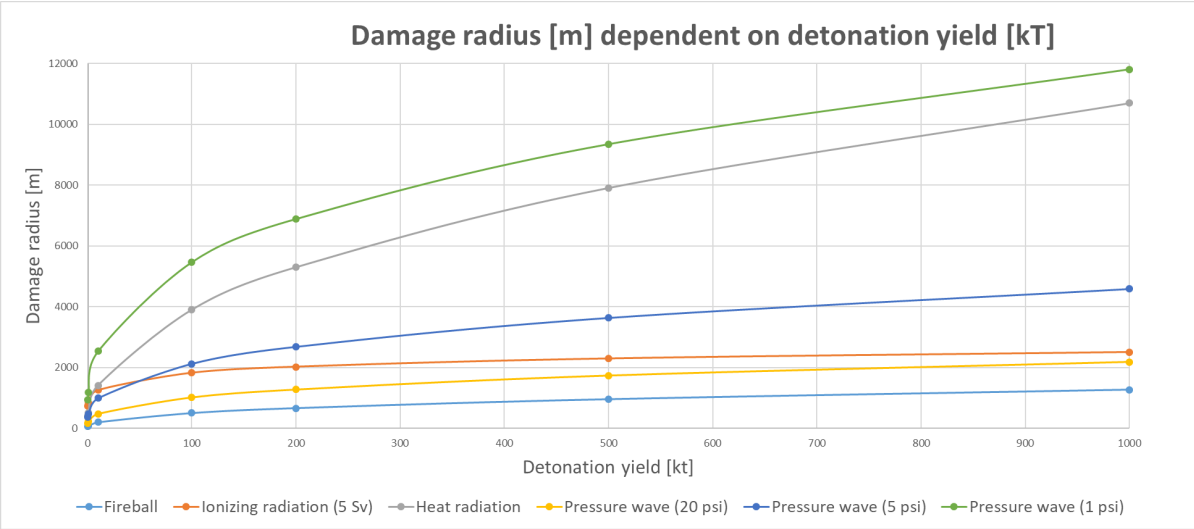
In the following, the primary effects at the detonation site as a function of the yield of tactical nuclear weapons, are summarized.

Table 2: Primary effects in comparison (yield: 10, 100, 200 kt), ground detonation, circular effects close to the ground

Effects	10 Kt		100 kt		200 kt		Note
	Radius (m)	Area (km^2)	Radius (m)	Area (km^2)	Radius (m)	Area (km^2)	
Fireball	200	0,12	500	0,79	660	1,37	Total destruction
Radiation (5 Sv)	1.250	4,91	1.820	10,5	2.020	12,8	Lethal dose for approximately 50% of those exposed within 1 month
Heat radiation	1.410	6,22	3.900	47,9	5.300	88,1	3rd degree burns
Shock wave (20 psi; 1.38 bar)	470	0,69	1.010	3,21	1.270	5,09	Severe damage to buildings; almost 100% fatal
Shock wave (5 psi; 0.345 bar)	990	3,06	2.120	14,2	2.680	22,5	Medium damage to buildings; Threat of outbreak of fires
Pressure wave (1 psi; 0.069 bar)	2.530	20,2	5.460	93,7	6.880	149	Slight damage to buildings; Threat of bursting glass windows

Source: BMLV

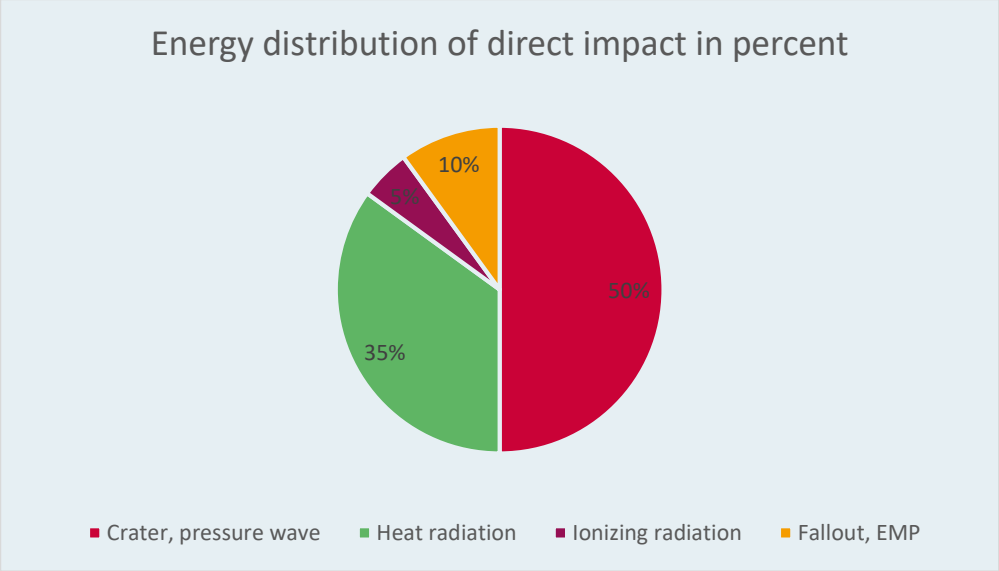
Figure 1: Damage radii as a function of yield for a ground-level detonation



Source: BMK, Dept.V/8 (calculations Nukemap (https://nuclearsecrecy.com/nukemap/))

The energy distribution of the direct effects in percent is shown in the figure below.

Figure 2: Energy distribution of direct impacts in percent



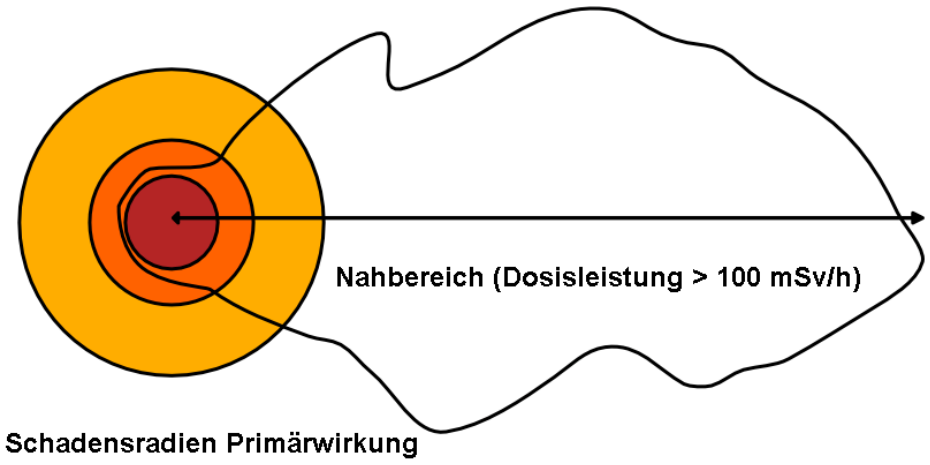
Source: BMK, Dept.V/8

2.1.2.2 Effects of transport of radioactively contaminated air masses at short-range (several 10 km to about 100 km) in the event of ground-level detonations

Here, larger particles from the carrier material of nuclear weapons, which has only partially evaporated, or solid or molten material, which is sucked from the ground (earth or building material) into the fireball, play a role. Due to the size of the particles, they are quickly deposited ("fallout"). Condensed radioactive fission products or activation products adhere to them due to neutron radiation during nuclear fission (see Technical Annex).

At short-range, which is also the area most contaminated by fallout, gamma radiation primarily plays a role in the exposure. However, beta emitters can cause skin burns when unprotected skin is contaminated. Large fallout particles, whose size extend down to the mm range (see Technical Annex), usually pose the greatest danger.

Figure 3: Damage radii of the primary effects and the effects at short-range due to transport of radioactively contaminated air masses (within the contour ambient dose rate > 100 mSv/h).



Damage radii in dark red: severe damage to buildings, damage radii in red: medium damage to buildings and in orange: slight damage to buildings.

Source: BMK, Dept.V/8, US Planning Guidance for Response to a Nuclear Detonation [FEMA 2022]

Precipitation plays a major role in the deposition of radioactive substances on the ground ("fallout"). Especially during very high thunderstorms, large amounts of radioactive particles can be washed out ("rainout" or "washout").

Rough assessment of the size of the short-range for ground-level nuclear weapon detonations the following results, depending on the yield and weather conditions (wind speed, precipitation, stability, etc.):

- The short-range is the area where the initial ambient dose rate exceeds 100 mSv/h.
- These ambient dose rates are mainly caused by short-lived radionuclides.
- The decrease in high dose rates at short-range follows the rule of thumb after 7 h to 1/10, after 7x7 h (about 2 days) to 1/100 and after 7x7x7 h (about 14 days) to 1/1000.
- The short-range ranges from about 20 to 70 km downwind from the detonation site at 10 kt nuclear detonation close to the ground and
- about 80 to 150 km downwind from the detonation site at 100 kt nuclear detonation close to the ground.

Note: The two air bases in Italy (Aviano, Ghedi-Torre) and Ramstein Air Base in Germany are closest to Austria. Especially in the case of a nuclear weapons detonation in Aviano in Italy, 75 km away from Austria, border districts of Austria could be in the short-range area, depending on yield and weather.

In the case of non-ground-level nuclear weapon detonations with altitudes > 140 m at 10 kt and > 350 m at 100 kt, the effects at short-range are much lower because the fireball does not touch the ground and no activation products of the ground material are formed.

Note: When estimating the effects of nuclear weapons detonations, the yield was always assumed to be 10 kt and 100 kt to illustrate the dependence on the magnitude of the yield. Tactical nuclear weapons can have an yield of up to 150 kt. However, a factor of 1.5 higher yield does not significantly change the results.

2.1.2.3 Effects of transport of radioactively contaminated air masses in the long range (100 km to several 1000 km) in the case of ground-level detonations

In contrast to nuclear power plant accidents with ground-level release of radioactive substances, a large part of the radioactive substances in a nuclear weapon detonation is transported at altitudes of several kilometers. As a result, smaller radioactive particles are distributed relatively widely and diluted in the process.

Compared to severe nuclear accidents, smaller amounts of radioactive substances are released in the scenarios of nuclear weapon detonations with 10 kt to 100 kt.

- Precipitation plays a major role in the deposition of radioactive substances on the ground. Especially during very high thunderstorms, large amounts of radioactive particles can also be washed out of higher air layers ("rainout" or "washout").
- In the case of ground-level air concentration and deposition, the vertical movement of the air masses (sinking of higher air masses) plays a decisive role.

Based on daily TAMOS calculations of the dispersion of air masses from Ukraine for the 4 NPP sites, GeoSphere Austria selected two representative, historical weather conditions for scenario calculations with TAMOS for the long-range area with a coverage of Central Europe (see Technical Annex). Information on the TAMOS system can be found in Chapter 3.2.3.1.

For both scenarios, assessment of the expected concentrations for the most important radioactive substances in food and feed were carried out. Since these assessments are strongly dependent on the season (growing season of the plants), different seasons were taken into account. More information can be found in the Technical Annex.

In the worst case – in summer – the EC maximum food levels can be exceeded for individual radioactive substances in individual foodstuffs, such as leafy vegetables.

In summary, the radiological effects in the long-range range are less severe even in the case of a ground-level detonation of a strategic nuclear weapon than those of a severe accident in a nuclear power plant at a comparable distance.

2.2 Organisations involved in emergency management, their responsibilities and operational readiness

The following tables summarise all organisations involved in emergency management, their key responsibilities and their operational readiness. The contact addresses can be found in Annex 2.

2.2.1 Federal authorities and departments, technical support organisations

Table 3: Federal authorities and departments, including outsourced organisations, BMK, Dept. V/8

Organisation (alphabetical order)	Responsibility for emergency management	Operational readiness
Federal Ministry for European and International Affairs (BMEIA)	• Travel warnings and recommendations • Protective measures for Austrian citizens abroad • Permanent Mission of Austria to the United Nations; CTBTO Contact Point	24/7 service for urgent assistance abroad
Federal Ministry of the Interior (BMI), Situation Centre	• National Contact Point (IAEA, EC, bilateral, EC Emergency Response and Coordination Center (ERCC)) • Information hub for receiving, sending or forwarding messages and alerts: Immediate distribution of reports from the BMK (situation assessments, etc.) • Convening of the Coordination Committee of the State Crisis and Disaster Management (SKKM) • International disaster relief	24/7 permanent service
Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK)	• Competent Authority concerning international regulations on early information sharing (IAEA, EC, bilateral) • Operation of emergency systems • Radioactivity monitoring of the environment and feedstuff • Assessment of the situation (including radiological effects) and definition of protective measures with the involvement of the BMSGPK • Informing the public	On-call duty outside working hours: First response within 30 minutes, arrival at emergency center within one hour

Organisation (alphabetical order)	Responsibility for emergency management	Operational readiness
Federal Ministry of Defence (BMLV)	• Contact Point: EC Military Staff, NATO, intelligence • Internal protective measures (for the Austrian Armed Forces) • Assessment of the effects in the vicinity of the detonation site • Assistance services in accordance with the Armed Forces Act (in particular CBRN Defense).	General: 6 to 12 hours after request CBRN hazardous substance readiness: approx. 2 hours after request
Federal Ministry of Social Affairs, Health, Care and Consumer Protection (BMSGPK)	• Involvement in the definition of protective measures • Radioactivity monitoring of foodstuffs • Pre-distribution of potassium iodide tablets	Named employees of the BMSGPK can be reached by telephone
Coordination Committee of the State Crisis and Disaster Management (SKKM)	Coordination on the implementation of protective measures and the provision of information to the public	2 to 4 hours after convocation

Note: Special units of the CBRN defence are not regarded as emergency workers (intervention teams), but are active as part of an assistance service of the Austrian Armed Forces. The resources of the Austrian Armed Forces for assistance missions in radiological emergencies are shown in Annex 9.

2.2.2 Technical support organisations

Table 4: Technical support organisations, BMK, Dept. V/8

Organization (alphabetical order)	Responsibility for emergency management	Operational readiness
Austrian Agency for Health and Food Safety (AGES)	• Laboratory measurements of food, feed and environmental media • Participation in the evaluation of the measurement results	Outside working hours max. 1 to 2 hours
Federal Environment Agency (UBA)	• Technical management of emergency systems • Support of the BMK in radiological emergencies	On-call duty outside working hours
GeoSphere Austria (GSA) / former Central Institute for Meteorology and Geodynamics (ZAMG)	• Meteorological expert advice (weather bulletin) • (Automated) provision of weather forecast data for the BMK • Provision of the TAMOS prognoses system	24/7 permanent service (meteorologist in weather forecasting)

2.2.3 Authorities and departments in the Austrian Provinces

Table 5: Authorities and departments in the Austrian Provinces, BMK, Dept. V/8

Organization (alphabetical order)	Responsibility for emergency management
Offices of the provincial governments	Implementation of specific protective measures
District administrative authorities	see emergency response plans of the Austrian Provinces
Emergency workers / intervention teams in the Austrian Provinces	see emergency response plans of the Austrian Provinces
Warning Centres in the Austrian Provinces (LWZ)	Reception and distribution of messages and alerts at Provincial level
Emergency response forces at the Provincial level	see emergency response plans of the Austrian Provinces

2.2.4 Federal Intervention Teams

Table 6: Federal intervention teams

Organization (alphabetical order)	Responsibility for emergency management	Operational readiness
Mobile Task Force (MoEG) Nuclear Engineering Seibersdorf GmbH	• Telephone support and advice • On-site measurements and sampling • Laboratory analyses • Securing and/or salvaging of radioactive sources, transport	On-call availability for 1 person; partial on-call availability of the other members of the Mobile Task Force
Austrian Agency for Health and Food Safety (AGES)	• Measurement of radioactivity in food/feedand environmental media (including in situ measurements) • Participation in the evaluation of results	outside the servicetime max. 1 to 2 hours; In situ measurement team on the following working day
Radiation detection units of the Federal Police (BMI)	• Radiation detection and measurement (ground, car and air) • Transfer of measurement data • Cordoning of radiation areas • Contamination controls	approx. 1 hour

Source: BMK, Dept. V/8

More detailed information on emergency response services at federal level can be found in Annex 3.

Note: Special units of the CBRN defence are not regarded as emergency workers / intervention teams, but are active as part of an assistance service of the Austrian Armed Forces.

2.3 Communication and arrangements for cooperation and coordination

2.3.1 Information channels in case of nuclear weapons detonations

The Austrian authorities are alerted and informed in the event of the use of nuclear weapons.

- through the Austrian federal ministries and their interfaces to international organisations and their partners, and
- through diplomatic links.

BMEIA

- Diplomatic service
- Permanent Mission of Austria to the United Nations as contact point to the Preparatory Commission for Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO)

BMI

EC Emergency Response and Coordination Center (ERCC).

BMLV

EC Military Staff, NATO, intelligence.

As in other radiological emergencies, the information is distributed via the radiation protection distribution list of the BMI (Situation Centre) (see Chapters 2.3.3 and 2.3.5).

2.3.2 Other international and bilateral reports in radiological emergencies

The BMI (Situation Centre) is the Austrian Contact Point for bilateral and international alerts and reports in radiological emergencies.

2.3.2.1 International alerts/notifications

- ECURIE system (EC)
- USIE system (IAEA).

- A detailed description of ECURIE and USIE is given in Chapter 3.2.

2.3.2.2 Bilateral alerts/messages

- Notifications in accordance with bilateral agreements to BMI (Situation Centre) by fax or e-mail
- USIE system can also be used for bilateral reporting

2.3.3 BMI (Situation Centre) – BMK

The Radiation Protection Department of the BMK is the Competent Authority at federal level for the evaluation of incoming notifications. All reports received by the BMI (Situation Centre) (international and national, for example from the Provincial warning centres or other federal ministries) are forwarded to the on-call service of the BMK for evaluation. Communication between BMI (Situation Centre) and BMK is as follows:

- Telephone communication of the on-call service in the BMK and forwarding of the reports to the BMK.
- Transmission of evaluation reports from the BMK to the BMI (Situation Centre) for further distribution to the responsible authorities.
- In very urgent cases, these evaluation reports are sent directly by the BMK to the competent authorities (radiation protection distribution list[2]).

[2] As a rule, the situation assessments and defined protective measures of the BMK/BMSGPK are distributed via the situation centre in the BMI by sending them to the radiation protection distribution list by e-mail. Should the situation require it, this distribution of information can also be carried out directly by the BMK by e-mail via the BMI radiation protection distribution list, which is also available in the BMK.

2.3.4 BMK – BMSGPK

In the event of a radiological emergency, the BMK shall, if necessary, define protective measures with the involvement of the BMSGPK on the basis of the situation assessment. In such cases, the BMK radiation protection contacts one of the persons named by the BMSGPK by telephone.

The procedure for defining protective measures is defined in detail between the BMSGPK and the BMK: Representatives of the BMSGPK are represented in the BMK's crisis management group as early as possible.

2.3.5 BMI (Situation Centre) – LWZ/Austrian Provinces, Provincial Authorities

After receipt of the initial evaluation report prepared by the BMK Radiation Protection, this and all other reports (situation assessments and any protective measures) are sent by the BMI (Situation Centre) to all LWZ of the Austrian Provinces, to the Provincial Authorities and emergency response organisations.

- This transmission by the BMI (Situation Center) takes place by e-mail via the distribution list maintained by the BMI (radiation protection distributor).
- In urgent cases, these messages can also be sent directly by the BMK.

2.3.6 Feedback LWZ/ Austrian Provinces – Federal State

These are carried out via the Provincial warning centres and the BMI (Situation Centre).

Corresponding regulations are to be laid down in the emergency response plans of the Austrian Provinces.

2.3.7 Further arrangements for cooperation and coordination at federal level

2.3.7.1 Coordination of the situation assessment BMK, BMSGPK, BMLV and GeoSphere Austria

The calculation results for the near and far range form the basis for the radiological situation assessment. Close coordination between the BMK with the involvement of the BMSGPK, the CBRN Defence Centre (BMLV) and GeoSphere Austria is planned using the radiological situation reporting system (see Chapter 2.3.7.3).

2.3.7.2 Crisis unit of the BMK

A representation of the BMSGPK is involved in the crisis staff of the BMK at an early stage[3]. This will allow rapid coordination of protective measures and information to the public.

2.3.7.3 Radiological situation reporting system

Via the BMK's "Radiological Situation Reporting System" web application, information about a radiological emergency is immediately made available to all authorities and organisations involved in emergency management (limited circle of registered users). This will enable an efficient and coordinated emergency response. This information shall include in particular:

- data on the emergency exposure situation,
- assessment of the situation and impact assessment,
- information for the media/the public,
- protective measures and assessment of their effectiveness (by the Austrian Provinces) and
- background.

[3] At If necessary, liaison officers from other federal ministries (e.g. BMI, BMLV, BMEIA) are also sent to the BMK's crisis team.

The "Radiological Position Display" works in the so-called pull mode; users can access and download information, but are not notified of the availability of new information. Therefore, the radiological situation reporting system does not replace the existing alarm and reporting channels. The radiological situation reporting system offers the possibility to quickly exchange information on possible effects of nuclear weapon detonations between BMK Dept. V/8, CBRN Defence Centre of the BMLV and GeoSphere Austria.

2.3.7.4 Coordination Committee State Crisis and Disaster Management

The State Crisis and Disaster Management (SKKM) is coordinated by the BMI. The SKKM was established in the BMI by decision of the Council of Ministers on 20 January 2004. If necessary, the BKA, BMEIA, BMF, BMI, BMLV as well as the other federal ministries with technical expertise, the Austrian Provinces and emergency organisations are represented in the coordination committee of the SKKM.

If necessary, representatives of the ORF and the Austria Press Agency (APA) can be consulted. The Coordination Committee is convened by the BMI. It is chaired by the Director-General for Public Security or by a person appointed by him/her. The responsible department in the BMI acts as the secretariat of the committee. In particular, the Committee shall exchange information between the bodies concerned and coordinate the measures to be taken. If necessary, the Committee sets up expert groups to discuss current problems under the leadership of the department primarily concerned or a federal state. The BMI (Situation Centre) acts as an operational communication and information instrument.

In principle, the Committee is composed of the nominated representatives of the federal ministries as well as the Austrian Provinces and emergency response organisations. In the event of a radiological emergency, the Coordination Committee is supplemented by experts from the radiation protection department of the responsible ministries (BMK, BMSGPK). The further involvement of experts from the Austrian Provinces and emergency response organisations is possible. The tasks of the SKKM in the event of a radiological emergency are primarily the coordination of the implementation of protective measures[4]

[4] This includes the implementation of the protective measures defined by the BMK with the involvement of the BMSGPK as well as the resulting accompanying measures (e.g. maintenance of critical infrastructure in a radiological emergency).

and the coordination of information to the public (see Chapter 3.6). The convocation takes place as follows:

- BMK recommends BMI to convene the SKKM. Reporting channel: BMK – BMI (Situation Centre)
- The meeting is convened by the BMI via defined information channels (e-mail, fax and SMS distribution list).

The recommendation to the BMI to convene the SKKM is made in accordance with the requirements of the StrSchG 2020. According to StrSchG 2020, the BMK can use the existing crisis management structures at federal level for the purpose of coordination with all authorities that have a defined role according to the national emergency response plan.

2.4 Procedures

In the following, the procedures planned at the federal level in the case of nuclear weapons detonations at a greater distance from Austria are presented in analogy to the procedures for other large-scale radiological events. The listed procedures represent only a basic framework for the processes. The actual processes may differ depending on the situation. The processes are only approximately chronological, as many activities are carried out in parallel. The most important key points are shown below:

Trigger

Nuclear weapon detonation of a tactical nuclear weapon at a greater distance from Austria

Alerting

- Official information about BMLV/BMEIA/CTBTO/IAEA/EC/bilateral to BMI to BMK (on-call service) or
- Non-official information (media, social media, etc.) to BMK (on-call service).

Early warning phase in Austria

Initial information by the on-call service BMK (as in case of other radiological events)

- Initial information for authorities (report)[5] and the public (APA press release)
- Distribution of the initial information to involved authorities and organizations via BMI (Situation Center) OR directly by BMK (radiation protection distribution list)
- Transmission of the initial information (APA press release) by BMK to APA

First situation assessment by BMK in coordination with CBRN Defence Centre BMLV / GeoSphere Austria

- Obtaining further information on the event (bilateral/international), verification of the information, international coordination if possible
- Assessment of possible effects on Austria (if Austria is affected, in particular time of arrival of radioactively contaminated air masses) and Austrian citizens in affected areas in other states (emergency systems, in particular TAMOS; international data exchange of measured values (EURDEP, IRMIS, bilateral)) in coordination with CBRN Defence Centre BMLV and GeoSphere Austria
- Request weather bulletin of GeoSphere Austria
- First situation assessment by BMK including the BMSGPK (report) and information to the public (media texts: APA press release / ORF speaker text), distribution of the first situation assessment via BMI (situation centre) OR directly by BMK (radiation protection distributor)
- Activation of the radiological situation reporting system
- Activate BMK crisis team/emergency centre and contact BMSGPK (BMSGPK representative in the BMK crisis team)
- Recommendation to convene the SKKM Coordination Committee by BMI
- Transmission of APA press release to APA / narration to ORF (radio and television)
- Recommendation Activation Call Center in BMI
- Information on website (BMK website / emergency website of the BMK)

[5] Text templates for reporting texts and media texts (APA press releases, Twitter reports and ORF announcements) in the event of the use of tactical nuclear weapons at a greater distance from Austria were prepared at the BMK.

- Pre-information of emergency workers (intervention teams) / laboratories (to start of the intensive measurement program of ground-level air)

Subsequent situation assessments by BMK in coordination with CBRN defence centre BMLV / GeoSphere Austria

- Obtaining further information (bilateral/international)
- Further assessments of possible effects on Austria or in the heavily affected areas outside Austria
- Further situation assessments by BMK (reports and media texts), in particular situation assessment for Austrian citizens in affected areas in other states
- Coordination of international assessments of the situation
- Public information: Media texts for BMK websites (BMK website / emergency website of the BMK), APA, radio and television
- Distribution of situation assessments via BMI (Situation Centre)
- Keeping the radiological situation reporting system and BMK websites (BMK website / emergency website of the BMK) up to date

Protective measures in the early warning phase in Austria

The early warning phase is determined by the duration of the transport of radioactively contaminated air masses after detonation until arrival in Austria:

- BMK including BMSGPK (representation in the BMK crisis team)
  - Coordination with the radiation protection authorities of other states
  - Definition of protective measures for early warning phase in Austria based on assessment of the situation
  - Public information: APA, radio and television

- Distribution of reports/media texts on protective measures via BMI (Situation Centre)
- BMEIA: Measures to protect Austrian citizens in affected areas in other states / travel warnings / travel recommendations
- BMI: Call centre activation and convening of SKKM Coordination Committee
- Austrian Provinces (LWZ)
  - Implementation of protective measures
  - Information on the implementation of protective measures to BMK

- BMK:
  - Information of federal intervention teams: AGES and police radiation detection units
  - International information (bilateral, IAEA, EC)

Protective measures for the contamination phase in Austria

Definition and implementation of the protective measures before the arrival of the radioactively contaminated air masses in Austria:

- Coordination with the radiation protection authorities of other states
- BMK with the involvement of the BMSGPK
  - Reassessment of the situation / possible adaptation of protective measures
  - Definition of protective measures in the contamination phase (in particular activation of sampling plan)
  - Informing the population about protective measures in the contamination phase

- Distribution of reports/media texts on protective measures via BMI (Situation Centre)
- Austrian Provinces (LWZ)
  - Implementation of protective measures for the contamination phase
  - Information on the implementation of the protective measures to BMK

- Regular meetings of the SKKM Coordination Committee
  - Coordination in the implementation of the defined protective measures (accompanying measures in the individual ministries; e.g. BMEIA measures for Austrian citizens in affected areas in other states)
  - Coordination of public information

Contamination phase in Austria

Procedure during the passage of radioactively contaminated air masses through Austria):

- BMK
  - Coordination with the radiation protection authorities of other states or internationally
  - Reporting of measured values and protective measures in Austria to the EC, the IAEA and bilaterally

- BMK with the involvement of the BMSGPK
  - New situation assessment (report) based on measured values from the Austrian radiation early warning system (ambient dose rate and air concentrations)
  - Distribution of the new situation assessment by BMI (Situation Centre)
  - Coordination with the radiation protection authorities of other states or internationally (primarily on protective measures)
  - Adaptation of protective measures
  - Informing the population about protective measures in the contamination phase

- BMK
  - Regular information for the population, in particular about protective measures
  - Regular international information (bilateral, IAEA, EC)

- Austrian Provinces (LWZ)
  - Further implementation of the protective measures in the contamination phase
  - Further information on the implementation of protective measures at BMK

- Regular meetings of the SKKM Coordination Committee
  - Coordination in the implementation of the defined protective measures (accompanying measures in the individual ministries; e.g. BMEIA measures for Austrian citizens in affected areas in other states)
  - Coordination of public information

Intermediate phase in Austria

Procedure after the radioactively contaminated air masses left Austria:

- BMK with the involvement of the BMSGPK
  - New situation assessment based on existing measured values (Austrian radiation early warning system, radiation detection units, implementation of sampling plan/laboratory-based monitoring system) and distribution by BMI (Situation Centre)
  - Coordination with the radiation protection authorities of other states and internationally
  - Definition of protective measures (cancellation of measures already taken/new measures intermediate phase) and distribution by BMI (Situation Centre)

- BMK
  - Regular information of the population about protective measures
  - Regular information international (bilateral, IAEA, EC)

- Austrian Provinces (LWZ)
  - All-clear information for the population in affected districts if emergency measures are lifted
  - Implementation of protective measures for the intermediate phase (in particular implementation of the sampling plan)
  - Information on the implementation of protective measures at BMK

- AGES
  - Prepare samples from the Austrian Provinces according to the sampling plan and measure them in the laboratory
  - Transmission of the evaluation to the radiological situation reporting system (approval by BMK)

- Regular meetings of the SKKM Coordination Committee
  - Coordination in the implementation of the defined protective measures (accompanying measures in the individual departments)
  - Coordination/alignement informing the public

Late phase in Austria

In the late phase, as an existing exposure situation, the radiological situation is comprehensively evaluated. Urgent protective measures are no longer required. Criteria for the transition of a radiological emergency to the late phase are set out in Annex 8. The procedures in the late phase as an existing exposure situation after a radiological emergency are no longer part of this emergency response plan. The processes in the late phase have to take into account the following tasks in particular:

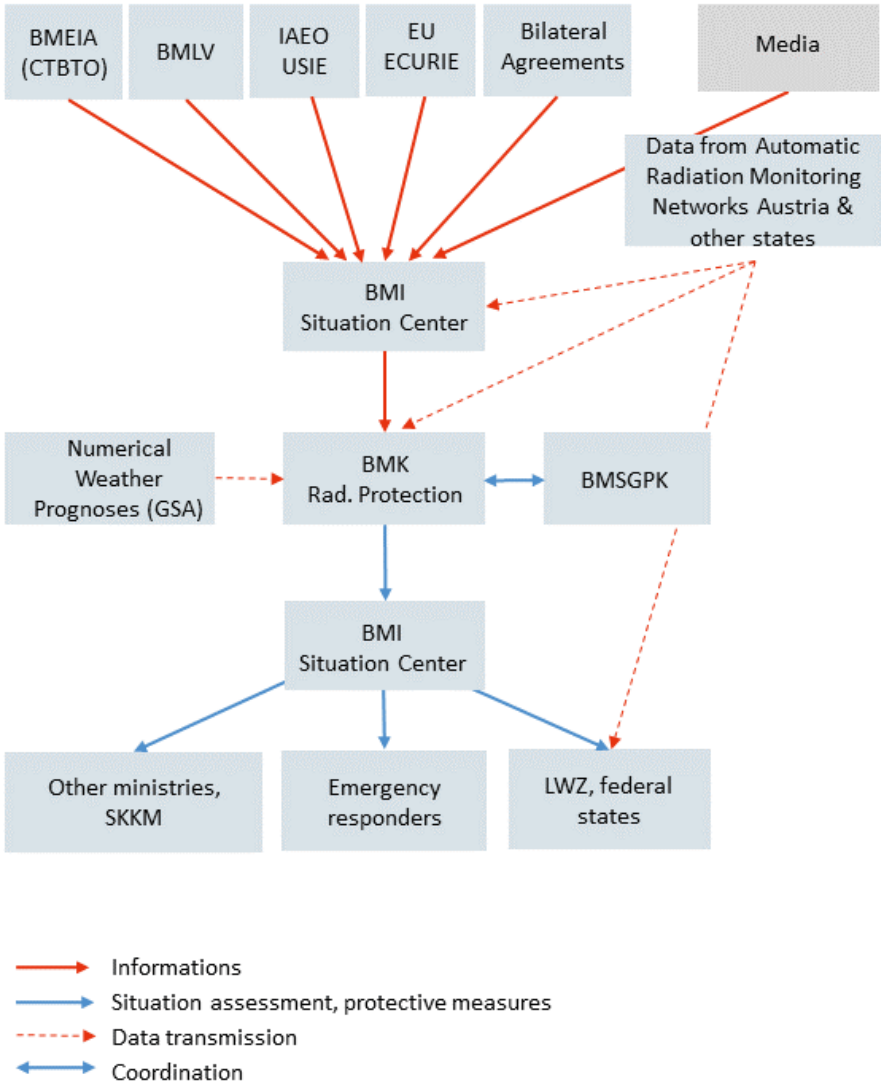
- Carrying out measurements, especially to check the effectiveness of measures, to identify trends and to record the contamination of individual media or regions more accurately,
- review of the need to maintain previously taken protective measures,
- consideration of further measures in the late phase, such as urban decontamination measures or measures in the field of food production and agriculture,
- regular adjustments of the protective measures with the involvement of stakeholders;
- regular exchange of information with the radiation protection authorities of other states, the EC and the IAEA,
- regular information and, if necessary, support for those affected,
- regular information to the public.

3 Emergency response

3.1 Reporting and alerting channels in case of nuclear weapons detonations

The following organisation chart presents the most important reporting channels in simplified form.

Figure 4: Reporting channels in case of nuclear weapons detonations



Source: BMK, Dept. V/8

3.2 Assessment of the emergency exposure situation

According to StrSchG 2020, the BMK, with the involvement of the BMSGPK, has[6]

- to assess the situation,
- if necessary, to determine protective measures on the basis of this assessment and to implement them by means of official orders or recommendations to the affected population,
- to reassess in case of substantial changes in the situation and, if necessary, to adapt or lift protective measures.

In accordance with the requirements of the StrSchG 2020, in the event of a radiological emergency, that is likely to have radiological consequences for Austria or occur in Austria, the BMK must immediately contact the competent authorities of all other states that may be involved or likely to be affected in order to:

- exchange views on the assessment of the exposure situation,
- coordinate protective measures and information to the public, and
- cooperate in the transition from an emergency exposure situation to an existing exposure situation.

Coordination is carried out by the BMK by the bilateral exchange of information and by international reporting/information systems of the IAEA and the EC (see Chapter 3.2.2).

[6] The responsibility for an emergency exposure situation due to a nuclear weapon detonation (an event that is not explicitly mentioned in § 123 Abs.1 Z1 to 4) would be taken over by the BMK for reasons of expediency according to § 124 StrSchG 2020.

3.2.1 Evaluation criteria

The central criteria for the assessment of a radiological emergency is whether and to what extent protective measures are necessary in Austria. The general and operational criteria set out in Annex 6 and the reference levels set out in the IntV 2020 form the basis for the definition of protective measures. The criteria for prohibiting the placing on the market of food and feed is the achievement or exceeding of the EC maximum permitted levels (see Annex 5). Based on these criteria, the following four scenarios can be distinguished with regard to the effects of radiological emergencies in Austria:

1. From a radiological point of view, no measures are necessary to protect the population in Austria. The planned EC maximum levels for food and feed and the general and operational criteria for protective measures, such as sheltering and ITB, are far from being achieved. Important measures to be taken are regular information to the public and further monitoring of the situation.
2. The envisaged EC maximum levels could be achieved for at least some food and feed, and measures in the fields of agriculture and food should therefore be considered. Protective measures such as sheltering and ITB are not necessary.
3. In addition to point 2, the general or operational criteria established for persons under 18 years of age and pregnant women for the protective measures sheltering and/or ITB could be achieved. Measures in the fields of agriculture and food, as well as measures to protect the critical population group, should therefore be considered.
4. In addition to point 3, the general or operational criteria laid down for adults for the protective measures sheltering and/or ITB could also be exceeded. All the measures envisaged for the protection of the population[7] must therefore be taken into account.

In the assessment of an event that has occurred, subsequent information and emergency systems are important tools.

3.2.2 Alarming/information systems, data exchange

International alerting and information systems enable early alerting and information of international bodies and potentially affected states when radiological events occur.

[7] The protective measures provided for in Annex 7 are excerpted from the catalogue of measures.

3.2.2.1 Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO)

The BMEIA (Permanent Representation of Austria to the United Nations) is the Austrian contact point for information from the CTBTO:

- First notification of the CTBTO: Immediately after verification of the detonation of nuclear weapons by the signatory states of the CTBTO (National Data Centres), the BMLV can make information on weapon systems present in the affected area and their impact parameters available via the CTBTO. In the case of the provision of "verified" image and film material, initial assessment can be made regarding the weapon systems used and thus their presumed yield.
- About 1 hour after the detonation, a second notification from the CTBTO is expected, the contents of which allow more accurate assessment of detonation yield.

3.2.2.2 International exchange of information – BMLV

The BMLV receives additional information from the following international sources:

- EC Military Staff,
- NATO,
- Intelligence Service

3.2.2.3 ECURIE (EC)

The ECURIE system (European Community Urgent Radiological Information Exchange) is the technical implementation of Council Decision 87/600/EURATOM (EURATOM 600/1987) on the accelerated exchange of information in the event of a radiological emergency. The reporting channels for ECURIE are as follows:

- The state concerned submits an initial report and subsequent information on the radiological emergency to the ECURIE headquarters in Brussels and Luxembourg, as well as to the permanently staffed national contact points of all ECURIE member states (in Austria, the BMI (Situation Centre)).
- The national contact point alerts the competent authority (in Austria the BMK) and forwards the transmitted information to it for evaluation (in some states, the contact point is also the competent authority).

3.2.2.4 USIE (IAEA)

The IAEA's international safety standards [IAEA, GSR Part 7] require early information for transnational emergencies. In accordance with the criteria for transnational radiological emergencies listed in the IAEA definitions, the use of nuclear weapons is to be classified as a transnational radiological emergency.

Emergency information is distributed using USIE (Unified System for Information Exchange in Incidents and Emergencies) or FAX (EMERCON forms). The reports are pre-verified by the IAEA [EPR-IEComm-2019]. USIE has automatic interfaces to ECURIE and can also be used for bilateral information exchange. The reporting channels are analogous to ECURIE reports.

3.2.2.5 Bilateral exchange of information

In the event of a radiological emergency in neighbouring states, the bilateral agreements[8] (see Annex 1) provide the Austrian authorities with additional information on those exchanged via the IAEA and the EC. Based on the bilateral agreements, the BMK has access to the following emergency-relevant information from neighbouring states:

- Switzerland: Access to Swiss electronic situation reporting system (ELD), automatic transmission of the measured values of the automatic monitoring network (ambient dose rate - ADR) and the ADR measuring rings around the nuclear power plants.
- Germany: Access to the situation reporting system of the German BMU (ELAN), automatic transmission of the measured values of the ADR automatic monitoring network.
- Czech Republic: automatic transmission of measured values from the ADR automatic monitoring network and the Ceske Budejovice AMS station.
- Slovak Republic: automatic transmission of measured values from the ADR automatic monitoring network and the Bohunice AMS station.
- Hungary: Access to Emergency Web, automatic transmission of measured values from the ADR automatic monitoring network and AMS stations.

[8] Radiological emergencies resulting from the use of nuclear weapons are covered by bilateral agreements with Austria's neighbouring states, such as the agreement with Germany in Art. 3(2): 'The two Contracting Parties shall notify each other of abnormally high levels of radioactivity on their respective territories which are not attributable to a nuclear accident at a nuclear installation or any other activity on that territory.'

- Slovenia: Automatic transmission of measured values from the ADR automatic monitoring network and AMS stations.

3.2.3 Prognoses and decision support systems (TAMOS, ESTE)

Based on information on the yield and the detonation height of nuclear weapon detonations and the weather forecast, initial assessment of the radiological effects can be made at an early stage with prognoses and decision-support systems. On the basis of these assessments, appropriate protective measures for the population are then prepared or taken if necessary.

3.2.3.1 TAMOS

The forecasting system TAMOS was developed by GeoSphere Austria. Immediately after reporting a nuclear weapon detonation and alerting the BMK, the BMK can use TAMOS to carry out initial atmospheric transport and deposition calculations. These calculations are based on current weather forecasts (from the European Centre for Medium-Range Weather Forecasts in Bologna/Italy). TAMOS can be used to quickly assess whether Austria could be affected by the effects of the event. If necessary, the precipitation forecast can be used to determine the potentially more affected regions of Austria. If the remote access to the TAMOS system by BMK is not available due to technical problems, TAMOS calculations can also be carried out directly by the permanent service of GeoSphere Austria and the results transmitted to the BMK.

In order to calculate the effects of nuclear weapon detonations at a greater distance, specific source terms for 10 kt and 100 kt yield were stored in the TAMOS system with the radiologically relevant nuclide vector of uranium-based nuclear weapons. In addition, the release height was adjusted in the form of a uniform release between 0 m to about 8,000 m altitude at 10 kt or between 0 m to about 14,000 m altitude at 100 kt. The integration of a more sophisticated model for nuclear weapon detonations of GeoSphere Austria into the operational TAMOS system is under development.

Cooperation and earliest possible coordination with the CBRN Defence Centre of the BMLV (which operates the forecasting system HYSPLIT) and GeoSphere Austria in the assessment of the effects of nuclear weapon detonations in the near and far range in the event of an incident is part of the emergency arrangements.

3.2.3.2 ESTE system

Based on a bilateral agreement with the Czech nuclear regulatory authority, the BMK has been operating the decision support system ESTE (Emergency Source Term Evaluation) since 2005. Source terms for different nuclear weapons and yield are stored in ESTE. The standard weather forecasts (of the European Centre for Medium-Range Weather Forecasts in Bologna/Italy) transmitted to ESTE would have to be extended to higher levels (several 10 km altitude) to cover the release heights of nuclear weapon detonations.

3.2.3.3 Weather bulletin of GeoSphere Austria

In order to assess the reliability of the weather forecasts used in the prognoses and decision-making support systems, a weather bulletin can be requested from the permanent service of GeoSphere Austria (24/7). Thus, the prognoses results of the BMK can be evaluated by a meteorological expert assessment.

3.2.4 Automatic measuring systems

3.2.4.1 Radiation early warning system – automatic data exchange (coupled automatic monitoring networks)

On the basis of bilateral agreements (see Annex 1), there is a permanent exchange of data between the Austrian radiation early warning system and the automatic monitoring networks of all neighbouring states, with the exception of the Italian automatic monitoring network[9]. The following table shows which data is exchanged with the individual states or the European data platform EURDEP.

[9] The Measured values from the Italian automatic monitoring network are available via the European data platform EURDEP.

Table 7: Automatic data exchange between radiation early warning systems (automatic measuring networks), BMK, Dept. V/8

Country/Institution	Austria delivers	Austria receives	Beginning
Switzerland	ADR 1-h average value (MW), all measuring points (via ISPRA)	ADR 1-h-MW approx. 60 measuring points per hour	2009
Germany	ADR 10-min-MW all measuring points	ADR 10-min-MW approx. 600 measuring points (in Bavaria and Baden-Württemberg); 1 time daily; increased measured values immediately	2006
CzechRepublic	ADR 10-min-MW all measuring points	ADR 10-min/1-h-MW approx. 25 measuring points per hour	2001
Slovak Republic	ADR 10-min-MW all measuring points	ADR 10-min-MW approx. 20 measuring points per hour	1994
Hungary	ADR 10-min-MW all measuring points	ADR 1-h-MW approx. 40 measuring points per hour	2004
Slovenia	ADR 1-h-MW all measuring points	ADR 30-min-MW approx. 50 measuring points (in case of occasion: 5-min-MW)	1995
European data platform EURDEP	ADR 1-h-MW all measuring points	European states different mean value class different transmission frequency	1999

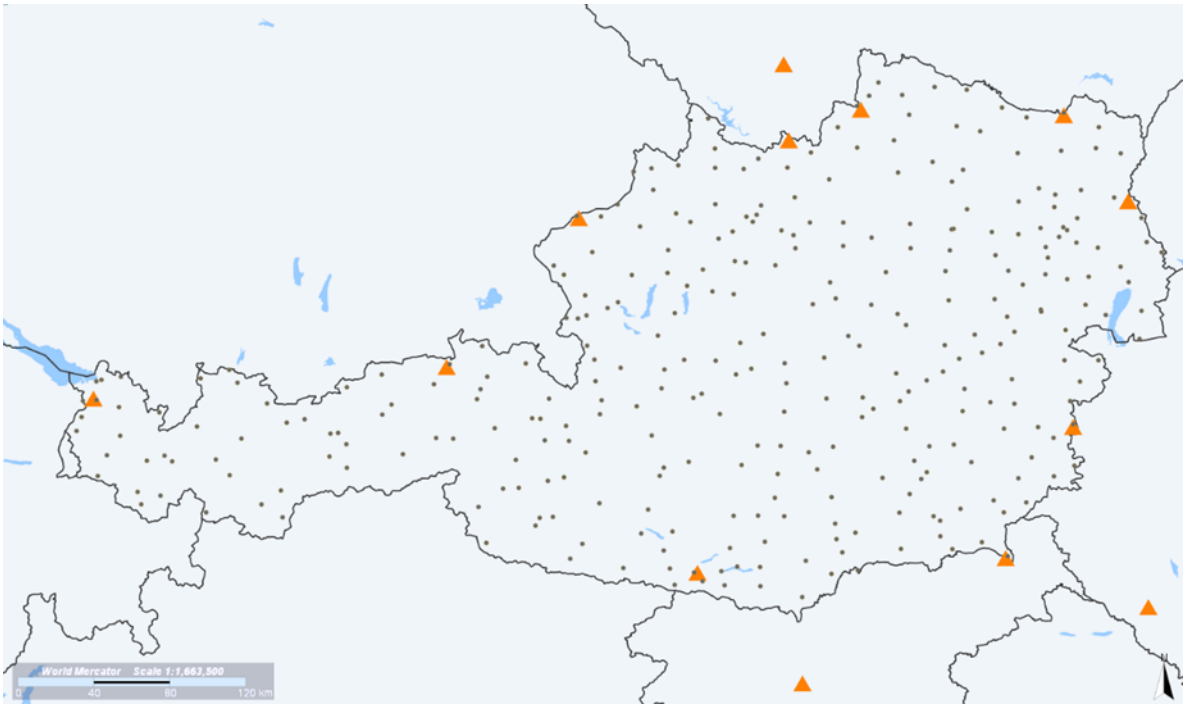
Note: There is a data exchange with Hungary for the stations of the measuring ring around the Paks nuclear power plant and some other stations with hourly transmission of measurement data (1-h-MW); for the remaining Hungarian stations: 6-h-MW.

In order to be able to record the situation throughout Europe in case of an event with large-scale contamination, the European Commission has set up a "data platform" for the measured values of the radiation early warning systems. One of the platform's headquarters is located at an EC research facility in Ispra, Italy. Almost all European states as well as some states outside Europe exchange their measured values via this data platform with radiation early warning systems – including Austria. The measured values are also publicly available at the Internet address remap.jrc.ec.europa.eu . A comparable global data platform (IRMIS) is being set up by the IAEA.

3.2.4.2 Radiation Early Warning System – Ambient Dose Rate Monitoring Network

More than 300 ambient dose rate meters installed in Austria (see Figure 5) operate fully automatically. Essentially, they measure the intensity of gamma radiation at the installation site and send the measured values and status messages to the data centers of the Austrian Radiation Early Warning System (SFWS). The measured values are 10-min average values or, after a significant change in the measured values of the ambient dose rate (ADR), 1-min average values[10]. The majority of the locations of the ADR probes comply with international recommendations: installation of the measuring probes one metre above ground on untreated permanent meadows or on flat roofs. The data center of the SFWS is located in Vienna in the BMK, Dept. V/8. A backup center for the redundant systems was set up in military buildings in Korneuburg.

Figure 5Austrian radiation early warning system (black dots: ambient dose rate meters, orange triangles: air monitor stations)



Source: BMK, Dept. V/8

[10] At most SFWS measuring stations are automatically converted

A so-called "alarm level" of 300 nSv/h has been defined for alerting the on-call service in the BMK or the operational management of the SFWS at the Federal Environment Agency. In the event of alarms due to increases in measured values, the management of the SFWS (Umweltbundesamt GmbH) sends information to the BMI (Situation Centre) and all LWZ during working hours or by the on-call service of the BMK (Dept. V/8) outside working hours to evaluate and explain the increase in measured values.

Even if the effects of a detonation of a tactical nuclear weapon at a distance (at a distance of more than 400 km from the Austrian border) do not show any measurement increases at the ambient dose rate meters of the Austrian radiation early warning system, the measured value increases can be tracked in the coupled measuring networks of the neighbouring states or in EURDEP.

3.2.4.3 Radiation Early Warning System – Air Monitor Monitoring Network

The ADR measuring devices only determine the gamma dose rate at the installation site. For this reason, so-called air monitoring stations are also operated in the SFWS, which enable nuclide-specific air concentration measurements. The air monitors are preferably located in the meteorological catchment area of nuclear power plants close to the border, directly on the Austrian border. The air monitor stations continuously suck in air, whereby aerosol-bound radioactive substances are deposited on a filter. The filters are permanently examined directly at the measuring point for existing alpha, beta and gamma emitters. The use of germanium or sodium iodide detectors enables a nuclide-specific determination of gamma-emitting radionuclides. If radioactive substances are detected, an activated carbon filter is additionally sucked in and examined for the presence of gaseous iodine isotopes. The facilities are also equipped with a weather station. There are currently 10 air monitoring stations (AMS) in operation in Austria.

In addition to the plants in Austria, 4 air monitoring stations are also set up abroad near nuclear power plants near the border on the basis of bilateral agreements. The data from these systems are automatically transmitted to the data centre of the Austrian SFWS.

Table 8: Air monitoring stations in Austria and neighbouring states operated by Austria. HPGe (High Purity Germanium), NaI (Sodium Iodide)

State/Neighbouring State	Station name	Start of operations	Gamma detector
B	Rechnitz	2004	HPGe
K	Villach	1998	NaI
NO	Gmünd	1996	HPGe
NO	Laa/Thaya	1996	NaI
NO	Leopoldschlag	1999	HPGe
NO	Zwerndorf	1996	HPGe
Upper austria	Braunau	2000	NaI
ST	Bad Radkersburg	1998	HPGe
T	Kufstein	1998	NaI
V	Dornbirn	2001	HPGe
CZ	Ceske Budejovice (near Temelin NPP)	2001	HPGe
HU	Gerjen (near NPP Paks)	2006	HPGe
SK	Jaslovske Bohunice (near Bohunice NPP)	2001	HPGe
SI	Krsko 2, Drnovo (near Krsko NPP)	1999	HPGe

Source: BMK, Dept. V/8

From the bilateral data exchange, the Austrian data center receives additional measurement data from three Hungarian (Napkor, Tesa and Nagykanizsa) and two Slovenian (Krsko and Brinje nuclear power plants) air monitor stations.

If a nuclear weapon detonation occurs closer to an air monitor station and the radioactively contaminated air masses are transported over the air monitor station, increased nuclide-specific readings are possible. For this reason, the nuclide library of the evaluation software has been adapted.

As a basis for the adaptation of the nuclide library, a document of the "Comprehensive Nuclear Test Ban Treaty Organisation (CTBTO)" [CTBTO 2001] was used, which contains a selection of nuclides that are dose-relevant on the one hand and can be determined by gamma measurements on the other.

3.2.4.4 Laboratory-based monitoring system

In order to comprehensively assess Austria's impact on large-scale contamination and to define or adapt protective measures, laboratory-based radioactivity monitoring is carried out in Austria in the event of a radiological emergency. This laboratory-based monitoring system is based on sampling and laboratory measurements in the specialized measurement laboratories of the Austrian Agency for Health and Food Safety (AGES) at four locations Innsbruck, Linz, Vienna and Graz and is operated by AGES on behalf of the BMK and the BMSGPK.

The laboratory-based monitoring system can handle very low radionuclide concentrations in media (e.g. environmental samples such as air filters, precipitation, surface water; Food and feed). Here, too, the radioactively contaminated air masses must pass through the sample collection stations (air collectors, precipitation collectors), analogous to other releases such as a nuclear power plant accident. AGES has also adapted the nuclide library to the evaluation software for gamma measurements.

As a basis for the adaptation of the nuclide library, a document of the CTBTO [CTBTO 2001] was used, which contains a selection of nuclides that are dose-relevant on the one hand and can be determined by gamma measurements on the other. Sampling, measurement and transmission of measurement results in radiological emergencies are described in Chapter 3.3.

3.2.4.5 Dose estimation based on measurement data by OECOSYS

The computer simulation model OECOSYS allows dose assessment for the most important exposure pathways (inhalation, external cloud radiation and external ground radiation). Assessment of activity concentrations in certain foods and the corresponding ingestion dose may also be made.

As input data for OECOSYS, both the results of the propagation forecasts for nuclear weapon detonations with TAMOS and existing measured values can be used.

3.3 Radiation monitoring, sampling, sample transport and measurement

3.3.1 Mobile radiation monitoring teams

Federal and state authorities can request radiation detection missions via the BMI (Situation Center). These missions are carried out by the approximately 515 emergency workers of the radiation detection units of the police (emergency teams). Annex 4 contains a request form for an official radiation detection mission. In the form, the authority requesting, the transmission of the measurement results, the radiological situation including the suspected radionuclides, the area of measurements, the detection target and the implementation including type of measurement (flight, car, ground) must be entered. In the event of large-scale contamination, several Austrian Provinces also provide additional ambient dose rate measurement data through the rapid measurement at pre-defined measuring points.[11]

Procedure

- Alerting and coordination of the radiation detection units via the Provincial Policy Control Centres (LLZ) set up at the Provincial Police Directorates. The Provincial Policy Control Centres are permanently staffed by on-call services.
- Transmission of the measurement data (counts per second or ambient dose rate, geographical coordinates) to the authority requesting.
- Display of the measurement data at BMK: Integration into the display of the measurement data of the SFWS; display in Google Earth or in QGIS or RODOS.

[11] In case of failures of parts of the SFWS, for example due to natural disasters, radiation detection missions are important redundant measurement methods.

3.3.2 Sampling plan for large-scale contamination

For small- and large-scale radiological emergencies, the SKKM working group "Sampling Plan", which consists of representatives of the responsible federal ministries, the Austrian Provinces, AGES and emergency response organisations, prepared a sampling plan for large- and small-scale radioactive contamination as part of the national emergency response plan [AG Proben 2021].

In the case of large-scale contamination, the sampling plan is mainly based on the expected effects of major nuclear power plant accidents and is adapted for nuclear weapons detonations. The sampling and sample transport to AGES is carried out by the respective federal state in accordance with the specifications in the emergency response plan of this federal state.

Procedures for activating the sampling plan for large-scale contamination

- BMK including BMSGPK: activation of the sampling plan (as intervention measure), classification of the affected districts in radiological emergency categories (0 to 2) according to the sampling plan [AG Proben 2021].
- Austrian Province: Order for sampling to the sampling organizations in the Province.
- Sampling organisations: carrying out sampling (including filling in the sample cover letter).
- Transport organization: Transport of samples.
- Laboratory measuring stations of AGES (Vienna, Linz, Graz, Innsbruck): Measurement results (presentation and transmission to federal state and BMK, upload to the radiological situation reporting system).
- BMK: Release of the measurement results in the radiological situation reporting system.

3.4 Catalogue of measures, optimised protection strategy

According to StrSchG 2020, the national emergency response plan must contain a catalogue of measures with a compilation of intervention measures including optimised protection strategies. In accordance with IntV 2020, this catalogue of measures serves as the basis for defining protective measures in radiological emergencies and protective and remediation measures in the late phase. A list of all intervention measures included in the catalogue of measures [2022 catalogue of measures] to be considered in the different phases of a radiological emergency and in the late phase in the event of possible large-scale contamination can be found in Annex 7.

3.5 Protective measures

The intervention measures contained in the catalogue of measures form the basis for the definition of protective measures. The following are general and specific provisions for protective measures in the event of the use of nuclear weapons.

3.5.1 General provisions according to StrSchG 2020

The BMK, including BMSGPK, has to

- assess the situation,
- if necessary, to determine protective measures on the basis of this assessment and to implement them by means of official orders or recommendations to the affected population,
- reassess substantial changes in the situation and, if necessary, adapt or lift the protective measures;
- review and, if necessary, adapt the effectiveness of the protective measures under implementation; and
- adopt, where necessary, regulations to ensure the implementation of protective measures. These regulations shall be promulgated by appropriate means, such as on radio or television, and shall enter into force immediately after their promulgation. They shall be repealed when the protective measures in question are no longer necessary.

Note: Responsibility for an emergency exposure situation due to a nuclear weapon detonation, an event that is not explicitly mentioned in § 123 Abs.1 Z 1 to 4, would be taken over by the BMK for reasons of expediency pursuant to § 124 StrSchG 2020.

The provincial governors have to

- implement the established protective measures,
- to inform the BMK about the status and effectiveness of the protective measures implemented.

International cooperation

The BMK must immediately contact the competent authorities of all other states which may be involved or likely to be affected, in order to:

- exchange views on the assessment of the exposure situation and
- coordinate protective measures and information to the public.

3.5.2 Protective measures in case of a detonation of a nuclear weapon

The following chapters refer primarily to the investigated scenarios of the effects in the long range of a ground-level nuclear weapon detonation with a maximum yield of 100 kt.

3.5.2.1 Protective measures in Austria, in the case of nuclear weapons detonated at a greater distance from Austria (about 100 km to several 1000 km)

In the scenario calculations, nuclear weapon detonations in Ukraine were calculated. A yield of 10 kt or 100 kt and rare unfavourable weather conditions with direct transport of radioactively contaminated air masses towards Central Europe with partial deposition were taken into account. Dose assessment for the main radioactive substances show that the highest dose contributions come from external ground radiation and, above all, from the ingestion of contaminated food. Inhalation, especially of radioactive iodine, plays a subordinate role.

Annex 7 contains an excerpt of all protective measures of the Austrian catalogue of measures for large-scale contamination. In the event of a nuclear weapon detonation at a

greater distance from Austria (more than 400 km from Ukraine), the following shall apply to these protective measures in Annex 7:

- The general criteria for ITB and sheltering are not exceeded in Austria (regardless of age group).
- Protective measures in the agricultural and food sectors cannot be ruled out. The investigated weather scenarios show a transport time of the radioactively contaminated air masses of more than 24 hours. The need for protective measures in the agricultural and food sectors in Austria depends on several factors such as the yield of the nuclear weapon, the height of the detonation, the distance of the detonation point to Austria, the weather situation and the season.
- In addition, the following protective measures play a role:
  - Regular information for the population
  - Reinforced measurement and sampling program
  - Measures against psychosocial effects (fear, uncertainty, etc.)
  - Recommendations for behaviour (closing the windows and doors, switching off the air conditioning systems, refraining from consuming fresh food from the open air (self-catering), hygiene measures, etc.)
  - Individual decontamination measures and individual measures in the waste sector

- Protective measures in Annex 7, which may have to be taken into account in the event of nuclear weapon detonations at a greater distance from Austria, are specifically indicated.

Even in the event of a ground-level detonation of a tactical nuclear weapon at a greater distance from Austria (more than 400 km away from Ukraine), the protective measures "preparation and implementation of ITB" and "sheltering" are not necessary in Austria. Protective measures in the field of agriculture and foodstuffs may be necessary depending on the situation.

3.5.2.2 Protective measures for Austrian citizens in the heavily affected areas abroad

In particular, the following measures may be considered:

- Following the recommendations of the competent authorities in the States concerned,
- Travel recommendations or warnings by the BMEIA,
- Information and, if necessary, measures for Austrian citizens in the affected states (including staff of the Austrian embassy and their relatives), see protective measures in the vicinity (chapter 3.5.2.5),
- Information for relatives of Austrian citizens in the affected states,
- Information for Austrian citizens returning from affected states (possibly information on where returnees can quickly be checked for contamination).

In order to assess such events and their effects, Austria will make particular use of information provided by local authorities through international information systems (EC ECURIE and IAEA USIE) or bilaterally.

Procedure

- Based on the assessment of the radiological emergency, protective measures are determined by the BMK with the involvement of the BMSGPK.
- BMEIA is informed via the defined reporting channel BMK – BMI (Situation Centre) – BMEIA and the prepared reporting text (measures for Austrian citizens in the affected states, import control).

3.5.2.3 Measures to protect against contaminated imported goods or means of transport

Radiation monitoring and surveys may be required for:

- imports from third states and, if necessary, the distribution of goods within the EC (in particular food and feed) from severely affected states, and
- Means of transport (planes[12], vehicles, trains) from heavily affected states.

Procedure

- Based on the assessment of the radiological emergency, the BMK determines the appropriate measures with the participation of the BMSGPK.
- The implementation of these measures is generally the responsibility of the Austrian Provinces (defined reporting channel: BMK – BMI (Situation Centre) – LWZ). The BMK can request mobile emergency forces (radiation monitoring teams of the Austrian Police) for this purpose.
- The BMSGPK is responsible for the monitoring of foodstuffs. This also applies to other goods subject to the Food Safety and Consumer Act (LMSVG).
- The BMK is responsible for monitoring feeding stuffs, other goods and products.
- Monitoring is carried out by AGES in a laboratory-based monitoring system.

3.5.2.4 Measures in the field of air transport – change of flight routes

In nuclear weapons detonations, radioactive substances are transported to high altitudes. Flight routes may need to be changed to prevent contamination of the aircraft and exposure of passengers and staff.

[12] Due to the high release levels in case of nuclear weapons detonations (up to about 14 km at 100 kt yield) air traffic may also be affected.

Procedure

- Dept. V/8 in the BMK makes the TAMOS calculations based on the latest information (location, time, detonation height, yield, etc.)
- GeoSphere Austria provides the results of these current TAMOS calculations (radionuclide concentrations at different altitudes) to Austro Control, the responsible supervisory authority (BMK) and the Dept. V/8 in the BMK.
- If necessary, Austro Control decides on changes to the flight routes.

3.5.2.5 Comments on protective measures in near-range (up to several 10 km to about 100 km)

The use of nuclear weapons at NATO bases is considered very unlikely, as a nuclear attack on a NATO base would very likely lead to further nuclear weapons deployments (see also Technical Annex). Due to the distance of the Italian NATO base Aviano of about 75 km to the Austrian border, it cannot be ruled out that administrative districts close to the border could be located in the heavily affected area (in the short-range) with a 100 kt nuclear weapon. The following protective measures are necessary at short-range:

- Due to the missing or very short warning phase in the case of the use of nuclear weapons, sheltering is strongly recommended (usually of at least 24 hours) and to stay as far away as possible from the windows and, if possible, on the lower floors or in the basement. The high dose rate at short-range decreases relatively quickly (after 7 h to 1/10, after about 2 days (7x7 h) only 1/100 of the external radiation). The shielding of external radiation by buildings is between 1/10 and 1/100, depending on the type of building.
- It is important to inform oneself about radio and television as far as possible.
- Immediate evacuation is not recommended. Due to the lack of advance warning time, people are exposed unprotected.
- Even at short-range, the need for ITB is very unlikely. Compared to a serious NPP accident, the activity of the released radioactive iodine is orders of magnitude lower. A large part of the radioactive iodine is transported to very high altitudes or released at very high altitudes and only reaches the air near the ground in a very dilute form.

3.5.2.6 Request for Austrian assistance by severely affected states

The Convention on Assistance in the Event of a Nuclear Accident or Radiation-Related Emergency entered into force for Austria on 22 December 1989. Article 2 of the Convention stipulates, inter alia, that, in the event of a nuclear accident or radiation-related emergency, a State Party may request assistance from any other State Party, directly or through the IAEA. A Response and AssistanceNetwork (RANET) has been established by the IAEA to implement the Convention in practice.

In 2010, Austria registered resources in RANET that can be requested from other signatory states if necessary. The registration does not entail any concrete obligation to permanently provide/reserve resources, as the principle of voluntariness and a "case by case" decision are adhered to if necessary. Austrian resources were registered for the following areas:

- Radiation survey (without in situ measurements): Measurement team on site and support from experts in Austria
- Source search/recovery: Measurement team on site and support from experts in Austria

Procedure

- The application is examined, answered and ultimately implemented by the BMI (the department responsible for international disaster relief in Austria) in agreement with the BMK as the competent authority.
- The request for assistance is received via IAEA at the BMI (Situation Centre).
- The BMI forwards the request for assistance to all relevant ministries, Austrian Provinces and emergency organisations.
- Ministries, Austrian Provinces and emergency response organisations inform the BMI of support options.
- The BMI bundles the information and, after internal decision and coordination with the BMK, forwards it to the IAEA as a coordinated Austrian offer of assistance.
- Reporting channels: IAEA – BMI – organisations with emergency teams – BMK (coordination)

- The country that made the request for assistance, the IAEA (Incident and Emergency Center - IEC) and Austria (BMI/BMK) are preparing an Assistance Action Plan (AAP).

3.5.2.7 Request and receipt of assistance by Austria

Austria has the possibility to request international assistance through the Convention on Assistance in the Event of a Nuclear Accident or Radiation-Related Emergency and RANET. This could be necessary in the field of medical care for a large number of patients suspected of having received very high levels of radiation.

Procedure

- The request for assistance is submitted to the IAEA by the BMK as the competent authority (request for assistance via USIE).
- The BMK, the IAEA (IEC) and the competent authorities of the states offering assistance draw up an Assistance Action Plan (AAP).
- Details on assistance, including costs, are regulated in the AAP.

3.6 Informing the public

According to StrSchG 2020, the BMK must inform the public in an appropriate manner to prepare for a radiological emergency and, in the event of a radiological emergency, as required by the situation. The content listed in Annex XII to Directive 2013/59/Euratom shall be taken into account.

3.6.1 Preparing for a radiological emergency

The following sources of information are available to prepare the population:

Website of the BMK strahlenschutz.gv.at and emergency website of the BMK notfallschutz.gv.at including the central official emergency documents, FAQs and publicly

accessible measured values of the radiation early warning system (from around 110 measuring stations)

- Brochure of the BMK: Agricultural measures (with the involvement of the Federal Ministry of Agriculture, Forestry, Regions and Water Management, the Austrian Provinces and the Austrian Chamber of Agriculture)
- BMSGPK website on potassium iodide tablets
- Radiation protection guide of the BMI (bmi.gv.at/zivilschutz)
- Regular briefing of media by the BMK

3.6.2 In case of a radiological event – national crisis communication

3.6.2.1 General requirements

Crisis communication is a central component of efficient emergency management. In case of radiological events, especially the use of nuclear weapons, a very high demand for information from the population and the media is to be expected. In case of an incident, the affected population in particular must be warned quickly. If necessary, protective measures must be announced via the ORF.

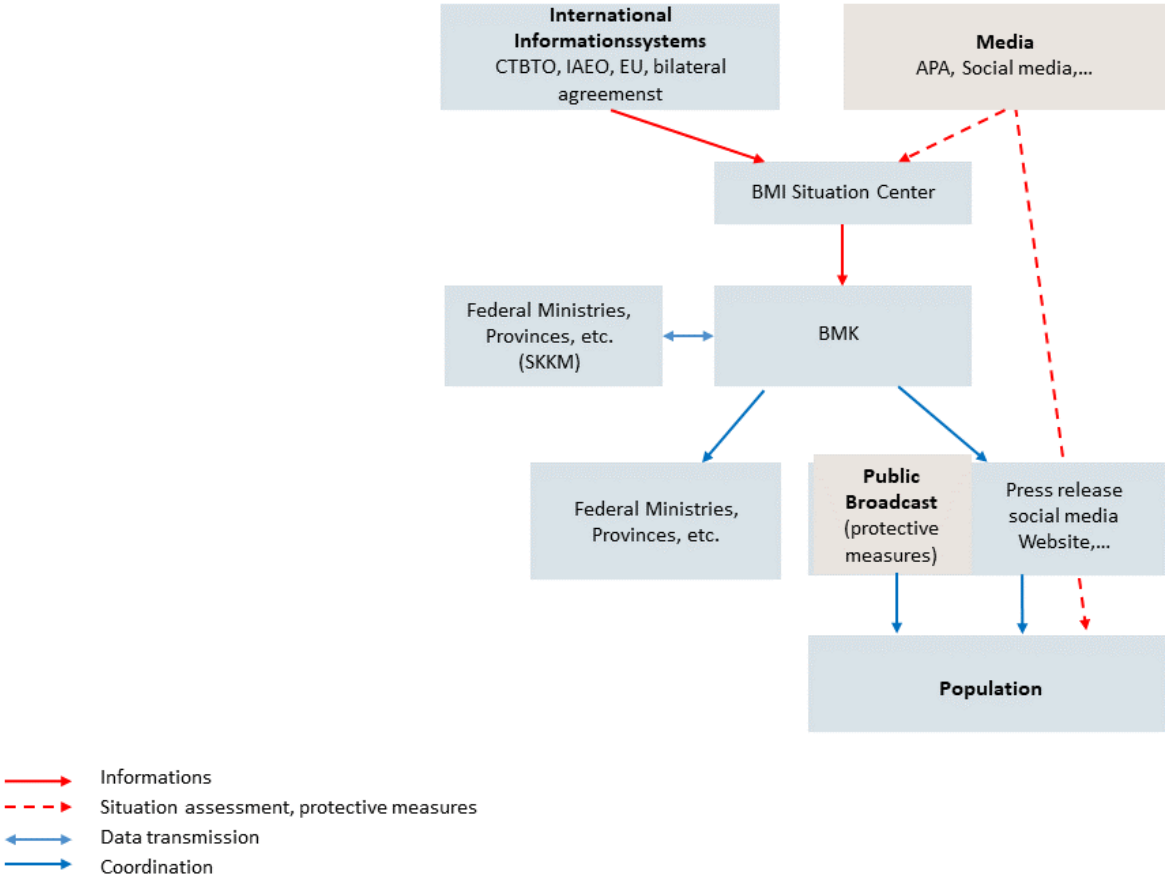
> The information provided to the public must be consistent, timely and comprehensible in order to counteract uncertainty among the population or false reports.

For this reason, the information activities of all authorities and organisations involved in case of an incident must be closely coordinated right from the start. Since there is little time available in the early phase of a radiological emergency, the information of the public (e.g. procedures, prepared text templates) must already be determined in the emergency preparedness or closely coordinated and regularly practiced.

3.6.2.2 Coordination mechanisms in Austria

The following figure shows the procedure for informing the public in a radiological emergency following the use of nuclear weapons.

Figure 6: Flow chart for informing the public



Source: BMK, Dept. V/8

As already shown in Chapter 2.3.7, the following coordination mechanisms exist:

- Early involvement of the BMSGPK in the crisis unit of the BMK;
- Rapid transfer of information in the "radiological situation reporting system" to other ministries, Austrian Provinces and emergency organisations. This enables the authorities and organisations involved to have access to all important information and the same level of knowledge; this also includes information to media such as press releases, ORF statements.
- Coordination in the coordination committee of the SKKM, in which representatives of the ORF and the APA are also consulted on a case-by-case basis.

Arrangements for harmonising the information of the public in the Austrian Provinces with those at federal level shall be made in the emergency response plans of the Austrian Provinces.

3.6.2.3 International coordination

According to StrSchG 2020, the BMK must immediately contact the competent authorities of all other states that could be affected in order to:

- exchange views on the assessment of the exposure situation and
- coordinate protective measures and information to the public.

Existing information and coordination systems shall be used at bilateral or international level. Such coordination activities shall not prevent or delay necessary protective measures to be taken at national level.

3.6.2.4 Public information channels

The warning and information of the public in the event of an incident takes place via various information channels:

- Warning and alarm system ("siren warning system")
- Press releases (APA)
- Information on ORF (Radio, Television and Internet (orf.at))
- Social media (Facebook and Twitter)
- Website of the BMK and emergency website of the BMK
- Call Center BMI
- KATWARN Austria/Austria

3.6.2.4.1 Warning and alarm system

Austria has a nationwide acoustic warning and alarm system (sirens), which is operated by the BMI together with the Austrian Provinces. In a radiological emergency, the warning and alarm system for warning/alerting is only used in those districts where the preparation/implementation of the protective measures "sheltering" or "ITB" is required.

> In the event of the detonation of a tactical nuclear weapon at a greater distance from Austria, neither protective measure is required in Austria. The population is therefore alerted and informed directly via ORF (television, radio, Internet). Text templates for ORF announcements in the event of nuclear weapons detonations at a greater distance from Austria are available at the BMK.

3.6.2.4.2 Press releases (APA)

Press releases are written by the BMK at an early stage and distributed via the APA. APA messages reach all media (e.g. print media, private television, online services) that can disseminate the information. Text templates for press releases in the event of nuclear weapon detonations at a greater distance from Austria are available at the BMK.

3.6.2.4.3 Information of those affected via ORF (television, radio, Internet)

ORF plays a central role as a public broadcaster. According to § 5 of the ORF Act, ORF is obliged to provide federal and Provincial authorities with the necessary and appropriate

broadcasting time free of charge at all times for calls in crisis and disaster situations and other important reports to the general public. The above provisions also apply to the distribution in online offers. In the event of a crisis or disaster, it is possible to broadcast regionally or nationally on all ORF stations (radio and television) at any time via the radio station Ö3.

Procedure

- The BMK contacts directly or via BMI (Situation Center) Ö3.
- The corresponding official notification of the BMK is sent regionally or nationally.
- At the same time, according to ORF-internal defined procedures, the placement of a run of the message on television as well as the announcement of the message on the radio station Ö1 is initiated via the respective transmission line.

Corresponding information on the nature of the danger and the correct behavioural and protective measures are provided by the BMK via radio and television. Templates for speech texts for radio and television for the use of nuclear weapons at a greater distance in Austria are available in the BMK.

3.6.2.4.4 Social media

In a radiological emergency, the Facebook page and the Twitter account of the BMK are used. The Minister's Office, the press spokespersons and the public relations work of the BMK communicate via social media. The current press releases of the BMK can be distributed via Facebook. The BMK has developed text templates for Twitter for the respective messages. Twitter text templates for the use of nuclear weapons at a greater distance from Austria are available in the BMK.

3.6.2.4.5 (Emergency) Website

Information on radiological emergencies and additional background information are available on the emergency website of the BMK (notfallschutz.gv.at).

The emergency website of the BMK is highly available and, if necessary, scalable for a large number of simultaneous accesses to the website, easy and fast to activate or update and clearly structured. Information on the radiological emergency and supplementary background information is also available here.

Among other things, the ambient dose rate measurement data of the Austrian radiation early warning system (from about 100 locations) are available on the website strahlenschutz.gv.at and via the ORF Teletext, page 623 (teletext.orf.at).

3.6.2.4.6 Call center

In the short term, a call center can be put into operation in the BMI (Situation Center), which operates under the content specifications of the responsible department. The call center is intended to serve a large number of calls and questions from the population. The procedures for activating and operating the call centre are laid down in an agreement between BMI and BMK.

3.6.2.4.7 KATWARN Austria/Austria

KATWARN Austria/Austria is a system that transmits information and warnings from various authorities to mobile individual devices (e.g. smartphones) based on location or occasion [KATWARN]. Thus, KATWARN Austria/Austria complements the existing warning options such as sirens, loudspeakers and media and can also be used in radiological emergencies.

3.6.2.4.8 Other communication channels

Further information channels in radiological emergencies are:

- Press conferences
- Interviews
- Expert panels on ORF

3.7 Protection of persons carrying out interventions

3.7.1 Emergency responders

The StrSchG 2020 and the IntV 2020 regulate the protection of persons who carry out interventions. This includes requirements for emergency responders, in particular with regard to education and training, reference values for interventions, provision of personal protective equipment, provision of information necessary for the specific operation, dose determination (personal dosimeter, use of warning dosimeters if necessary), immediate medical examinations if the dose values established for occupational exposures are exceeded and determination of the intake dose if there is a suspicion of incorporation of radioactive substances.

For federal emergency responders, relevant information can be found in Annex 3. The emergency response forces are as follows:

- AGES emergency response forces (Vienna, Linz),
- Radiation detectors of the police and
- Mobile Task Force (MoEG) Nuclear Engineering Seibersdorf

Note: Special units of the CBRN defense are not regarded as emergency forces, but are active as part of an assistance service of the Austrian Armed Forces.

3.7.2 Helpers in radiological emergencies

Helpers are people who are not emergency responders and carry out interventions. The competent authority may also call on persons who are not emergency responders as helpers, provided that this achieves a significant optimisation in the implementation of protective measures (see emergency response plans of the Austrian Provinces). The prerequisite for this is that:

- their commitment is voluntary,
- they have the necessary knowledge or have received the appropriate instructions,
- they have been informed of the associated risk,
- except in duly justified exceptional cases, their use respects the reference value set out in the IntV 2020,
- they are equipped with dosimeters, unless exposure can be assessed by other means, and
- they are equipped with appropriate personal protective equipment.

Note: According to StrSchG 2020, samplers, for example, can fall into this group of people in the event of large-scale radioactive contamination.

3.7.3 Persons who urgently carry out necessary work[13]

For persons who have to carry out urgently necessary work in emergency exposure situations, without this being protective measures, the competent authority must lay down regulations for adequate protection (see emergency response plans of the Austrian Provinces). The reference values according to IntV 2020 can be found in Annex 6 of the emergency response plan.

[13] Examples for urgently necessary work that must be carried out during a radiological emergency, but does not constitute interventions within the meaning of the StrSchG 2020, fire extinguishing and rescue operations in contaminated areas, supplying the population with vital products, securing people, objects and borders, maintaining vital services or maintaining safe operation or shutting down a plant with hazard potential.

3.8 Medical assistance and control of non-radiological effects

3.8.1 Medical assistance

Medical assistance in the event of radiological emergencies is regulated within the framework of the emergency response plan "Medical assistance in the event of significant exposure or contamination of persons" and the emergency response plans of the Austrian Provinces. In the case of the use of nuclear weapons at a greater distance from Austria:

- The occurrence of deterministic damage to health in Austria due to the use of nuclear weapons at a greater distance from Austria can be ruled out.
- Deterministic damage to health cannot be ruled out in persons who come from the short-range (several 10 km) of the detonation point of a nuclear weapon. Decontamination, clarification of incorporation and medical therapy may be necessary for these individuals.

3.8.2 Mitigation of non-radiological effects

In all radiological emergencies, non-radiological effects must be considered in addition to radiological effects. This applies in particular to the use of nuclear weapons, which is likely to cause panic and major negative psychological and social effects. In addition, considerable economic effects can occur, if only because of the enormous follow-up costs incurred by agriculture, food producers, tourism and the public sector. The major psychological and social consequences of radiological emergencies have also been demonstrated by the nuclear power plant accidents in Chernobyl and Fukushima [WHO 2020]. In radiological emergencies, comprehensive information of the population is therefore very important in order to mitigate psychological and social effects (see Chapter 3.6).

In the case of necessary psychosocial care, specially trained persons are available in various organizations in all Austrian Provinces. The organisations active throughout Austria in the field of psychosocial acute care and crisis intervention are grouped together in the platform "Crisis Intervention – Acute Care". Currently, the following organizations are in the platform:

- Crisis Intervention Team of the Province of Styria
- Crisis Intervention Team of the State of Vorarlberg
- Acute CareVienna
- Austrian Red Cross
- Catholic Emergency Pastoral Care Austria
- Evangelical Emergency Pastoral Care Austria
- Crisis Aid Upper Austria
- Crisis intervention team of Arbeitersamariterbund of Austria
- AKUTteam Lower Austria
- Army Psychological Service

In addition, it is possible, in cooperation with the ORF, to set up a nationwide advice hotline, which is available daily around the clock. The staff of the counselling hotline can be supported by psychosocial experts from the member organisations of the Austrian platform "Crisis Intervention – Action Support[14]".

Details, in particular on reporting channels, procedures and the implementation of the planned measures to mitigate psychological and social effects, are to be regulated in the emergency response plans of the Austrian Provinces.

[14] A study on measures to mitigate non-radiological effects in radiological emergencies in Austria was carried out in 2009 by the Research Institute of the Red Cross and is available in the BMK [FRK 2009].

3.9 Records and data management

The "radiological situation reporting system" described in Chapter 2.3 is used, among other things, for chronological logging and data management. It is used during exercises, in events relevant from the point of view of radiation protection or purely media-relevant events as well as in the occurrence of a radiological emergency. The information about terminated events and exercises remains stored and can be accessed by all registered users at any time. This enables systematic documentation and evaluation of the sequence of events, including the reaction and response of the authorities and organisations involved.

4 Maintaining emergency preparedness

4.1 Authorities and their responsibilities

The responsibilities and tasks of the organizations involved in the emergency management system in emergency preparedness and emergency response are given in accordance with StrSchG 2020 and the present national emergency response plan (see Chapter 2.2). The participating organisations shall be responsible for maintaining emergency preparedness in their area of responsibility and for fulfilling their emergency response tasks.

The operational readiness and functionality of the entire emergency management system or parts thereof shall be checked in regular emergency exercises. Where necessary, improvements and adaptations shall be made.

4.2 Resources

The organisations involved in the emergency management system shall have an obligation to provide the necessary resources to maintain emergency preparedness in their area of responsibility and to fulfil their emergency response tasks.

4.3 Training and emergency drills

According to StrSchG 2020, the authorities responsible for drawing up emergency response plans must hold, evaluate and document emergency exercises at appropriate intervals.

When conducting emergency drills, the requirements of the IntV 2020 must be observed in accordance with the IAEA recommendations [EPRExercise2005] in the following areas:

- Exercise objectives and scope
- Preparation, implementation and follow-up
- Exercise organization
- Exercise scenario and exercise instructions
- Exercise documentation

For a practical implementation of these requirements, the SKKM working group "Emergency Exercises" has developed a guideline for the implementation of emergency exercises [Guideline Exercise Planning].

4.4 Quality assurance and updating of the emergency response plan

4.4.1 Preparation of the national emergency response plan

According to StrSchG 2020, very general quality requirements for the emergency management system apply in accordance with international standards. Among other things, the emergency management system shall be reviewed at appropriate intervals, including international peer reviews.

Contingency plans are an important cornerstone of this emergency management system. The present national emergency response plan was drawn up by the BMK in accordance with StrSchG 2020 with the involvement of all federal ministries concerned. It contains the content required in Annex 1 of the IntV 2020, which is primarily based on the requirements of the European basic radiation protection standard for protection against the dangers of exposure to ionising radiation [EURATOM 59/2013], the general safety standards for emergency preparedness and response of the IAEA [GSR Part 7] and the recommendations of the IAEA [EPR-METHOD-2003]. The national emergency response

plan has been brought to the attention of all those involved in interventions in radiological emergencies (see distribution list).

4.4.2 Regular updating of the stae-wide emergency response plan

In accordance with StrSchG 2020, the emergency response plan must be reviewed at appropriate intervals to ensure that it is up-to-date and updated if necessary, taking into account in particular experience from past emergency exposure situations and from national and international emergencies.

A prerequisite for this is that the BMK is informed by the participating organisations about any changes in their area. The BMK will submit the national emergency response plan to all participating organisations for comment when it is checked for timeliness.

Explanations of terms

General criteria: dose levels established in the national emergency response plan at which protective measures are to be considered. In the event of a radiological emergency, the general criteria form a basis for determining protective measures.

Occupational emergency exposure: Exposure of emergency workers in an emergency exposure situation [StrSchG 2020].

Existing exposure situation: Exposure situation that already exists when a decision on its control has to be made and which does not or no longer requires immediate measures [StrSchG 2020].

Effective dose: the sum of weighted organ equivalent doses in all tissues and organs of the body from internal and external expansion; Annex 21 [AllgStrSchV 2020].

Expected dose: dose to be expected from single or multiple exposure pathways in the case of an emergency or existing exposure situation.

Exposure: Any effect of ionizing radiation on the human body [StrSchG 2020].

Hazardous radioactive sources: A radioactive source containing a radionuclide whose current activity is equal to or higher than the value specified in accordance with § 43 Z 5 (StrSchG 2020) [StrSchG 2020]. In order to characterize the hazardousness of radioactive sources, the IAEA has defined two threshold values ("D-values") and established nuclide-specific activity values for them [EPRD-values2006]:

- D1 for handling of sealed radioactive sources (excluding combustion of radioactive materials)
- D2 in the event of a release of the radioactive inventory of a radioactive source due to various causes (e.g. fire)

The D-value is determined by the lower of the two values D1 and D2.

According to IAEA [EPRMETHOD2003], radioactive sources are classified according to their hazardousness according to the ratio of their activity (A) to the above-mentioned sources:

- A/D < 0.01: Handling of the sealed radioactive source (D1) and release of the inventory of the radioactive source (D2) not dangerous (no deterministic health effects)
- 0,01 ≤ A/D < 1: Handling of the sealed radioactive source (D1) and release of the inventory of the source (D2) probably harmless
- 1 ≤ A/D < 10: Handling of a sealed radioactive source (D1) dangerous for individuals and release of the inventory of the radioactive source (D2) dangerous in the immediate vicinity
- 10 ≤ A/D < 1,000: handling of sealed radioactive source (D1) very dangerous for individuals and release of the inventory of the radioactive source very dangerous in the immediate vicinity
- 1,000 ≤ A/D: Handling of enclosed radioactive source (D1) extremely dangerous for individuals and release of the inventory of the radioactive source (D2) extremely dangerous in the immediate vicinity

According to this classification, radioactive sources, with A/D ≥ 1, are described as dangerous.

Large-scale radioactive contamination: contamination of a large area by radioactive substances. As a rule, several regions of a state (in Austria some political districts) or several states are affected. The transitions from small-scale to large-scale contamination are fluid and are determined on a case-by-case basis.

Helpers in radiological emergencies: Persons who are not emergency responders and carry out interventions. The competent authority may use persons as helpers, provided that this achieves a significant optimisation in the implementation of protective measures. The prerequisites for this are laid down in the StrSchG 2020 and the IntV 2020.

Highly radioactive sealed source: A dangerous radioactive source that is enclosed [StrSchG 2020].

Intervention: The implementation of intervention measures [StrSchG 2020].

Intervention measures: The protective measures in an emergency exposure situation or the protective and remedial measures in an existing exposure situation [StrSchG 2020].

Nuclear plant: A nuclear power plant, an enrichment plant, a plant for nuclear fuel production, a reprocessing plant, a research reactor, an interim storage facility for spent fuel elements and an interim storage facility for radioactive waste, which is directly related to the listed nuclear facilities and is located on the site of these facilities [StrSchG 2020].

Small-scale radioactive contamination: contamination of a smaller area by radioactive substances. In practice, small-scale contamination is defined as contamination that affects only one or a few political districts. The transitions from small-scale to large-scale contamination are fluid and are determined on a case-by-case basis.

Laboratory-based monitoring system: The laboratory-based monitoring system is used to determine radioactivity in the environment (e.g. air, precipitation, water, soil), food, drinking water, animal feed and agricultural and forestry products. It consists of four measurement laboratories of the Austrian Agency for Health and Food Safety – AGES (locations: Vienna, Linz, Graz and Innsbruck). There are sampling plans for routine cases, which are regularly updated, and for radiological emergencies, in particular for large-scale radioactive contamination.

Catalogue of measures: The compilation of intervention measures, including optimised protection strategies [StrSchG 2020].

Emergency responder: A specially trained person with a defined role in a radiological emergency who could be exposed to radiation during their deployment in an emergency [StrSchG 2020].

Emergency exposure situation: An exposure situation as a result of a radiological emergency [StrSchG 2020].

Emergency management system: The legal or administrative framework used to establish responsibilities for emergency preparedness and response, as well as arrangements for decision-making in an emergency exposure situation [StrSchG 2020].

Emergency response plan: A plan that contains appropriate responses to an emergency exposure situation for specific events and corresponding scenarios [StrSchG 2020].

Operational criteria: criteria, such as measures and indicators of conditions on the ground, to be used when deciding on intervention measures where the general criteria for protective measures are not applicable.

Optimised protection strategy: Coordinated intervention measures that enable compliance with the defined reference value and pursue the goal of optimising protection below the reference value [StrSchG 2020].

Phases of an emergency radiological exposure situation

- Early warning phase: Phase that begins with the occurrence of a radiological emergency and ends as soon as the contamination of the area under consideration begins [IntV 2020].
- Contamination phase: Phase in which dispersal and deposition processes of radioactive substances take place in the area under consideration [IntV 2020].
- Intermediate phase: Phase that begins with the end of the contamination phase and ends with the beginning of the late phase [IntV 2020].

Radioactive contamination: The accidental or unintentional contamination of materials, surfaces, the environment or a person by radioactive substances [StrSchG 2020].

Radiological emergency: A non-routine situation or event in which a radiation source is present and that requires immediate measures to mitigate serious adverse consequences for the health, safety, quality of life and property of people and the environment, or a hazard that could result in such serious adverse consequences [StrSchG 2020].

Radiological Dispersion Device (RDD): Devices for the dissemination of radioactive substances in the environment, whereby, in addition to the ignition of a conventional explosive, other application mechanisms, such as spraying of radioactive liquids, can be used. These are always events involving the deliberate release of radioactive substances with a terrorist or criminal background. Other terms commonly used in the literature or media are "dirty bomb" (explosive detonation as a delivery mechanism) and "unconventional explosive and incendiary device for the dissemination of radioactive materials" – USBVA (explosive ignition or fire as delivery mechanism).

Radiological Exposure Device (RED): devices for the intended external irradiation of persons by hidden, unshielded radioactive sources.

Reference value: In an emergency or existing exposure situation, the value of the effective dose or organ equivalent dose or the activity concentration above which exposures are considered inappropriate, even if it is not a limit value that must not be exceeded [StrSchG 2020].

Remedial measures: The elimination of a radiation source or reduction of its strength (activity or quantity) or disruption of exposure pathways or reduction of their effects for the purpose of avoiding or reducing the doses that could otherwise be obtained in an existing exposure situation [StrSchG 2020].

Protective measures: The measures that are not remedial measures for the purpose of avoiding or reducing the doses that could otherwise be obtained in an emergency or existing exposure situation [StrSchG 2020].

Immediate measures : Those protective measures which, for reasons of effectiveness, must be carried out immediately after the occurrence of an emergency exposure situation [StrSchG 2020].

Late phase: An existing exposure situation after a radiological emergency [StrSchG 2020].

Transnational emergency: Radiological emergency of actual or potential radiological significance for more than one country [IAEA, GSR Part 7]. This includes:

- a significant transboundary release of radioactive materials (where a transnational emergency does not necessarily require a significant transboundary release of radioactive materials),
- a general emergency in a facility or other event that may lead to a significant transboundary release (atmospheric or aquatic) of radioactive materials;
- the finding of the loss or unlawful removal of a dangerous source transported across a national border or the transport of which across a national border cannot be excluded;
- a radiological emergency leading to a significant disruption to international trade or travel;

- a radiological emergency requiring the implementation of protective measures for foreign citizens or embassies in the state of occurrence of the radiological emergency and other affected states,
- a radiological emergency which results in actual or potential severe deterministic consequences, or as a result of a malfunction and/or problem (e.g. of equipment or software) with potentially serious international implications for the backup;
- a radiological emergency that causes great concern among the population of more than one state due to an actual or suspected radiological hazard.

Radiation early warning system: Comprehensive automatic measuring system for radioactivity in the environment in Austria. It currently consists of more than 300 ambient dose rate measuring points and 10 air monitors for recording the activity concentration in ground-level air. The measured values of the radiation early warning system are available online in the alarm centres of the BMK, the BMI and the Austrian Provinces.

Strategic nuclear weapons: nuclear weapons with a yield exceeding 150 kt TNT equivalent, which are primarily used for nuclear deterrence.

Tactical nuclear weapons: Nuclear weapons with a yield below 150 kt TNT equivalent, which are usually used to gain a military advantage when conventional weapons are no longer sufficient or as a warning.

Environmental monitoring: The measurement of external dose rate due to radioactive substances in the environment or radioactive substances in the environment [IntV 2020].

Avoidable dose: dose that can be avoided by an intervention measure.

Distribution list

- Offices of the state governments
- Federal Ministry of Education, Science and Research
- Federal Ministry for European and International Affairs
- Federal Ministry of the Interior
- Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology
- Federal Ministry of Agriculture, Forestry, Regions and Water Management
- Federal Ministry of Defence
- Federal Ministry of Social Affairs, Health, Care and Consumer Protection
- Mobile Task Force, Nuclear Engineering Seibersdorf GmbH
- Austrian Agency for Health and Food Safety
- Umweltbundesamt GmbH
- Central Institute for Meteorology and Geodynamics / from 2023: GeoSphere Austria – Federal Institute for Geology, Geophysics, Climatology and Meteorology

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StrSchG 2020: Federal Act on Measures for Protection against Dangers from Ionizing Radiation (Radiation Protection Act 2020 – StrSchG 2020), Federal Law Gazette I No 50/2020.

WHO 2020: A Framework for Mental Health and Psychosocial Support in Radiological and Nuclear Emergencies, World Health Organization, 2020.

ZAMG: Maurer et al, Atmospheric propagation calculation of a nuclear explosion, ZAMG.

Abbreviations

AGES	Austrian Agency for Health and Food Safety
AllgStrSchV 2020	Ordinance on General Measures for Protection against Dangers from Ionising Radiation (General Radiation Protection Ordinance 2020 - AllgStrSchV 2020)
AMS	Aerosol Monitoring System
APA	Austria Press Agency
BMBWF	Federal Ministry of Education, Science and Research
BMEIA	Federal Ministry for European and International Affairs
BMI	Federal Ministry of the Interior
BMK	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology
BML	Federal Ministry of Agriculture, Forestry, Regions and Water Management
BMLV	Federal Ministry of Defence
BMSGPK	Federal Ministry of Social Affairs, Health, Care and Consumer Protection
CTBTO	Comprehensive Nuclear Test-Ban-Treaty Organisation
CONVEX	Convention Exercise
ECMWF	European Center for Medium-Range Weather Forecasts
ECURIE	European Community Urgent Radiological Information Exchange
EMERCON	Emergency Convention (information transfer forms)
ESTONIAN	Emergency Source Term Evaluation
EURDEP	European Radioactivity Data Exchange Platform
GAMSRee	Recognising danger – exploring, carrying out closures – securing – rescuing people, requesting special forces
GPS	Global Positioning System
HERCA	Heads of the European Radiological Protection Competent Authorities
IAEA	International Atomic Energy Agency
IEC	IAEA Incident and Emergency Center
INES	International Nuclear and Radiological Event Scale

INEX	International Nuclear Emergency Exercise
IntV 2020	Ordinance on Interventions in Emergency Exposure Situations and in Existing Exposure Situations after a Radiological Emergency or due to contaminated goods or radioactive contaminated sites (Intervention Ordinance 2020 – IntV 2020)
IRMIS	IAEA International Radiation Monitoring Information System
Nuclear power station	Nuclear power station
Kt	Yield in kilotons of TNT equivalent
LLZ	State Control Centre
LSC	Liquid Scintillation Counting
LWZ	National Warning Centre
MoEG	Mobile task force of the NES
MW	Average
NEMP	Nuclear electromagnetic pulse
.NES	Nuclear Engineering Seibersdorf GmbH
ADR	Ambient dose rate
OECOSYS	Radioecological model adapted to Austrian conditions for the prognosis of contamination in food and radiation exposures after release of radioactive substances
PRIS	IAEA Power Reactor Information System
PSA	Personal protective equipment
RANET	IAEA Response and Assistance Network
RARA	Radon and radioecology
RDD	Radiological Dispersion Device
RED	Radiological Exposure Device
RODOS	Realtime Online Decision Support System
SFWS	Austrian Radiation Early Warning System
SKKM	State crisis and disaster management
StrSchG 2020	Federal Act on Measures to Protect against Dangers from Ionising Radiation (Radiation Protection Act 2020 – StrSchG 2020)
TAMOS	Austrian emergency system for trajectories and dispersion calculation
TLD	Thermoluminescence dosimeter

USBVA	Unconventional explosive and incendiary devices for the dissemination of radioactive materials
USIE	IAEA Unified System for Information Exchange in Incidents and Emergencies
UTM	Universal Transverse Mercator (global coordinate system)
WENRA	Western European Nuclear Regulators Association
ZAMG/GSA	Central Institute for Meteorology and Geodynamics / GeoSphere Austria
24/7	permanent availability (24 hours a day, 7 days a week)

Appendixes

Appendix 1: Legal basis

Austria

- Federal Act on Measures for Protection against Dangers from Ionising Radiation (Radiation Protection Act 2020 – StrSchG 2020), Federal Law Gazette I No. 50/2020.
- Ordinance of the Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology, the Federal Minister for Social Affairs, Health, Care and Consumer Protection and the Federal Minister for Digital and Economic Affairs on general measures for protection against dangers caused by ionising radiation (General Radiation Protection Ordinance 2020 – AllgStrSchV 2020), Federal Law Gazette II No. 339/2020.
- Ordinance of the Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology on Interventions in Emergency Exposure Situations and in Existing Exposure Situations after a Radiological Emergency or due to contaminated goods or due to radioactive contaminated sites (Intervention Ordinance 2020 – IntV 2020), Federal Law Gazette II No. 343/2020.
- Ordinance of the Federal Minister for the Environment, Youth and Family concerning information on the risk of accidents (Major Accident Information Ordinance – StIV, Federal Law Gazette No. 391/1994 (idgF.).

EC law

- Council Decision on Community agreements on the accelerated exchange of information in the event of a radiological emergency, 87/600/EURATOM.
- Council Regulation laying down maximum permitted levels of radioactivity in food and feed following a nuclear accident or other radiological emergency and repealing Council Regulation 87/3954/EURATOM and Commission Regulations 89/944/EURATOM and 90/770/EURATOM, 2016/52/EURATOM.
- Council Directive laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation and repealing Directives 89/618/EURATOM, 90/641/EURATOM, 96/29/EURATOM, 97/43/EURATOM and 2003/122/EURATOM, 2013/59/EURATOM.

International agreements (IAEA)

- Convention on Early Notification in the Event of a Nuclear Accident, Federal Law Gazette No. 186/1988.
- Convention on Assistance in the Event of a Nuclear Accident or Radiological Emergencies, BGBl. No 87/1990.

Bilateral agreements

- Agreement between the Government of the Republic of Austria and the Government of the Republic of Belarus on the Exchange of Information in the Field of Nuclear Safety and Radiation Protection, Federal Law Gazette III No. 175/2005 of 19 September 2005. The agreement was signed on 9 June 2000 and entered into force on 13 September2005.
- Agreement between the Government of the Republic of Austria and the Government of the Federal Republic of Germany on the Exchange of Information and Experience in the Field of Radiation Protection, Federal Law Gazette No. 892/1994 of 17 November 1994. The exchange of notes on the continued application of the former GDR Agreement (Federal Law Gazette No 128/1989) entered into force on 1 December 1994.
- Agreement between the Government of the Republic of Austria and the Government of the Republic of Poland on the Exchange of Information and Cooperation in the Field of Nuclear Safety and Radiation Protection, Federal Law Gazette No. 643/1990 of 12 October 1990. The agreement was signed on 15 December19 89 and is dated 1. December1990.
- Agreement between the Government of the Republic of Austria and the Government of the Union of Soviet Socialist Republics on Early Notification in the Event of a Nuclear Accident and the Exchange of Information on Nuclear Installations, Federal Law Gazette No. 130/1990 of 8 March 1990. The Agreement was signed on 12 September 1988 and entered into force on 26 March 1990. Explanatory notes Federal Law Gazette No. 257/1994 of 31 March 1994. The exchange of notes concerns the continued application of the above mentioned USSR Agreement with the Russian Federation entered into force on 9 March 1994.
- Agreement between the Government of the Republic of Austria and the Swiss Federal Council on the Early Exchange of Information in the Field of Nuclear Safety and Radiation Protection ("Nuclear Information Agreement" Austria and Switzerland) including Annex and Joint Declaration, Federal Law Gazette III No. 201/2000 of 23

November 2000. The agreement was signed on 19 March 1999 and entered into force on 1 January 2001.

- Agreement between the Government of the Republic of Austria and the Government of the Slovak Republic on the Regulation of Questions of Common Interest in Relation to Nuclear Safetyand Radiation Protection, Federal Law Gazette No. 1046/1994 of 28 December 1994. The exchange of notes concerns the continued application of the above. a. CSSRA entered into force on 1 January 1995.
- Agreement between the Republic of Austria and the Republic of Slovenia on the early exchange of information in the event of radiological hazards and on questions of common interest in the field of nuclear safety and radiation protection, Federal Law Gazette III No. 176/1998 of 11 November 1998. The Agreement was signed on 19 April 1996 and entered into force on 1 December 1998.
- Agreement between the Government of the Republic of Austria and the Government of the Republic of Tajikistan on Early Notification in the Event of a Nuclear Accident and the Exchange of Information on Nuclear Installations, Federal Law Gazette III No. 4/1998 of 12 January 1998. According to this proclamation, the abovementioned USSR Agreement has continued to be in force since 9 September 1991.
- Agreement between the Government of the Republic of Austria and the Government of the Czechoslovak Socialist Republic on the Regulation of Questions of Common Interest in Connection with Nuclear Safety and Radiation Protection, Federal Law Gazette No. 565/1990 of 5 September 1990. The Agreement was signed on 25 October 1989 and entered into force on 23 July1990. (BGBl No 123/1997 of 31 July 1997, proclamation concerning bilateral agreements in force with the Czech Republic).
- Agreement between Austria and the Czech Republic concerning conclusions of the Melk process and follow-up, Federal Law Gazette No. 266/2001 of 28 December 2001. The Agreement was signed on 29 November 2001 and entered into force.
- Agreement between the Government of the Republic of Austria and the Government of Ukraine on the Exchange of Information and Cooperation in the Field of Nuclear Safety and Radiation Protection, Federal Law Gazette III No. 152/1998 of 30 September 1998. The Agreement was signed on 8 November 1996 and entered into force on 18 August 1998.
- Agreement between the Government of the Republic of Austria and the Government of the Hungarian People's Republic on the Regulation of Questions of Common Interest in Connection with Nuclear Installations, Federal Law Gazette No. 454/1987 of 22 September 1987. The Agreement was signed on 29 April 1987 and entered into force on 1 November 1987.

Appendix 2: Contact Addresses

(not intended for publication)

Annex 3: Federal Emergency Response Forces

Appendix 3 lists the resources of emergency response forecast federal level.

Radiation detectors of the police

Table 9: Police radiation detectors (as of July 2019)

Scopes	Data
Protective measures that may be carried out by the body concerned in the event of radiological emergencies	• Radiation detection (for open and sealed radioactive sources) • Radiation measurement (shut-off at a specified shut-off dose rate, finding locations of the highest dose rate) • Contamination controls (conversion factor is required for limit value setting) • Nuclide identification (by gamma spectrometry; exclusively by organs with knowledge of hazardous substances)
Cooperation with other organisations if support from other organisations is required in the implementation of the protection measures	Depending on the occasion, the following support may be required: • Decontamination(fire brigade, army) • Illumination of deployment sites (fire brigade)

Scopes	Data
Emergency response forces (total number of people, number of people who can be deployed at short notice, location)	• A total of 515 trained police radiation detectors throughout Austria. (B: 36, K: 48, NÖ: 126, OÖ: 88, S: 34, ST: 86, T: 41, V: 20, W: 36); • Due to vacation, illness, leave of absence, it can realistically be assumed that about 50-60 percent of them can be used at short notice. A nationwide short-term shift of forces is possible. • In principle, it can be assumed that at least 4 trained radiation detectors are active in each administrative district. In the provincial capitals there are between 6 and 12 radiation trackers, in the federal capital Vienna 36. • Approximately 40 of these police radiation detectors are also trained as organs with knowledge of hazardous substances.
Procedure 1. Alerting the emergency services (reporting channels, contact addresses, on-call service)	• The alerting and coordination of emergency forces is carried out primarily by means of the state control centres (LLZ) set up at the state police directorates and at district level by the district control centres/city control centres (BLS/SLS) set up at the district police commanders/city police commanders. • The state control centres and district control centres are staffed by a 24-hour on-call service.
Procedure 2. Indication of the period of time in which the personnel are ready for action after the alarm has been raised	Operational readiness is usually possible within one hour.
Procedure 3. Transmission of measurement data to the BMK	The measurement data are transmitted to the Federal Ministry for Climate Action, the Environment, Energy, Mobility, Innovation and Technology (BMK) by e-mail as standard, but in exceptional cases can also be carried out by telephone or fax (date, time, location [either as a location as UTM coordinate or as GPS coordinate], dose rate value [at a height of 1 meter]).

Scopes	Data
Education and training according to IntV 2020	The training takes place in accordance with the IntV 2020 and ÖNORM S 5207 (three-stage training of emergency forces in radiological emergencies) at the ÖNORM-certified training center Civil Defence School of the Federal Ministry of the Interior (BMI).1. Basic training2. Advanced training I (with Strahlenschutz performance competition in bronze)3. Advanced training II (with radiation helmet performance competition in silver) After successful completion of all 3 training phases, the radiation detectors of the police are considered fully trained, can be used independently and on their own responsibility during radiation detection missions and thus meet the requirements for working as emergency responders.
Training and exercises	Every year, a two-day training course (16 hours) with practical operational exercises takes place under the direction of employees of the Civil Protection School of the BMI. In addition, a one-day training course (8 hours) in relevant areas takes place once a year under the responsibility of the radiation protection officer of the State Police Directorate. Participation in exercises (national and international) is planned.
Records of the person responsible for the emergency services	Radiation passports for emergency responders in radiological emergencies are available.
Existing personal protective equipment for emergency responders (protective clothing, respiratory protection, etc.) and dosimeters (personal and warning dosimeters)	• Disposable protective suit (3 pieces/person) • Protective boots, protective gloves, protective mask with particle protection filter and additional FFP3 protective mask • Personal thermoluminescence dosimeter (evaluation annually or after use) • one directly readable digital warning and alarm dosimeter for each detection team

Source: BMI

AGES Vienna

Department of Radiation Protection and Radiochemistry & Dept. of Technical Radiation Protection and Technical Quality Assurance, Spargelfeldstraße 191, 1220 Vienna (as of March 2022)

Table 10: AGES Vienna, Dept. of Radiation Protection and Radiochemistry & Dept. of Technical Radiation Protection and Technical Quality Assurance (as of March 2022)

Scopes	Intensified measurement program in the laboratory according to sampling plan	Emergency responders
Protective measures that may be carried out by the body concerned in the event of radiological emergencies	Intensified measurement program in the laboratory according to the sampling plan (prepared by AG Proben des Staatlichen Krisen- und Katastrophenschutzmanagements (SKKM), Status: 2021)	• Provision of measurement capacity and expertise for evaluation (incl. in situ measurements and specific measurements and investigations) • On-site sampling
Cooperation with other organisations if support from other organisations is required in the implementation of the protection measures	Provinces: Sample provision	• Radiation detectors: communication regarding the contaminated area • Provinces: Sample provision
Emergency services (total number of persons, number of persons who can be deployed at short notice, location)	• Permanent staff: 17 • Supporters: 6 • Location: AGES Vienna, Spargelfeldstraße 191, 1220 Vienna	• Permanent staff: 17, including 4 emergency responders • Location: AGES Vienna, Spargelfeldstraße 191, 1220 Vienna
Procedure 1. Alerting the emergency services (reporting channels, contact addresses, on-call service)	• Telephone numbers according to the alert list (see contact addresses in Annex 2) • Private telephone numbers are available at the place of work	• Telephone numbers according to the alert list (see contact addresses in Annex 2) • Private telephone numbers are available at the place of work

Scopes	Intensified measurement program in the laboratory according to sampling plan	Emergency responders
Procedure 2. Indication of the period of time in which the personnel are ready for action after the alarm has been raised	• On-call service: max. 1.5 hours between alerting and deployment at the place of employment • Personnel: 1 person ready for action within 1.5 hours (sampling & gamma measurement, additional persons on the following working day)	• On-call duty: max. 1.5 hours between alarm and deployment at the place of employment • Additional 3 people for in situ measurement team on the following working day
Procedure 3. Transmission of measurement data to the BMK	• Database extract by e-mail • Upload of the database extract (RAMSESALL) to the BMK radiological situation reporting system	In situ: by phone, e-mail
Education and training according to IntV 2020	• 4 people • However, no special training of personnel is required for increased measurement activities in the event of large-scale contamination. The professional qualification is given by the regular measurement activity. The permanent staff has at least the training for radiation protection officers "Basic training technology" and "Open radioactive substances in technology".	4 persons (emergency forces) according to ÖNORM S 5207
Training and exercises	• Internal exercises for measurements in the event of large-scale contamination (incl. a functional test of the devices) • In situ proficiency test every 2 years (comparative measurements), measuring instruments in permanent accredited measuring use	• Internal exercises for measurements in the event of large-scale contamination (incl. a functional test of the devices) • In situ proficiency test every 2 years (comparative measurements), measuring instruments in permanent accredited measuring use

Scopes	Intensified measurement program in the laboratory according to sampling plan	Emergency responders
Records of the person responsible for the emergency services	Not necessary for the increased measurement activity in the laboratory in the event of large-scale contamination, as the (permanent) personnel are monitored dosimetrically.	Notification obligations according to IntV 2020 are fulfilled
Existing personal protective equipment for emergency responders (protective clothing, respiratory protection, etc.) and dosimeters (personal and warning dosimeters)	• Protective clothing: disposable overalls with hood, gloves, overshoes; Respiratory protection (filtering half masks), safety goggles • Dosimeter: TLD for all persons, electronic warning dosimeters, ADR measuring devices, contamination detection devices	• Protective clothing: disposable overalls with hood, gloves, overshoes; Respiratory protection (filtering half masks), safety goggles • Dosimeter: TLD for all persons, directly readable warning and alarm dosimeters, ADR measuring devices, contamination detection devices

Source: AGES

AGES Linz

Department RARA, Wieningerstraße 8, 4020 Linz (as of March 2022)

Table 11: AGES Linz, Dept. RARA (as of March 2022)

Scopes	Intensified measurement program in the laboratory according to sampling plan	Emergency responders
Protective measures that may be carried out by the body concerned in the event of radiological emergencies	Intensified measurement program in the laboratory according to the sampling plan (prepared by AG Proben of the State Crisis and Disaster Management (SKKM) Status: 2021)	Provision of measurement capacity and expertise for evaluation (on-site: in situ measurements & ADR; Laboratory: gamma measurements). On-site sampling
Cooperation with other organisations if support from other organisations is required in the implementation of the protection measures	Provinces: Sample provision	Radiation detectors: communication concerning the contaminated area Provinces: Sample provision

Scopes	Intensified measurement program in the laboratory according to sampling plan	Emergency responders
Emergency services (total number of persons, number of persons who can be deployed at short notice, location)	• Permanent staff: 8 • Location: AGES , Department RARA, Wieningerstraße 8, 4020 Linz	• Permanent staff: 8, thereof • 4 emergency responders • Location: Wieningerstraße 8, 4020 Linz
Procedure 1. Alerting the emergency services (reporting channels, contact addresses, on-call service)	• Telephone numbers according to the alarm list (see contact addresses in Appendix 2) • Private telephone numbers are available at the place of employment and in the BMK	• Telephone numbers according to the alert list (see contact addresses in Annex 2) • Private telephone numbers are available at the place of work
Procedure 2. Indication of the period of time in which the personnel are ready for action after the alarm has been raised	• On-call service: max. 1.5 hours between alerting and deployment at the place of employment • Personnel: 1 person ready for action within 1.5 hours (sampling & gamma measurement, additional persons on the following working day)	• On-call service: max. 1.5 hours between alerting and deployment at the place of employment • Additional 3 people for in situ measurement team on the following working day
Procedure 3. Transmission of measurement data to the BMK	Database extract centrally via AGES Vienna (RAMSESALL)	In situ: by phone, e-mail
Education and training according to IntV 2020	• 4 people • However, no special training of personnel is required for increased measurement activities in the event of large-scale contamination. The professional qualification is given by the regular measurement activity. The permanent staff has at least the training for radiation protection officers "Basic training technology" and "Open radioactive substances in technology"	• 4 persons (emergency forces) according to ÖNORM S 5207

Scopes	Intensified measurement program in the laboratory according to sampling plan	Emergency responders
Training and exercises	• Internal exercises for measurements in the event of large-scale contamination (incl. a functional test of the devices) • In situ proficiency test every 2 years (comparative measurements), measuring instruments in permanent accredited measuring use	• Internal exercises for measurements in the event of large-scale contamination (incl. a functional test of the devices) • In situ proficiency test every 2 years (comparative measurements), measuring instruments in permanent accredited measuring use
Records of the person responsible for the emergency services	• Not necessary for the increased measurement activity in the laboratory in the event of large-scale contamination, as the (permanent) personnel are monitored dosimetrically.	• The recording obligations according to IntV 2020 are fulfilled.
Existing personal protective equipment for emergency responders (protective clothing, respiratory protection, etc.) and dosimeters (personal and warning dosimeters	• Protective clothing: disposable overalls with hood, gloves, overshoes; Respiratory protection (filtering half masks), safety goggles • Dosimeter: TLD for all persons, electronic warning dosimeters, ADR measuring devices, contamination detection devices	• Protective clothing: disposable overalls with hood, gloves, overshoes; Respiratory protection (filtering half masks), safety goggles • Dosimeter: TLD for all persons, directly readable warning and alarm dosimeters, ADR measuring devices, contamination detection devices

Source: AGES

AGES Graz

Institute for Food Analysis, Beethovenstraße 8, 8010 Graz (as of March 2022)

Table 12: AGES Graz, Institute of Food Analysis (as of March 2022)

Scopes	Intensified measurement program in the laboratory according to sampling plan
Protective measures that may be carried out by the body concerned in the event of radiological emergencies	Intensified measurement program in the laboratory according to the sampling plan (prepared by AG Proben of the State Crisis and Disaster Management (SKKM) Status: 2021)
Cooperation with other organisations if support from other organisations is required in the implementation of the protection measures	Provinces: Sample provision
Emergency services (total number of persons, number of persons who can be deployed at short notice, location)	• Total number of persons: 3 (permanent staff) • Number of additional persons who can be deployed at short notice: 3 (auxiliary staff) • Location: AGES, Institute for Food Analysis, Beethovenstraße 8, 8010 Graz
Procedure 1. Alerting the emergency services (reporting channels, contact addresses, on-call service)	Telephone numbers according to the alarm list (see contact addresses in Appendix 2) Private telephone numbers are available at the place of employment and in the BMK
Procedure 2. Indication of the period of time in which the personnel are ready for action after the alarm has been raised	Time span from alert: max. 1.5 h (during regular working hours)
Procedure 3. Transmission of measurement data to the BMK	Database extract centrally via AGES Vienna (RAMSESALL)
Education and training according to IntV 2020	No special training of permanent personnel is required for increased measurement activities in the event of large-scale contamination. The professional qualification is additionally given by the regular measurement activity. The auxiliary staff is mainly used for sample preparation and receives a short instruction every year.
Training and exercises	A regular exercise of the AGES radiation protection laboratories is carried out.
Records of the person responsible for the emergency services	Not necessary for the increased measurement activity in the laboratory in the event of large-scale contamination, as the (permanent) personnel are dosimetrically monitored

Scopes	Intensified measurement program in the laboratory according to sampling plan
Existing personal protective equipment for emergency responders (protective clothing, respiratory protection, etc.) and dosimeters (personal and warning dosimeters)	• Protective clothing: disposable overalls with hood, gloves, overshoes; Respiratory protection (filtering half masks), safety goggles • Dosimeter: TLD for all persons, electronic warning dosimeters, ADR measuring devices, contamination detection devices

Source: AGES

AGES Innsbruck

Institute for Food Analysis, Technikerstraße 70, 6020 Innsbruck (as of March 2022).

Table 13: AGES Innsbruck (as of March 2022)

Scopes	Intensified measurement program in the laboratory according to sampling plan
Protective measures that may be carried out by the body concerned in the event of radiological emergencies	Intensified measurement program in the laboratory according to the sampling plan (prepared by AG Proben of the State Crisis and Disaster Management (SKKM) Status: 2021)
Cooperation with other organisations if support from other organisations is required in the implementation of the protection measures	Provinces: Sample provision
Emergency services (total number of persons, number of persons who can be deployed at short notice, location)	• Total number of persons: 3 (permanent staff) • Number of additional persons who can be deployed at short notice: 3 (auxiliary staff) • Location: AGES, Institute for Food Analysis, Technikerstraße 70, 6020 Innsbruck
Procedure 1. Alerting the emergency services (reporting channels, contact addresses, on-call service)	• Telephone numbers according to the alarm list (see contact addresses in Appendix 2) • Private telephone numbers are available at the place of employment and in the BMK
Procedure 2. Indication of the period of time in which the personnel are ready for action after the alarm has been raised	Time span from alert: max. 1.5 h (during regular working hours)
Procedure 3. Transmission of measurement data to the BMK	Database extract centrally via AGES Vienna (RAMSESALL)
Education and training according to IntV 2020	No special training of permanent personnel is required for increased measurement activities in the event of large-scale contamination. The professional qualification is additionally given by the regular measurement activity. The auxiliary staff is mainly used for sample preparation and receives a short instruction every year.
Training and exercises	A regular exercise of the AGES radiation protection laboratories is carried out.

Scopes	Intensified measurement program in the laboratory according to sampling plan
Records of the person responsible for the emergency services	Not necessary for the increased measurement activity in the laboratory in the event of large-scale contamination, as the (permanent) personnel are monitored dosimetrically.
Existing personal protective equipment for emergency responders (protective clothing, respiratory protection, etc.) and dosimeters (personal and warning dosimeters).	• Protective clothing: disposable overalls with hood, gloves, overshoes; Respiratory protection (filtering half masks), safety goggles • Dosimeter: TLD for all persons, electronic warning dosimeters, ADR measuring devices, contamination detection devices

Mobile Task Force (MoEG)

Nuclear Engineering Seibersdorf GmbH, 2444 Seibersdorf, Austria (as of May 2019)

Table 14: Mobile Task Force (MoEG) of the NES (as of March 2022)

Scopes	Data MoEG
Protective measures that may be carried out by the body concerned in the event of radiological emergencies	• Telephone support and advice on topics related to radioactive sources and/or radioactive substances • When used on site: measurement of ambient dose rate, contamination, identification of radionuclides (gamma emitters), sampling (wipe test samples, material samples) • Laboratory analyses: surface contamination (alpha/beta total), identification of alpha, beta and gamma emitters (spectrometric and LSC measurements) • Securing and/or salvaging radioactive sources
Cooperation with other organisations if support from other organisations is required in the implementation of the protection measures	Contacts to: • ABCAbwS ÖBH • IAEA • Atomic Institute of the Austrian Universities • Austrian Institute of Technology GMBH / Seibersdorf Labor GmbH

Scopes	Data MoEG
Emergency response forces (total number of people, number of people who can be deployed at short notice, location)	• A total of at least 8 persons, early replacement in case of departure (retirement, voluntary retirement) in order to maintain the knowledge base and commitment; currently 12 people ready for action • Unconditional on-call availability for 1 person over 24 hours a day, 365 days a year; in addition, statistical on-call availability of the other members of the Mobile Task Force (MoEG), according to the experience of other emergency services (e.g. fire brigade), it can be assumed that about 1/3 of this number of persons is available at any time • Location SEIBERSDORF; in case of alerts outside normal office hours (Mon-Thu: 08:30-17:30, Fri: 08:30-13:30) Travel time to the location < 1 h • Additional specialist staff (about 15 people) available for the next working day
Procedure 1. Alerting the emergency services (reporting channels, contact addresses, on-call service)	Responsible head of the Mobile Task Force (MoEG) NES, alerting see contact addresses in Annex 2
Procedure 2. Indication of the period of time in which the personnel are ready for action after the alarm has been raised	• Staff can be reached immediately; telephone support without delay; • if required measuring equipment operational readiness in 1.5 h
Education and training according to IntV 2020	Training as radiation protection officer according to AllgStrSchV 2020: • Basic training • Special training: operation of radiation facilities and application of sealed radioactive substances • Special training: Application of open radioactive substances • Special training: handling of enclosed hazardous radioactive sources • Radiation Protection Performance Badge Bronze • Radiation Protection Performance Badge Silver • Basic training as an ADR driver
Training and exercises	Internal training andpractice about 10 x per year, 20 hours in total

Scopes	Data MoEG
Records of the person responsible for the emergency services	Members of the MoEG are occupationally exposed persons of categories A and B: • physical monitoring, • Cat A persons are also subject to regular medical monitoring
Existing personal protective equipment for emergency responders (protective clothing, respiratory protection, etc.) and dosimeters (personal and warning dosimeters)	Personal protective equipment (disposable gloves, boots, disposable overalls, respiratory protection), TLD and directly readable warning and alarm dosimeters available, collection of personal protective equipment at the Seibersdorf site necessary

Annex 4: Official radiation detection mandate

Figure 7: Official tracking order

Behördlicher Strahlenspürauftrag

(Gemäß gesamtstaatlichem Notfallplan)

An die Landesleitzentrale der Landespolizeidirektion ☐ B ☐ K ☐ N ☐ O ☐ S ☐ St ☐ T ☐ V ☐ W
im Wege des Lagezentrums des BMI (E-Mail: lagezentrum@bmi.gv.at)

Gelb hinterlegte Felder sind jedenfalls auszufüllen!

Auftrag durch

Organisationseinheit	
Ansprechperson/-stelle	
E-Mail	
Telefon	

Übermittlung der Spürergebnisse

Übermittlung an	☐ Auftraggeber/-in (wie oben) ☐ Abteilung Strahlenschutz des BMK (alarm@strahlenschutz.gv.at) ☐ Bundeswarnzentrale (EKC) des BMI (ekc@bmi.gv.at) ☐ Weitere:	
	Organisationseinheit	
	E-Mail	
	Telefon	

Schadenslage

Art des Ereignisses	
☐ Ereignis in kerntechnischer Anlage	☐ Ereignis in österreichischer Anlage
☐ Absturz von Satellit mit radioaktivem Inventar	☐ Ereignis mit gefährlicher radioaktiver Quelle
---	☐ Radiologischer Terror
☐ **Sonstiges:** Klicken Sie hier, um Text einzugeben.	

Radioaktive Quelle(n)	☐ Offen ☐ Umschlossen ☐ Unbekannt ☐ N/A		
Radionuklid(e)			
Aktivität(en)			

Figure 8: Official tracking order page 2

Spürziel

Spürziel	☐ Rascher Überblick über die radiologische Situation… ☐ im angegebenen Spürgebiet ☐ an den angeführten Spürpunkten ☐ entlang der vorgegebenen Wegstrecken ☐ Gründliche Suche nach radioaktiven Quellen ☐ sowie Ermittlung der höchsten Dosisleistung in 1 m Entfernung

Durchführung

Spürbeginn	☐ Sofort ☐ Am Klicken Sie hier, um ein Datum einzugeben. um Wählen Sie ein Element aus.		☐ **Hohe Priorität!**
Spürart	☐ Zu Fuß ☐ Mit dem Kraftfahrzeug („Autospüren") mit max. 30 km/h ☐ Mit dem Luftfahrzeug („Luftspüren") mit ca. 80 km/h in ca. 80 m Flughöhe mit ca. 150 m Spürbreite		
	☐ Abweichende Geschwindigkeitsvorgabe: Wählen Sie ein Element aus. ☐ Abweichende Vorgabe für die Flughöhe: Wählen Sie ein Element aus. ☐ Abweichende Vorgabe für die Spürbreite: Wählen Sie ein Element aus.		
Spürgebiet	Bundesland	☐ B ☐ K ☐ N ☐ O ☐ S ☐ St ☐ T ☐ V ☐ W	
	Bezirk(e)		
	PLZ und Ort(e)		
	Beschreibung		
Koordinaten (UTM, WGS 84)	Eckpunkt links unten		
	Eckpunkt rechts oben		
Zusatzangaben	☐ Karte des Spürgebiets beiliegend ☐ Karte mit abzuspürenden Wegstrecken beiliegend ☐ Liste der Spürpunkte beiliegend		
Weitere Hinweise	☐ Markieren bei	☐ Wählen Sie ein Element aus. ☐ Höchste Dosisleistung in 1 m Entfernung ☐ Dreifacher Leerwert	
	☐ Sonstige:		
Beilagen			

Datum, Uhrzeit	
Name	

Source: BMI, BMK, Dept. V/8

Annex 5: Envisaged EC maximum levels for food and feed

Council Regulation 2016/52/Euratom laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or other radiological emergency provides for the following maximum permitted levels for food and feed (Bq/kg and Bq/l respectively):

Figure 9: Maximum levels of radioactive contamination of foodstuffs (Bq/kg)

HÖCHSTWERTE RADIOAKTIVER KONTAMINATION VON LEBENSMITTELN

Die für Lebensmittel verbindlich festzulegenden Höchstwerte dürfen folgende Werte nicht überschreiten:

Isotopengruppe/Lebensmittelgruppe	Lebensmittel (Bq/kg) (1)			
	Lebensmittel für Säuglinge (2)	Milcherzeugnisse (3)	Sonstige Lebensmittel (sofern nicht von geringerer Bedeutung) (4)	Flüssige Lebensmittel (5)
Summe der Strontium-Isotope, insbesondere Sr-90	75	125	750	125
Summe der Jod-Isotope, insbesondere I-131	150	500	2 000	500
Summe der Alpha-teilchen emittierenden Plutonium-Isotope und Transplutonium-elemente, insbesondere Pu-239 und Am-241	1	20	80	20
Summe aller übrigen Nuklide mit einer Halbwertzeit von mehr als 10 Tagen, insbesondere Cs-134 und Cs-137 (6)	400	1 000	1 250	1 000

(1) Der Wert für konzentrierte Erzeugnisse und Trockenerzeugnisse wird auf der Grundlage des für den unmittelbaren Verbrauch rekonstituierten Erzeugnisses berechnet. Die Mitgliedstaaten können Empfehlungen hinsichtlich der Verdünnungsbedingungen abgeben, um die Einhaltung der in dieser Verordnung festgelegten Höchstwerte zu gewährleisten.
(2) Lebensmittel für Säuglinge sind Lebensmittel für die Ernährung von Säuglingen während der ersten zwölf Lebensmonate, die für sich genommen deren Nahrungsbedarf decken und in Packungen für den Einzelhandel dargeboten werden, die eindeutig als ein derartiges Lebensmittel gekennzeichnet und etikettiert sind.
(3) Milcherzeugnisse sind die Erzeugnisse folgender KN-Codes einschließlich späterer Anpassungen: 0401 und 0402 (außer 0402 29 11).
(4) Lebensmittel von geringerer Bedeutung und die für diese Lebensmittel jeweils geltenden Höchstwerte sind in Anhang II aufgeführt.
(5) Flüssige Lebensmittel sind Erzeugnisse gemäß Code 2009 und Kapitel 22 der Kombinierten Nomenklatur. Die Werte werden unter Berücksichtigung des Verbrauchs von Leitungswasser berechnet; für die Trinkwasserversorgungssysteme könnten nach dem Ermessen der zuständigen Behörden der Mitgliedstaaten identische Werte gelten.
(6) Diese Gruppe umfasst nicht Kohlenstoff-14, Tritium und Kalium-40.

Figure 10: Maximum levels of radioactive contamination of minor foodstuffs (Bq/kg)

Die für die in Nummer 1 genannten Lebensmittel von geringerer Bedeutung verbindlich festzulegenden Höchstwerte dürfen folgende Werte nicht überschreiten:

Isotopengruppe	(Bq/kg)
Summe der Strontium-Isotope, insbesondere Sr-90	7 500
Summe der Iod-Isotope, insbesondere I-131	20 000
Summe der Alphateilchen emittierenden Plutonium-Isotope und Transplutoniumelemente, insbesondere Pu-239 und Am-241	800
Summe aller übrigen Nuklide mit einer Halbwertzeit von mehr als 10 Tagen, insbesondere Cs-134 und Cs-137 (1)	12 500

(1) Diese Gruppe umfasst nicht Kohlenstoff-14, Tritium und Kalium-40.

Figure 11: Maximum levels of radioactive contamination of feedingstuffs (Bq/kg)

HÖCHSTWERTE RADIOAKTIVER KONTAMINATION VON FUTTERMITTELN

Die für die Summe von Cäsium-134 und Cäsium-137 verbindlich festzulegenden Höchstwerte dürfen folgende Werte nicht überschreiten:

Futtermittel für	Bq/kg (1) (2)
Schweine	1 250
Geflügel, Lamm, Kalb	2 500
Sonstige	5 000

(1) Mit diesen Werten soll zur Einhaltung der zulässigen Höchstwerte für Lebensmittel beigetragen werden; sie allein gewährleisten jedoch nicht unter allen Umständen eine Einhaltung der Höchstwerte und schmälern auch nicht die Verpflichtung, die Radioaktivitätswerte in Erzeugnissen tierischen Ursprungs, die für den menschlichen Verzehr bestimmt sind, zu kontrollieren.
(2) Diese Werte gelten für zum unmittelbaren Verbrauch bestimmte Futtermittel.

Source: Council Regulation 2016/52/Euratom

Applicable maximum levels under 2016/52/Euratom

(1) When the Commission receives an official notification of a nuclear accident or other radiological emergency which has led or is likely to result in significant radioactive contamination of food and feed – in particular under the community system for the accelerated exchange of information in the event of a radiological emergency or the IAEA convention on rapid information in the event of a nuclear accident of 26 September 1986 – it shall adopt an implementing regulation applying maximum permitted levels for potentially contaminated food or feed which could be placed on the market. Without prejudice to Article 3(4), the applicable maximum permitted levels laid down in such an implementing Regulation shall not exceed those laid down in Annexes I, II and III. This implementing Regulation shall be adopted in accordance with the examination procedure referred to in Article 5(2). The Commission shall, in accordance with the procedure referred to in Article 5(3), adopt an immediately applicable implementing Regulation where, on duly justified imperative grounds of urgency relating to the circumstances of the nuclear accident or other radiological emergency, imperative grounds of urgency so require.

(2) The period of validity of implementing regulations adopted pursuant to paragraph 1 shall be as short as possible. The duration of the first implementing Regulation in the event of a nuclear accident or other radiological emergency shall not exceed this month. The implementing regulations shall be periodically reviewed by the Commission and, if necessary, amended on the basis of the nature and location of the accident and the evolution of the levels of radioactive contamination actually measured.

(3) When drawing up or reviewing implementing regulations, the Commission shall take into account the basic standards laid down pursuant to Articles 30 and 31 of the treaty, including the principles of justification and optimisation, taking into account current technical knowledge and economic and social factors, in order to keep the level of individual doses, the likelihood of exposure and the number of persons exposed, as low as reasonably achievable.

When reviewing the implementing regulations, the Commission shall consult the group of experts referred to in Article 31 of the Treaty, in the event of a nuclear accident or other radiological emergency causing contamination of food or feed consumed in the Community to such an extent that the considerations and assumptions underlying the maximum permitted levels set out in Annexes I, II and III to this Regulation are no longer

valid. In any other case of contamination of food or feed consumed in the Community, the Commission may request the opinion of this group of experts.

4. Without prejudice to the objective of protecting public health pursued by this Regulation, the Commission may, at its request and in view of the exceptional circumstances prevailing in that Member State, authorise a Member State, by means of implementing regulations, to derogate temporarily from the maximum permitted levels for certain food and feed consumed in its territory. These exceptions must be based on scientific evidence and duly justified by the circumstances prevailing in the Member State concerned, in particular social factors.

Annex 6: Referencevalues, general and operational criteria

The StrSchG 2020 and the IntV 2020 set the following reference values.

Reference value for the population

The reference level for public exposure in emergency situations is: 100 mSv effective dose per year. When optimising protection, priority shall be given to exposures above the reference level and optimisation shall continue below the reference level.

Reference values for emergency response forces

The reference level for occupational emergency exposure of emergency responders shall be:

- saving human lives 250 millisieverts effective dose;
- the prevention of an acute danger to persons or 100 millisieverts effective dose to prevent a significant increase in harm;
- the protection of material assets 20 millisieverts effective dose;
- the total lifetime dose of 250 millisieverts effective dose.

Reference value for helpers

The reference level for exposure of persons carrying out emergencyexposure measures but not emergency response workers shall be 20 millisieverts effective dose.

Reference value for urgently needed work:

The reference level for the exposure of persons performing urgent work in an emergency exposure situation is for:

- saving human lives 250 millisieverts effective dose;
- the acute protection of the population 20 millisieverts effective dose;
- other urgently needed work 10 millisievert effective dose.

According to StrSchG 2020 and IntV 2020, general and operational criteria for protective measures must be defined in the national emergency response plan.

General criteria for protective measures

The table below contains dose values for various protective measures and their calculation bases. In the event of an emergency exposure situation, these general criteria form the basis for the definition of protective measures.

Table 15: General criteria for protective measures

Protective measure	Population group	General. Criterion	Type of dose	Exposure pathways	Integration time respective exposure pathway	Integration time follow-up dose
Sheltering	Persons under 18 years of age and pregnant women	1 mSv	Effective expectation dose	Cloud radiation	2 days	70 years
-	-	-	-	Ground radiation	2 days	70 years
-	-	-	-	Inhalation	max. 2 days	70 years
-	Adults	10 mSv	Effective expectation dose	Cloud radiation	2 days	50 years
-	-	-	-	Ground radiation	2 days	50 years
-	-	-	-	Inhalation	2 days	50 years
ITB	Persons under 18 years of age and pregnant women	10 mSv	Expected thyroid dose	Inhalation	2 days	70 years

Protective measure	Population group	General. Criterion	Type of dose	Exposure pathways	Integration time respective exposure pathway	Integration time follow-up dose
-	Adults under 40 years of age and breastfeeding women	100 mSv	Expected thyroid dose	Inhalation	2 days	50 years
Evacuation	All population groups	50 mSv	Avoidable dose	Cloud radiation	2 days	50 years
-	-	-	-	Ground radiation	2 days	50 years
-	-	-	-	Inhalation	2 days	50 years
Temporary relocation	All population groups	30 mSv	Effective expectation dose	Soil radiation	1 month (30 days)	-
Permanent relocation	All population groups	100 mSv	Effective expectation dose	Ground radiation	1 year	-

In the case of temporary relocation and long-term relocation measures, realistic periods of stay outdoors and the effect of protective and remedial measures shall be taken into account when estimating the expected dose.

Source: BMK, Dept. V/8

Operational criteria for protective measures

In addition to the general criteria, the BMK must define operational criteria such as metrics and indicators of local conditions. They shall be taken into account when deciding on protective measures if the general criteria for protective measures are not applicable.[15]

Table 16: Operational criteria for protective measures

Precaution	Population	Ambient dose rate
Sheltering	Persons under 18 years of age, pregnant women	10 µSv/h
Sheltering	Adults	100 µSv/h
ITB	Persons under 18 years of age, pregnant women	Iodine concentration in ground-level air for **2 days 1,000 Bq**/m 3 corresponds to a time-integrated air concentration for iodine: **1.73E+08 Bqs/m**^{3}
ITB	Adults < 40 and breastfeeding	Iodine concentration in ground-level air for **2 days 10,000 Bq**/m 3 corresponds to a time-integrated air concentration for iodine: **1.73E+09 Bqs/m**^{3}
Evacuation	All population groups	1 000 µSv/h

Source: BMK, Dept. V/8

[15] At After the nuclear power plant accident in Fukushima, the extent of the release of radioactive substances (source term) could only be assessed after weeks.

Annex 7: Extract from the catalogue of protective measures

Annex 7 lists the protective measures in the event of large-scale contamination following a nuclear power plant accident from the 2022 catalogue of measures. Those protective measures that may have to be taken into account in the event of a nuclear weapon detonation at a greater distance from Austria are specifically indicated.

Intervention measures in the early warning phase

Table 17: Intervention measures Early warning phase

Intervention measure	In case of nuclear weapon detonation at a greater distance from Austria may be taken into account
Activation of emergency management (V01)	Yes
Regular provision of information to the public (V02)	Yes
Warning of the affected population (V03)	No
Preparation for sheltering(V04)	No
Preparation of ITB (Iodine Thyroid Blocking) (V05)	No
Prompt harvest of marketable products, especially of storable products (V06)	No
Closure of greenhouses (V07)	Yes
Sheltering of farm animals in stables (V08)	Yes
Closure of stables, forecourt extensions and covering of open fronts (V09)	Yes
Prevention of access to cisterns and water reservoir containers (V10)	Yes

Intervention measures in the contamination phase

Table 18: Intervention measures Contamination phase

Intervention measure	In case of nuclear weapon detonation at a greater distance from Austria may be taken into account
Regular public information (K01)	Yes
Alerting the affected population (K02)	No
Enhanced measurement and sampling programme (K03)	Yes
Sheltering (K04)	No
Iodine Thyroid Blocking (ITB) (K05)	No
Closure of windows and doors, shut-off of ventilation and air-conditioning systems (K06)	Yes
Recommendation not to consume contaminated food (from own supplies), particularly field-grown vegetables (K07)	Yes
Recommendation to keep out of (potentially) affected areas – access restriction (K08)	No
limitations on time spent outdoors, e.g. cancellation of outdoor events (K09)	No
Restriction on outdoor work (K10)	No
Use of personal protective equipment (PPE) during interventions and urgently required work (K11)	No
Recommendation of special hygiene procedures (K12)	Yes
Protection against outdoor skin contamination (K13)	Yes
Decontamination of individuals and pets prior to entering the home (K14)	Yes
Medical advice and psychosocial care (K15)	Yes
Travel recommendations & restrictions (K16)	Yes
Grazing ban for farm animals (K17)	Yes
Restrictions on the use of feedstuff (K18)	Yes
Restrictions on placing feedstuff on the market (K19)	Yes
No storage and use of contaminated water (K20)	Yes

Restrictions on placing food on the market (K21)	Yes

Intervention measures in the intermediate and late stages

Table 19: Intermediate and late stage intervention

Intervention measure	In case of nuclear weapon detonation at a greater distance from Austria may be taken into account
Review and verification of the intervention measures implemented in the warning and contamination phase (ZS01)	Yes
Regular provision of information to the public and provision of information to the affected population on the potential health risks and on the means available to reduce their exposure (ZS02)	Yes
Intensified sampling programme, monitoring of food and feedstuff, environmental monitoring (system to monitor radiation exposure, long-term monitoring) (ZS03)	Yes
Travel recommendations and restrictions (ZS04)	Yes
Avoidance or restriction of outdoor sports in more contaminated areas (ZS05)	No
Replacement of air filters in installations and vehicles (ZS06)	Yes
Protective measures in the case of intervention measures and urgently needed work (ZS07)	No
Restrictions on the use of feedstuff (ZS08)	Yes
Restrictions on placing feedstuff on the market (ZS09)	Yes
Preferential use of uncontaminated feedstuff in the final weeks before slaughter (ZS10)	Yes
Restrictions on the spreading of sewage sludge (ZS11)	Yes
Measures for the management of contaminated food and feedstuff of vegetable origin – in-situ management (ZS12)	Yes
Measures to avoid additional contamination by contaminated water (ZS13)	Yes
Bringing forward the time of farm animal slaughter (ZS14)	Yes

Delaying the harvest to allow for the decay of short-lived radionuclides (ZS15)	Yes
Storage of feed to allow for the decay of short-lived radionuclides (ZS16)	Yes
Management of contaminated food of animal origin: milk (ZS17)	Yes
Management of contaminated food of animal origin, especially meat (ZS18)	Yes
Adequate industrial processing of food to reduce contamination (ZS19)	Yes
Storage and preservation of food to allow for the decay of short-lived radionuclides (ZS20)	Yes
Treatment of food in the household (ZS21)	Yes
Decontamination measures ofsoil, grassland and plants (ZS22)	No
Decontamination measures in buildings (ZS23)	No
Decontamination measures for indoor surfaces and objects in buildings (ZS24)	No
Decontamination measures in streets and squares (ZS25)	Yes
Decontamination measures in children's playgrounds (ZS26)	Yes
Protective measures for the management of contaminated waste and sewage sludge (ZS27)	No
Transport and incineration of sewage sludge in in waste incineration plants (ZS28)	Yes
Treatment of contaminated air filters (ZS29)	Yes
Registration, health screening and long-term medical surveillance (ZS30)	No

Many intervention measures – especially in the early warning phase (until the arrival of the radioactively contaminated air masses in Austria) – are communicated to the population via television and radio. Corresponding speech text templates have been developed and are available at the BMK.

According to StrSchG 2020, the Federal Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology must issue ordinances for individual intervention measures to ensure the implementation of protective measures. These regulations shall be promulgated by appropriate means, such as on radio or television, and shall enter into force immediately after their promulgation. They shall be repealed when the protective

measures in question are no longer necessary. Model regulations are being drawn up and will become part of the catalogue of measures.

With regard to the protective measures in the event of the use of nuclear weapons, there are also the following comments:

- In the case of the detonation of a tactical nuclear weapon at a greater distance from Austria, the protective measures "sheltering " and "ITB" are not required in Austria.
- The siren warning and alarm system is therefore not triggered. The population is warned and informed directly via ORF (television, radio, Internet).
- From a radiological point of view, shelters/bunkers are neither necessary in the event of serious nuclear power plant accidents near the border nor in the case of the use of nuclear weapons at a greater distance from Austria and are therefore not part of the Austrian catalogue of measures.

Annex 8: Criteria for ending an emergency exposure situation

On the basis of the IAEA document: "Arrangements for the Termination of a Nuclear or Radio-logical Emergency" [IAEA, GSG 11], the following criteria for the termination of an emergency exposure situation and the transition to an existing exposure situation were developed:

- All necessary protective measures in a radiological emergency have already been carried out.
- The situation is stable:
  - no further significant releases of radioactive substances are expected.

- The radiological situation is essentially recorded:
  - the main exposure pathways were identified and dose assessment for those affected (including critical population groups) were carried out; and
  - the effects on the expected dose for the population of a lifting of protective measures can be assessed.

- A risk analysis of the current situation and its further development is available (including further possible protective measures in the event of deterioration of the situation).
- The reference values for a planned exposure situation of workers (20 mSv effective dose) during the clean-up work can be met or undercut.
- The assessed remaining dose for the affected population is below the specified reference values for an existing exposure situation (20 mSv effective dose per year) following a radiological emergency.
- The non-radiological effects of the radiological emergency (e.g. psychological, economic, social) relevant to the termination of the radiological emergency were collected and taken into account.
- A registration of those affected who require further medical examinations or care (medical follow-up) is available.
- A strategy for the management of (partly radioactive) waste has been developed.
- A discussion with and involvement of stakeholders has taken place.
- The public was informed on the following topics:
  - decision-making bases for the termination of the radiological emergency,
  - adaptation or removal of protective measures,
  - introduction of new protective measures,

- adaptation of behaviour in affected areas (if necessary),
- long-term monitoring of the environment and the dose of those affected, and
- Health impact assessment.

Annex 9: Resources of the Austrian Armed Forces for assistance in radiological emergencies

(as of October 2019) (not intended for publication)

Technical Annex

Categorisation of nuclear weapons, assessment of the probability of use

Nuclear weapons

- Yield > 150 kt, intercontinental ranges > 5,500 km.
- These serve primarily as a nuclear deterrent.
- The use of these weapons is considered very unlikely, as this would immediately trigger a corresponding reaction from the other side.

Tactical nuclear weapons

- Yield < 150 kt Operating distances < 5,500 km
- Type/ranges: Intermediate range: 1,000 – 5,500 km, tactical nuclear weapons: < 500 km range, mini-nukes (yield < 5 kt)
- Tactical nuclear weapons could be used to gain a military advantage (when conventional weapons are no longer sufficient) or as a warning.
- The use of tactical nuclear weapons is judged to be more likely than the use of strategic nuclear weapons.

The assessment of the probability of the use of nuclear weapons was carried out within the framework of a working group with experts from the BMLV (CBRN Defence Centre), BMK (Radiation Protection Division), GSA and AGES.

Detonation heights and radioactive substances

The detonation levels have a major influence on the composition of the radioactive substances that are released.

- Ground-level detonation: In a ground-level detonation, large amounts of soil material, e.g. soil or concrete, sucked into the "nuclear mushroom", partially evaporated and activated by the radiation. The activation products of the soil material mainly form larger radioactive particles (> 250 µm to a few mm), which precipitate mainly in the vicinity of the detonation site as local fallout and cause the high external radiation exposure at short-range. The larger radioactive particles usually contain short-lived

activation products. However, fission products from nuclear fission can also adhere to the surface.

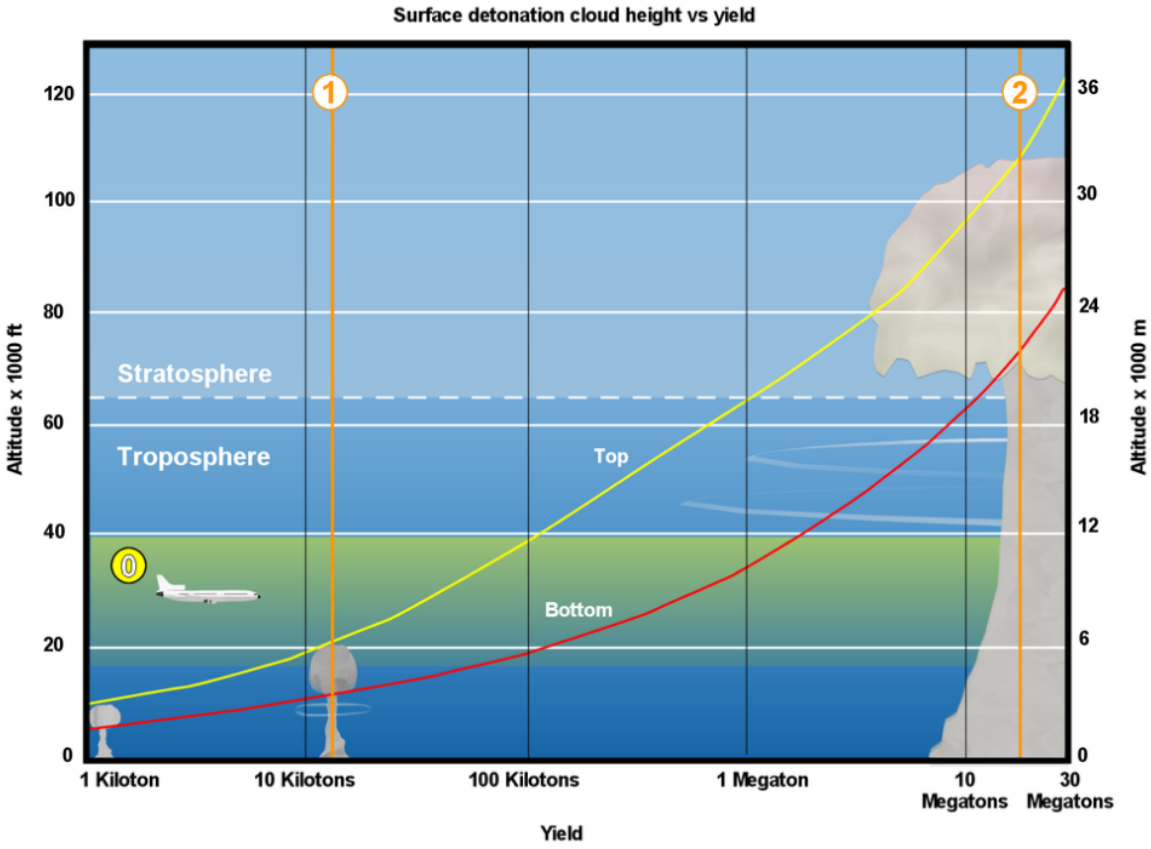
- Air detonation: Since no ground material is included in the detonation, predominantly small particles (a few µm to 20 µm) are produced, which can also be transported over longer distances into the long range. Fission products from nuclear fission dominate. Activation products of the soil material are not present.

Note on the detonation of a strategic nuclear weapon at high altitude: There are hardly any ground-level effects from the radioactive substances released. However, depending on the detonation altitude, a nuclear electromagnetic pulse (NEMP) can cause damage to power lines and electronics up to several 100 km away and lead to a blackout.

For more background information, see [Glassstone and Dolan, 1977] and [ZAMG].

Release heights as a function of the yield in ground-level detonations

Figure 12: Relationship between release levels (height of the "mushroom") and the power of the nuclear weapon



Source: https://en.wikipedia.org/wiki/Effects_of_nuclear_explosions, https://commons.wikimedia.org/wiki/File:Nukecloud.png

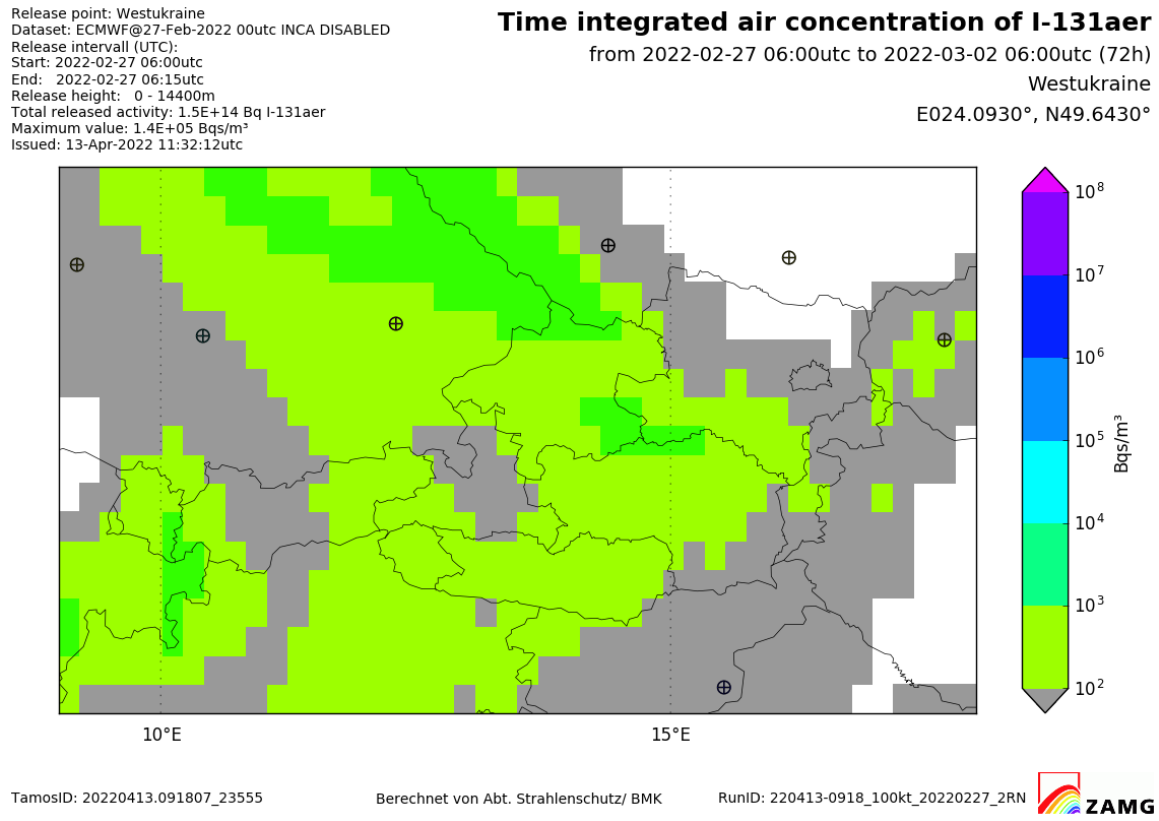
Comments on the figure: 1000 ft corresponds to approx. 305 m. 1 = Fat Man 22.5 kt, 2 = Castle Bravo 15 Mt, 0 typical altitude in civil aviation. The magnitudes of the release heights in the figure are consistent with the more precise calculations. See [Glassstone and Dolan, 1977] and [ZAMG].

Results of the Szenary calculations for the long range

The following results were calculated by the Radiation Protection Department using the TAMOS system.

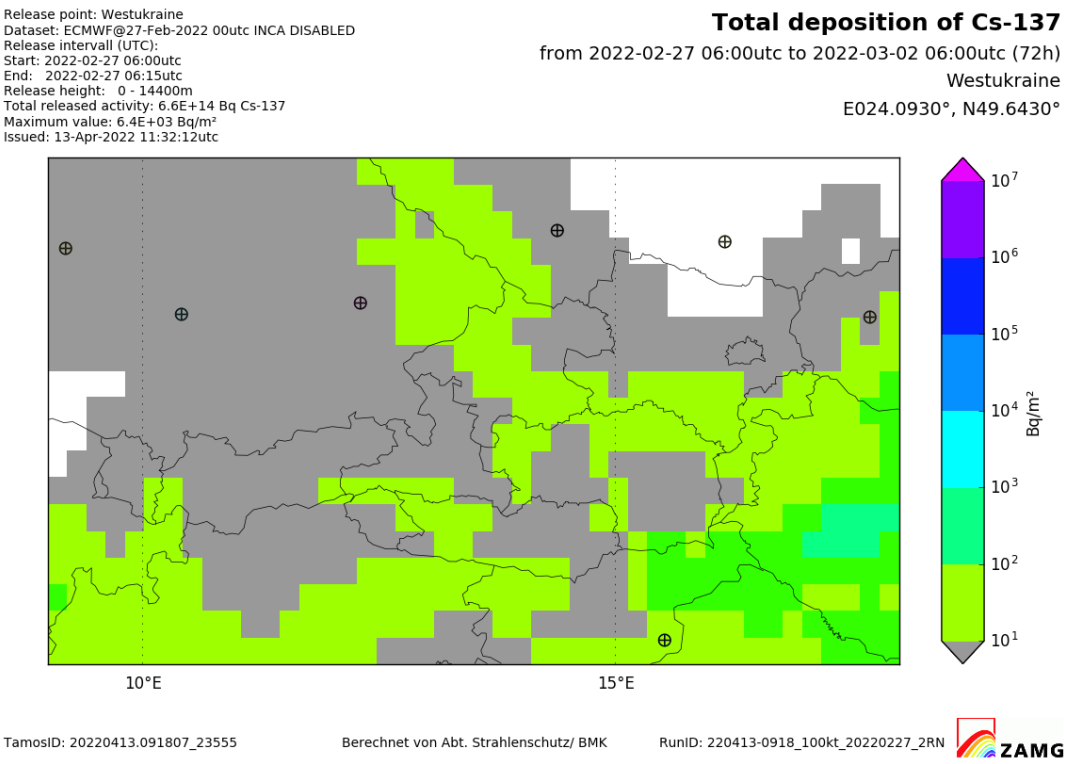
Scenario 27 February to 2 March 2022, nucleardetonation 100 kt, close to the ground

Figure 13: Time-integrated air concentration of iodine-131 in ground-level air (Bqs/m^3)



Source: BMK, Dept. V/8

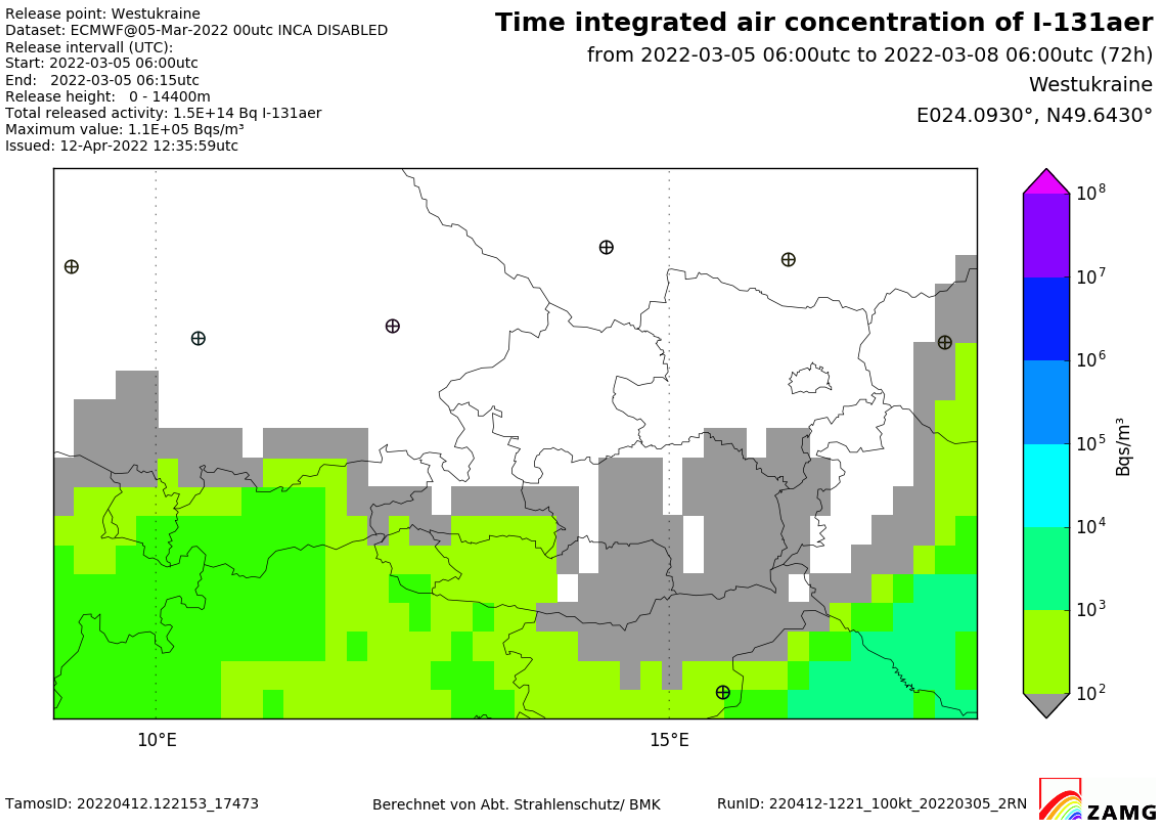
Figure 14: Total deposition (dry and wet) of cesium-137 at soil (Bq/m^2)



Source: BMK, Dept. V/8

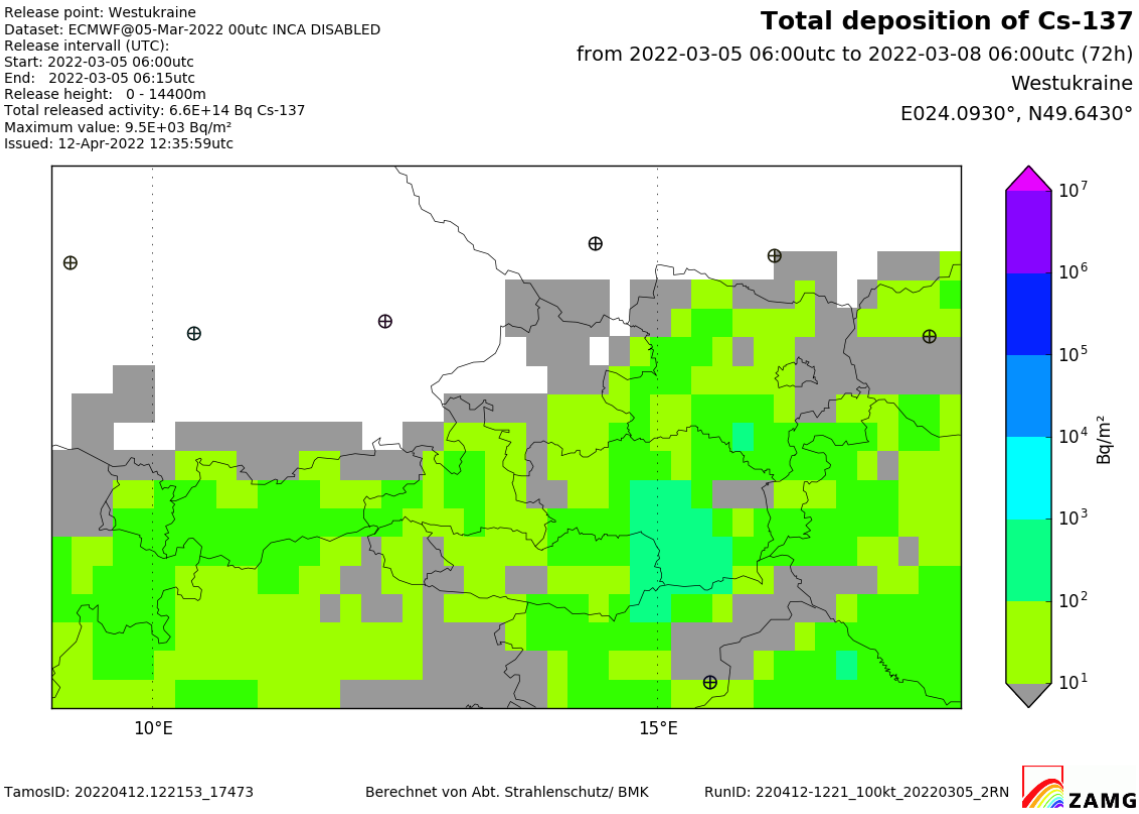
Scenario 5 to 8 March 2022, nuclear detonation 100 kt, close to the ground

Figure 15: Time-integrated air concentration of iodine-131 in ground-level air (Bqs/m^3)



Source: BMK, Dept. V/8

Figure 16: Total deposition (dry and wet) of cesium-137 at the soil (Bq/m^2)



Source: BMK, Dept. V/8

Estimation of radioactive substances in food and feed

With OECOSYS, the Department of Radiation Protection assessed the expected concentrations for the most important radioactive substances in food and feed. As OECOSYS input, the highest values for the time-integrated air concentration and the total deposition of the TAMOS calculations in Austria were used.

Table 20: Results for scenario 1 - TAMOS calculation 27 February - 2 March 2022, with precipitation, nuclear weapon detonation 100 kt, close to the ground

Radioactive substance (nuclide)	Half-time	Time-integrated activity in air (Bqs/m^3)	Total disposition on the ground (Bq/m^2)
Sr-90	28.8 years	1.0 E+4	1.0 E+3
Zr-95	64.02 days	1.0 E+4	1.0 E+3
Mon-99	65.94 hours	1.0 E+8	1.0 E+7
Ru-103	39.26 days	1.0 E+7	1.0 E+6
Ru-106	373.59 days	1.0 E+5	1.0 E+4
I-131	8.02 days	1.0 E+4	1.0 E+3
I-133	20.8 hours	1.0 E+7	1.0 E+6
Cs-137	30.07 years	1.0 E+4	1.0 E+3
Ba-140	12.75 days	1.0 E+7	1.0 E+6
CE-144	284.89 days	1.0 E+6	1.0 E+5

Source: BMK, Dept. V/8

Table 21: Results for scenario 2 - TAMOS calculation 5 - 8 March 2022, without precipitation, nuclear weapon detonation 100 kt, close to the ground

Radioactive substance (nuclide)	Half-life	Time-integrated activity in air (Bqs/m^3)	Total disposition on the ground (Bq/m^2)
Sr-90	28.8 years	1.0 E+4	1.0 E+2
Zr-95	64.02 days	1.0 E+4	1.0 E+2
Mon-99	65.94 hours	1.0 E+7	1.0 E+5
Ru-103	39.26 days	1.0 E+6	1.0 E+4
Ru-106	373.59 days	1.0 E+4	1.0 E+2
I-131	8.02 days	1.0 E+4	1.0 E+2
I-133	20.8 hours	1.0 E+6	1.0 E+4
Cs-137	30.07 years	1.0 E+4	1.0 E+2
Ba-140	12.75 days	1.0 E+7	1.0 E+5
CE-144	284.89 days	1.0 E+5	1.0 E+3

Source: BMK, Dept. V/8

As the two tables show, the total disposition depends on precipitation. The assessment of the concentrations also depend on the season (growth period of the plants).

Based on the radionuclide concentrations (air and deposition) in the tables above, OECOSYS calculations were also carried out for different seasons.

In the worst case, in summer, scenario 1 may exceed the EC maximum food levels for individual radioactive substances (e.g. Ru-103) and individual foods (e.g. leafy vegetables).

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