Radiological Protection
NEA/CRPPH/R(2013)4
July 2013
www.oecd-nea.org

International Short-term Countermeasures Survey

2012 Update

OECD
BETTER POLICIES FOR BETTER LIVES

NEA
NUCLEAR ENERGY AGENCY

Unclassified **NEA/CRPPH/R(2013)4**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **30-Aug-2013**

English - Or. English

Nuclear Energy Agency

NEA/CRPPH/R(2013)4
Unclassified

Committee on Radiation Protection and Public Health

International Short-Term Countermeasures Survey 2012 Update

Halil Burcin OKYAR (halilburcin.okyar@oecd.org)
NEA, RP

JT03343814

Complete document available on OLIS in its original format

English - Or. English

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 34 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Republic of Korea, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1 February 1958. Current NEA membership consists of 31 countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, the Republic of Korea, the Russian Federation, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

FOREWORD

The Working Party on Nuclear Emergency Matters (WPNEM) of the CRPPH has contributed to the field of emergency planning and preparedness, and emergency management with its programme of work to improve nuclear emergency management systems within the NEA member states, and to share its knowledge and experience widely. Within this framework, WPNEM activities focus on identified needs in planning, preparedness and response for the "early" and "intermediate" phases of a nuclear/radiological emergency. The 2003 NEA report *Short-Term Countermeasures in Case of a Nuclear or Radiological Emergency* presents the results of relevant activities and survey findings in order to establish an overview of short-term countermeasures used at that time. Although much improvement in these areas has been made since the Chernobyl accident in 1986, governments continue to strive to test and update their programmes, and to find better methods for the practical implementation of countermeasures in case of an accident.

National practices regarding short-term countermeasures have subsequently evolved, thus inciting the WPNEM to modify and redistribute the questionnaire in February 2012 with the aim of preparing an updated overview of these practices to re-evaluate the country approaches in light of the early Fukushima Dai-ichi NPP accident lessons learnt.

During the 34th meeting of the WPNEM, a proposal to update the above-mentioned NEA report on *Short-Term Countermeasures in Case of a Nuclear or Radiological Emergency* was discussed by exploring the current approaches of the member states with a new survey. The UK delegate of the WPNEM was asked to review and prepare a new questionnaire with necessary updates in collaboration with the Secretariat. The proposal was reviewed and approved by the WPNEM.

The resulting questionnaire includes nine sections to explore the different aspects, covering the following topics: member information, general objectives and criteria, national organisation, emergency planning zones, emergency plans, implementation of short-term countermeasures, information for the public, countermeasures for special groups, and harmonisation. It is aimed at comparing countries' current approach to nuclear emergency planning, and excludes proposed arrangements for new build.

The WPNEM received completed questionnaires from 20 countries: Austria, Canada, Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Republic of Korea, the Netherlands, Poland, Romania, Slovak Republic, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

Grant Ingham evaluated the completed questionnaires and prepared a draft report. His report was further elaborated and finalised by the NEA Working Party on Nuclear Emergency Matters, the results of which are reproduced herein.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Nuclear emergency planning, preparedness, response, and management, in general, are essential elements of any country's nuclear power programme. Part of nuclear emergency planning and preparedness is the implementation of national emergency plans, including detailed procedures for the implementation of short-term countermeasures, before during, and after the release of radioactive substances.

The timely and appropriate implementation of short-term countermeasures, such as sheltering, evacuation, and iodine prophylaxis, can, in case of a nuclear emergency with a release of radioactive material, considerably reduce the doses to the public in the vicinity of the nuclear installation.

Although international guidelines exist, national procedures and practices may differ due to different national habits, cultural specificity, and societal needs. Different national procedures and practices may, however, in the case of a radioactive release affecting two neighbouring countries, lead to different decisions in the implementation of countermeasures.

In order to better understand existing approaches and to facilitate the comparison of national practices, the NEA decided to launch a questionnaire on current practices regarding short-term countermeasures, updating a similar survey performed in 1994 and 2003, as countries' practices have since evolved and been modified. In 2012, it was decided to re-evaluate the country approaches in light of the early lessons learnt from the Fukushima Dai-ichi NPP accident.

The information collected may be used to understand the basis for decisions in various countries, and, if deemed appropriate, as a basis for international harmonisation. This may also assist member countries to explain to the public affected by an emergency why the decisions in neighbouring countries may vary.

This report summarises the information given by member countries and includes nine sections to explore the different aspects, covering the following topics: member information, general objectives and criteria, national organisation, emergency planning zones, emergency plans, implementation of short-term countermeasures, information for the public, countermeasures for special groups, and harmonisation. It is aimed at comparing countries' current approach to nuclear emergency planning, and excludes proposed arrangements for new build.

In February 2012, a questionnaire was sent to NEA members to gather information on the countermeasure provisions in place. Data was obtained from 20 countries (listed in Appendix A) and this report presents the findings from this survey. The full questionnaire can be found in Appendix B.

1. NEA MEMBER INFORMATION

1.1 What types of nuclear facilities/applications are located/conducted within your country?

All countries except Ireland reported some form of nuclear facility, with the majority having a range of different types of facility. France and the United Kingdom show the greatest diversity of nuclear facilities.

Figure 1.1: Types of nuclear facilities

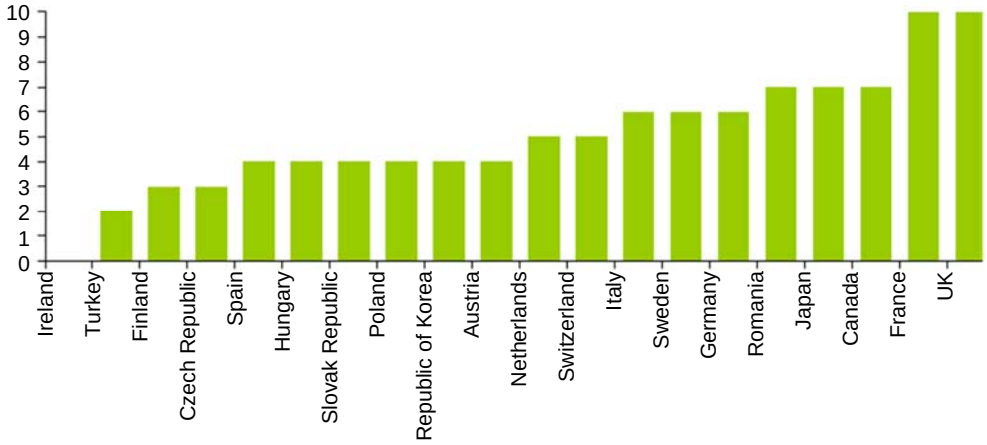
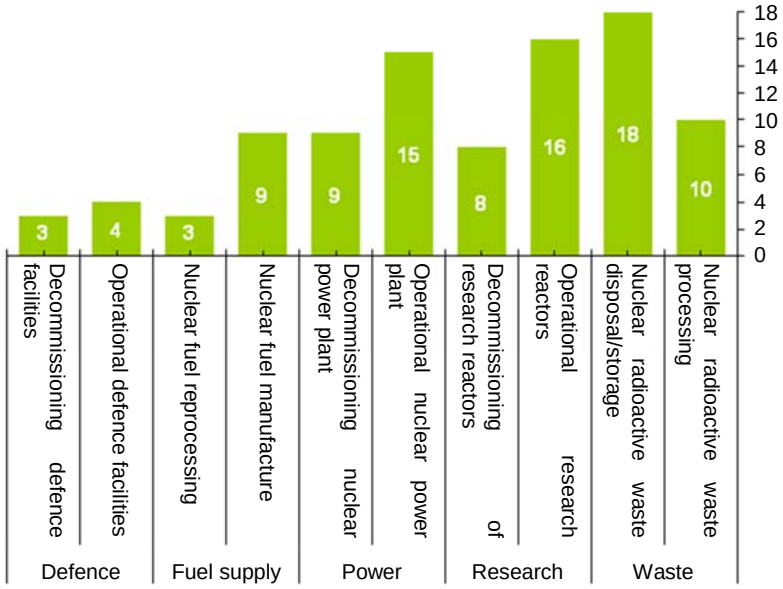


Figure 1.2: Types of facilities/practices



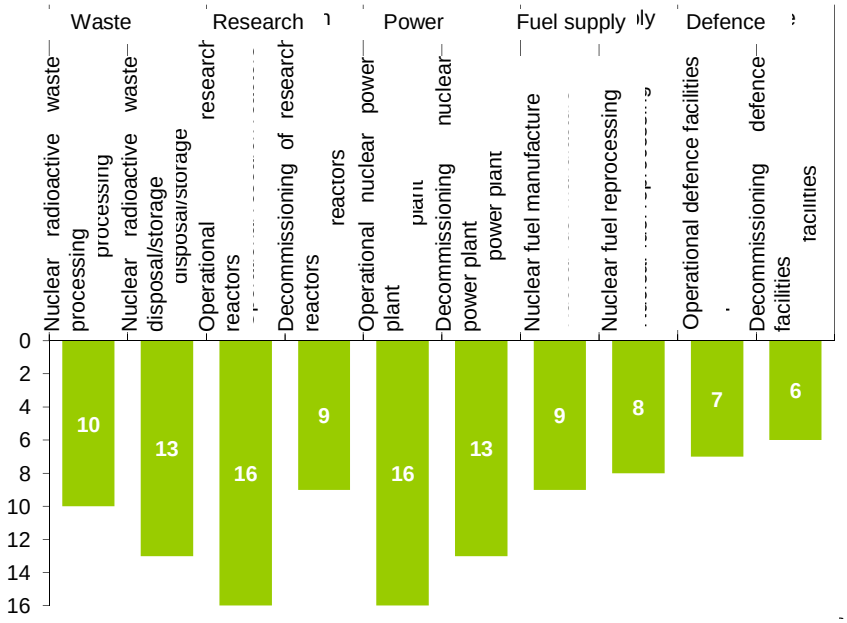
The most common types of facility were waste disposal/storage, operational research reactors, and operational power plants. Fifteen (15) countries have operational nuclear power plants, and 9 of these also have decommissioning power plants. Nine (9) countries have facilities involved in nuclear fuel manufacture, 3 of which also have reprocessing facilities. Sixteen (16) countries have operational research reactors, 8 of which also report decommissioned research reactors. Only 4 countries report operational defence facilities, and 3 of these also have decommissioned defence facilities. Ten (10) countries have facilities involved in nuclear waste processing, all of these, and an additional 18 countries have disposal or storage facilities.

1.2 What type of facilities/applications are located within your neighbouring countries?

When asked about nuclear facilities in neighbouring countries, most submissions reported operational power plants (16) and research reactors (16), with slightly fewer reporting waste disposal and storage sites. Decommissioning power plants in neighbouring countries were reported in 13 submissions.

Sweden, Canada, Switzerland, and the UK reported the greatest diversity of nuclear facilities in neighbouring countries. While there are no nuclear facilities in Ireland they reported a wide range in neighbouring countries.

Figure 1.3: Types of facilities/applications (located within neighbouring countries)

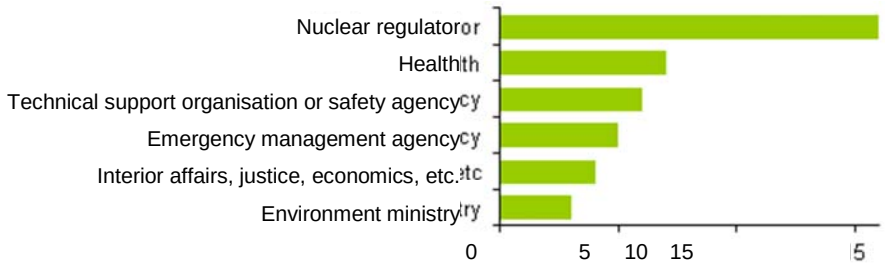


1.3 What organisations (type and jurisdictional level) were involved in completing this questionnaire?

The nuclear regulator was involved in completing the questionnaire for all countries.

In many cases other key government departments such as health, environment, or emergency management agencies contributed to the response. In some countries the technical nuclear agencies provided expertise where required, with submissions from Ireland and the Republic of Korea completed solely by these agencies.

Figure 1.4: Organisations involved in completing this questionnaire



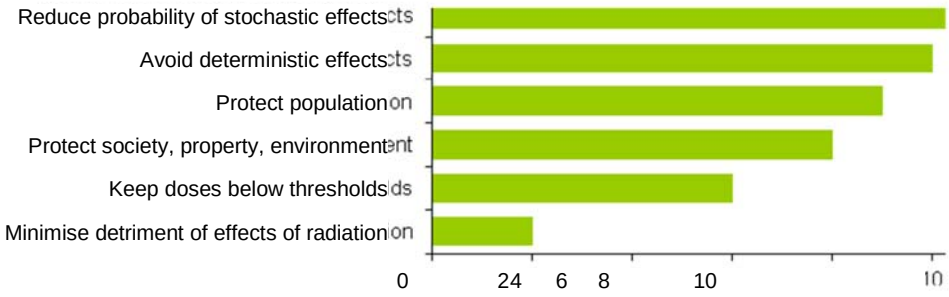
2. GENERAL OBJECTIVES AND CRITERIA FOR SHORT-TERM COUNTERMEASURES

2.1 What are the objectives of implementing short-term countermeasures in the case of a nuclear emergency?

For most countries, the key objectives when implementing countermeasures are reducing the probability of stochastic effects, avoiding deterministic effects, and generally protecting the population.

Several countries noted that the benefits of preventing harm from radiation must be balanced against potential detrimental effects from the countermeasures themselves.

Figure 2.1: The objectives of implementing short-term countermeasures in the case of a nuclear emergency



2.2 Describe the urgent countermeasures for the general public which are planned in your country to protect the public, agriculture, food manufacturing?

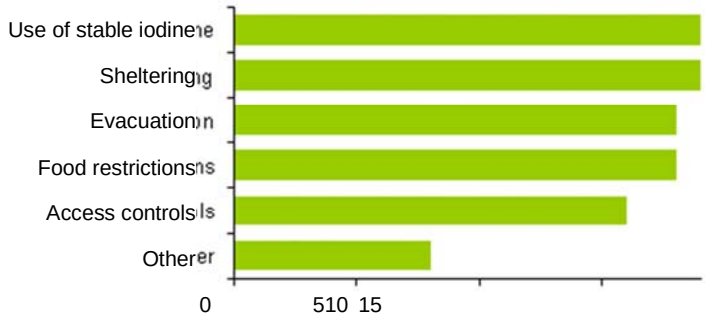
2.2.1 Near field accidents

Most countries plan to use stable iodine, sheltering, evacuation, access controls, and food restrictions in the case of a near field accident. Some countries described additional measures in the "Other" field; these included instructions to farmers, decontamination, temporary relocation or permanent settlement, partial sheltering, traffic restrictions, and activation of centres for radiological control/decontamination.

Stable iodine is pre-distributed up to 15 km around power plants in Sweden, 20 km in Switzerland, and in predefined planning zones in Hungary and in the Slovak Republic. Poland advises consumption of stable iodine if doses are expected to exceed defined levels, as does Canada, where the level is 100 mSv.

In Switzerland, sheltering is advised up to 20 km around the incident, Hungary will advise sheltering within predefined planning zones. Poland advises sheltering where doses are expected to exceed predefined levels, as does Canada, where the levels are set at 1 to 10 mSv.

Figure 2.2: Urgent countermeasures which are planned to protect the general public from near field accidents



Evacuation is foreseen as a potential countermeasure in Switzerland; however, no specific plans are in place. Hungary will advise evacuation within predefined planning zones. Poland advises evacuation where doses are expected to exceed predefined levels, as does Canada where the levels are set at 10 to 100 mSv.

The Netherlands includes access restrictions in emergency plans, but has no specific implementation measures in place. Switzerland plans access controls for a 4 km radius, whereas Poland specifies a dose rate level of 100 μSv/h for the implementation of access controls.

Food producers in Switzerland and Poland are expected to comply with legal dose limits; Hungary imposes 300 km food restriction zones around power plants, 3 km around spent fuel storage and 1 km around research reactors. Canada specified protective action levels between 1 and 1 000 Bq per kg for foodstuffs, infant food, milk, and water, depending on the specific radionuclide involved.

Sweden provides instructions to farmers within 50 km, and Switzerland restricts harvesting and grazing in the plume direction up to the national border. Hungary also restricts harvesting and grazing, and further provides advice to the general public on washing produce. The Netherlands and the UK have decontamination plans in place, whereas the Republic of Korea foresees temporary relocation or permanent resettlement as a potential response. Spain foresees evacuation, sheltering, use of stable iodine, food/water restriction, and also access control, whereas Italy has an off-site emergency plan to implement urgent countermeasures including sheltering and use of stable iodine only for the research reactors.

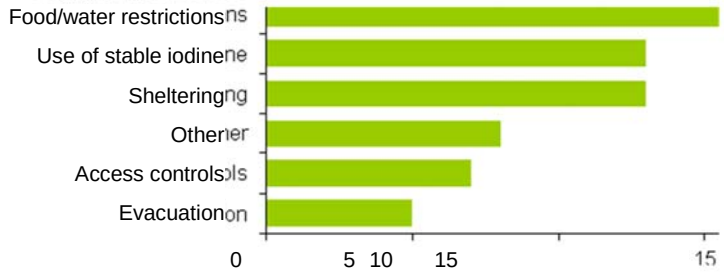
2.2.2 Far field accidents

Countries are more likely to have planned food and water restrictions in the case of a far field accident, although many still do not rule out use of iodine and sheltering. Evacuation is much less likely but still considered. “Other” countermeasures considered in the case of a far field accident include instructions to farmers, restrictions on traffic, transport and trade, and decontamination.

Poland, Canada, and Hungary use the same criteria for applying food and water restrictions as in a near field accident, and Austria works within EC limits.

Neither sheltering nor use of stable iodine is explicitly planned for far field accidents in Hungary, Sweden, and Switzerland. Spain foresees evacuation, sheltering, use of stable iodine, and food/water restriction for far field accidents. Iodine is not pre-distributed for far field accidents but stocks are available for use if doses are expected to exceed defined levels.

Figure 2.3: Urgent countermeasures which are planned to protect the general public from far field accidents



Switzerland, Austria, Finland and Hungary will all provide advice to farmers, and Sweden will do the same for farmers within 50 km of an incident. Turkey, Switzerland, Germany, and Hungary would implement traffic, trade, and travel restrictions. Finland would advise partial sheltering, while the UK and Austria would provide decontamination facilities.

Sweden has no specific plans for access controls in a far field accident, although recognises this may be required in extreme circumstances. Poland would exercise access controls if exposure levels were likely to exceed 100 μSv/h.

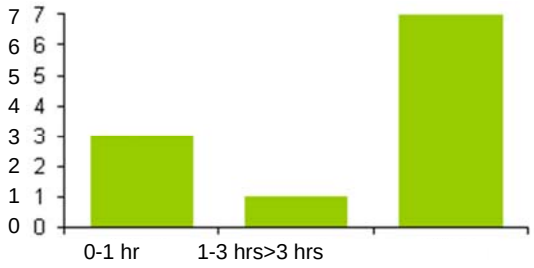
Evacuation is considered up to 50 km in emergency plans in Sweden, and is possible in Poland if doses are predicted to exceed defined levels, but many countries do not anticipate using evacuation as a countermeasure in the event of a far field incident.

2.3 What intervention levels and operational intervention criteria are used to initiate countermeasures, and how quickly should they be implemented?

Intervention levels for evacuation vary by country, from 10 to 500 mSv. Many countries give a range within which evacuation would be considered, depending on the situation. Canada considers evacuation in a range of 10-100 mSv; above 100 mSv evacuation is mandatory. UK and Romania define a range of 30-300 mSv. Spain, the Republic of Korea and Turkey state intervention levels of 50 mSv, as do France, Sweden, Ireland, and Hungary. Ireland, Hungary, and Sweden specify that this is within seven days, while France specifies that this is calculated using the duration of the release or by default over 24 hours. Intervention levels for evacuation in the Slovak Republic range from 50-500 mSv over seven days. The Czech Republic, Germany, and Japan use intervention levels of 100 mSv for evacuation. Poland and Switzerland also use 100 mSv, but Poland specifies within seven days, and Switzerland within two days. The Netherlands specifies intervention levels of 200 mSv within two days. Italy specifies an intervention level for evacuation from a few tens to a few hundred avertable effective doses, following the adoption of the specific measure, where the lower values represent the level below which the adoption of the countermeasure is not considered justified, and the upper one indicates the level above which the activation of the countermeasure should be guaranteed.

Sweden, Poland, Slovak Republic, Spain, Italy, and Switzerland do not define operational intervention criteria for evacuation, while in the UK it varies between sites. Romania, the Republic of Korea, Japan, Turkey, and Hungary set their operational intervention criteria for evacuation at 1 mSv/h, whilst Finland works with 20 mSv over 1 week. Other countries use a variety of factors in setting operational intervention levels; Canada uses real-time modelling data; France considers the time of day, weather conditions, and duration of release; Germany uses release data, contamination readings and dose rates; and the Czech Republic uses the averted effective dose in setting operational intervention levels for evacuation.

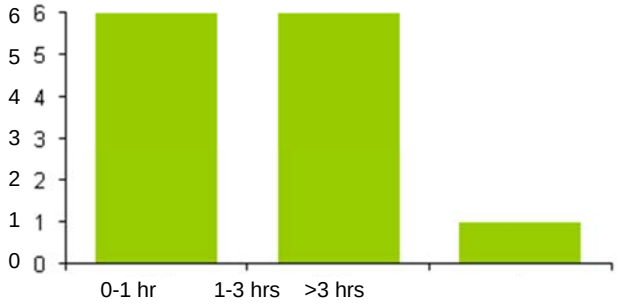
2.4: Time to implement evacuation



The UK, Finland, and Poland plan to implement evacuation as soon as possible, and Germany would like to implement significantly before a release. Japan and Ireland plan to implement within the first hour of an emergency, and the Republic of Korea 1-3 hours into an emergency. Spain, Sweden, Romania, Canada, Turkey, Switzerland, and the Czech Republic would all implement evacuation over three hours into an emergency.

Intervention levels for sheltering were expressed by some countries in terms of effective dose, and by others in terms of equivalent dose, however the Republic of Korea, Turkey, Germany, and the Czech Republic all stated intervention levels of 10 mSv but did not specify which measure. Japan gave levels of 100 mSv, the UK 3-30 mSv, Canada 1-10 mSv, and Sweden specified 10 mSv over two days. The Netherlands and Poland stated intervention levels of 10 mSv effective doses over two days, while Spain and France gave levels of 10 mSv effective dose, with France stating that effective dose is calculated using the duration of the release or by default over 24 hours. Ireland and Hungary stated intervention levels for sheltering of 10 mSv averted dose over two days. The Slovak Republic uses a range of 5-50 mSv averted dose over two days, while Romania gave ranges of 3-30 mSv effective dose, and 30-300 mSv equivalent dose. Austria and Switzerland specify effective doses of 1 mSv for children (and pregnant women) and 10 mSv for adults over seven days.

Figure 2.5: Time to implement sheltering



Sweden, the Slovak Republic, Poland, Japan, and Switzerland do not define operational intervention criteria for sheltering. Criteria differ by site in the UK, whereas Germany and Canada would use monitoring data to make decisions in the event of an emergency. The Czech Republic relies on the averted effective dose, but does not advise sheltering for longer than two days. The Republic of Korea and Turkey set levels of 0.1 mSv/h, Romania 1 mSv/h and Finland 10 mSv over two days.

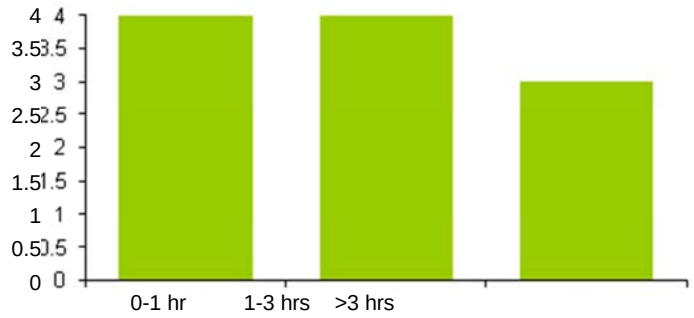
Most countries see sheltering as a slightly earlier countermeasure than evacuation, with the UK, Finland, and Poland implementing as soon as possible. The Slovak Republic, Japan, Switzerland, Ireland, and the Czech Republic would all implement sheltering (in houses) in the first hour of an emergency, whereas Canada, Sweden, Romania, the

Republic of Korea, Turkey, and Austria would implement between 1-3 hours. France would implement in the first hour if in the reflex phase, and at later points if ordered by the Prefect (the national government representative in the region).

Most countries consider thyroid dose when setting intervention levels for the use of stable iodine: Sweden, Poland, Hungary, and the Republic of Korea use criteria of 100 mGy, whereas Austria specifies 10 mGy for children, 100 mGy for adults, and 500 mGy for those aged 40+. The UK and Romania use a range from 30-300 mSv thyroid dose, and the Slovak Republic 50-500 mSv. Japan, France, Spain, Switzerland, and Ireland use 50 mSv, while Germany sets limits at 50 mSv for children and 100 mSv for adults. The Czech Republic, Turkey, and Canada set levels at 100 mSv, whilst the Netherlands uses 100 mSv for children and 1 000 mSv for adults.

Sweden, the Slovak Republic, Poland, Japan, and Switzerland do not define operational intervention criteria for stable iodine. Romania, the Republic of Korea, and Hungary use 0.1 mSv/h, whereas Turkey uses 1 mSv/h. Finland uses projected doses of 10 mSv for children and 100 mSv for adults, Germany and the Czech Republic intend to use monitoring data to aid decision making, and levels vary by site in the UK.

Figure 2.6: Time to implement administration of stable iodine



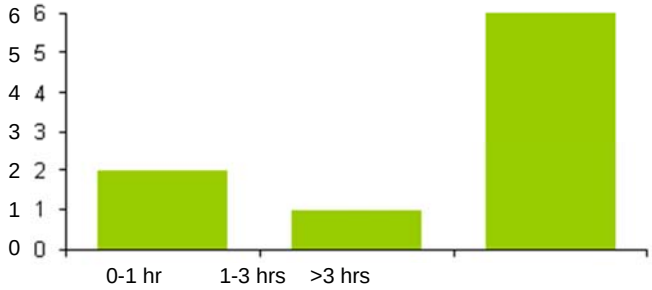
Poland, Finland, and the UK would advise people to take stable iodine as soon as possible in an emergency. The Slovak Republic, Japan, and the Czech Republic would implement within the first hour as a preventative measure, while in France iodine can be implemented following the reflex phase if ordered by the Prefect. Switzerland implements within an hour in the planning zones, but over 3 hours outside of planning zones. Ireland, Austria, Sweden, and the Republic of Korea anticipate implementing stable iodine regimes within 1-3 hours of an emergency. Canada, Romania, Spain, and Turkey would implement over 3 hours after the emergency has begun.

Spain, Sweden, Netherlands, Germany, Poland, Austria, Italy, Ireland, and the UK use intervention levels defined at the EU level for food and water restrictions. Switzerland has no dose criteria, and Turkey will judge whether restrictions are necessary based on contamination levels. Romania uses criteria of 5 mSv committed effective dose over a year and the Slovak Republic uses a range of 5-50 mSv per year. The Czech Republic uses 10 mSv, Japan 100 mSv, and Canada has a range between 1-1 000 Bq per kg depending on the radionuclide.

Sweden and the Slovak Republic do not have defined operational intervention levels for food and water restrictions. The UK and Ireland comply with EU advice, and Canada plans to use monitoring data in decision making. Turkey sets levels of 0.1 mSv/h, Romania, the Republic of Korea, and Japan use 1 μSv/h, and Finland uses 10 μSv/h.

Food and water restrictions are implemented later in an emergency than other countermeasures. Only Sweden and Switzerland would implement in the first hour. The UK would implement at 1-3 hours with the rest of the respondents stating they would implement after 3 hours.

Figure 2.7: Time to implement food/water restrictions



2.4 What criteria are used for ending countermeasures?

Germany, Hungary, Italy, and Japan have no specified criteria in place for ending countermeasures. Austria ends countermeasures based on intervention levels, and the Netherlands has no specific policy, ending countermeasures depending on individual situations, although intervention level for relocation and return is 50-250 mSv effective dose (50 years). New legislation in Spain, which is under preparation, intends to establish a criteria and new legislation in Switzerland gives power for ending countermeasures to a crisis management board. Other countries provided specific comments:

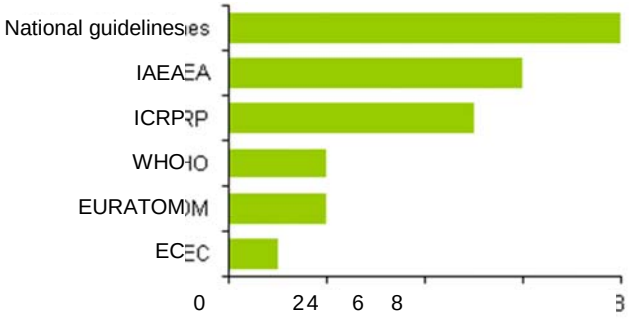
- *Evacuation* – Hungary states there are no defined criteria in their plans for ending evacuation. Turkey and the Czech Republic would end evacuation when the level of doses dropped below intervention levels, but did not specify the doses. Sweden, Finland and Poland would end evacuation when monthly doses drop below 10 mSv, although Finland adds that the dose should be expected to decrease rapidly, and that total annual residual dose should remain below 20 mSv. The Slovak Republic has thresholds of 30 mSv within the first month and 10 mSv in subsequent months, while Romania uses dose criteria between 20 and 100 mSv per year, scaled for one month. The Republic of Korea, France, Canada, Ireland, and the UK base their decision to end evacuation on a combination of measures – the end of releases, stability of the facility, and monitoring readings below intervention levels. Residual contamination levels are considered in the UK, and public acceptance levels are important in the Republic of Korea.
- *Sheltering* – Hungary and Romania set a maximum timescale of two days for sheltering, while the Czech Republic, Ireland, and Turkey end sheltering when measurements are below intervention levels. Finland ends sheltering based on dose criteria of 10 mSv per month, Poland uses criteria of 10 mSv over the following two days, and the Slovak Republic works with 30 mSv in the first month and 10 mSv after that. France, Canada, the Republic of Korea and the UK end sheltering based on the end of releases, stability, contamination, and other practical considerations.
- *Stable iodine* – Sweden, Finland, Ireland, the Czech Republic, and the UK would only advise one dose of stable iodine, and if a second became necessary would consider evacuation instead. France and Romania have no defined criteria for a second dose, Turkey and Canada use operational intervention levels, and Poland uses a thyroid dose criterion of less than 100 mGy.
- *Food and water restrictions* – the UK, Ireland, Turkey, Canada, France, and Poland all lift food and water restrictions based on intervention levels. Sweden, Finland and the Czech Republic plan to assess the situation and take into account recommendations made based on measurements, whilst the Slovak Republic uses a dose criterion of 5-50 mSv, and Poland uses measurements between 1 and 2 000 Bq/kg depending on the radionuclide and foodstuff involved.

- *Access controls* – Canada and Ireland lift access controls when measurements fall below intervention levels, the Czech Republic specifies a dose of 10 mSv/month, and Finland and Poland specify a dose rate level of 100 µSv/h for commencing the lifting of access controls. Turkey ends access controls depending on the level of contamination, France when all other protection measures are ended, and Sweden will end access controls when the criteria are no longer fulfilled or the measure is replaced by another.

2.5 On which basis did you develop your intervention levels?

Most countries have national legislation that defines their intervention levels. Many also used IAEA or ICRP guidance, while others turned to WHO, EURATOM, and EC guidelines.

Figure 2.8: Basis on which international levels were developed



3. NATIONAL ORGANISATION FOR NUCLEAR ACCIDENTS

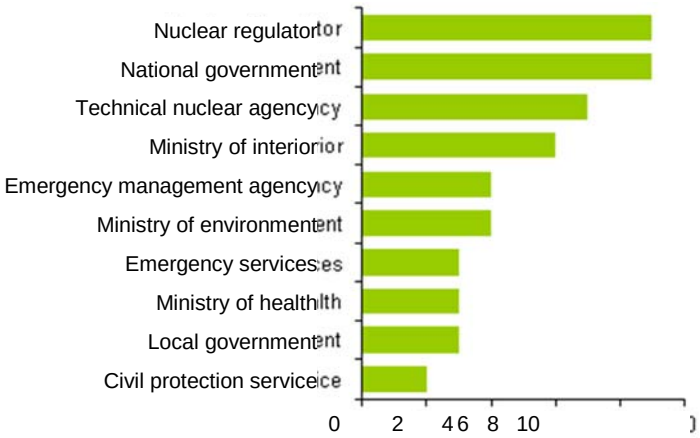
3.1 What organisation(s) developed the legal framework for your emergency preparedness and response system?

In around half of the countries who responded to this questionnaire the nuclear regulator or the national government were responsible for developing the legal framework around emergency preparedness.

The majority of responses indicated that development of the framework was a collaborative effort, involving a range of different organisations.

Where only one organisation was cited this was usually the national government, which may represent the efforts of several departments.

Figure 3.1: Organisation(s) developing the legal framework for the emergency preparedness and response system

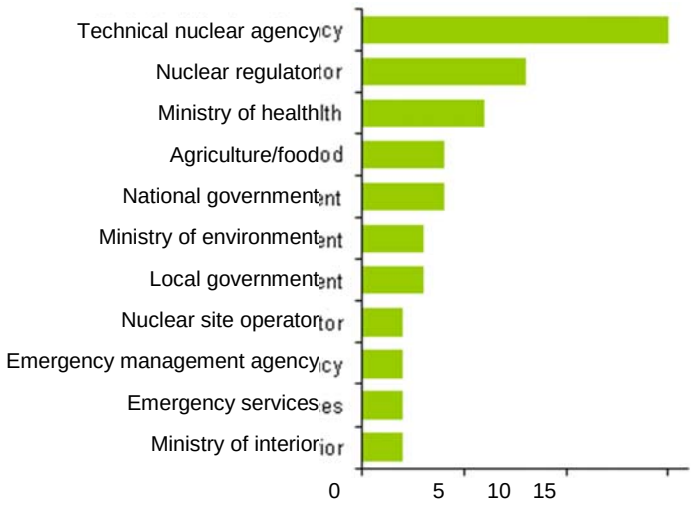


3.2 What organisation(s) makes recommendations concerning the implementation of countermeasures in case of a nuclear emergency?

Most countries stated that they rely on the expertise of a technical, nuclear specific agency to make countermeasure recommendations. The nature of the agencies cited ranged from atomic energy authorities to radiation protection agencies or nuclear safety agencies. Nuclear regulators were also involved in several countries.

Relevant government departments, such as ministries of health, agriculture or environment and also national institutes may also have a role in developing countermeasure recommendations where an emergency may affect areas for which they are responsible.

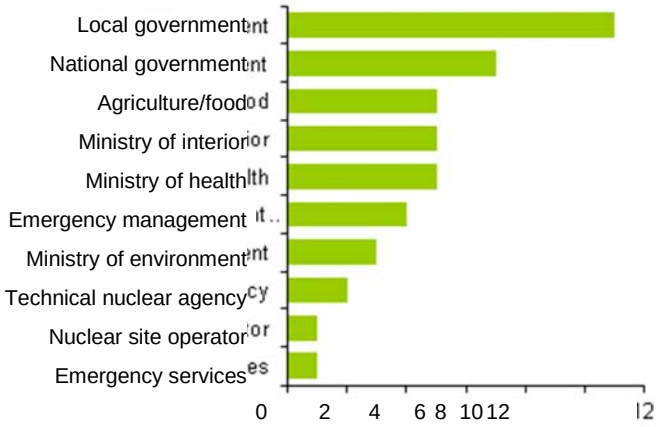
Figure 3.2: Organisation(s) making recommendations concerning the implementation of countermeasures in case of a nuclear emergency



3.3 What organisation(s) has the authority to make the decision whether or not to implement countermeasures in case of a nuclear emergency?

In around half of the countries who responded to the questionnaire the decision whether to implement countermeasures involves the local authorities, as they have authority in an initial response to an emergency.

Figure 3.3: Organisation(s) having the authority to make the decision whether or not to implement countermeasures in case of a nuclear emergency



In all cases however, there was more than one organisation (in case of the activation of a national plan or representation in a committee) listed, with relevant ministries and government departments providing advice on their specific policy areas, e.g. food, transport, health.

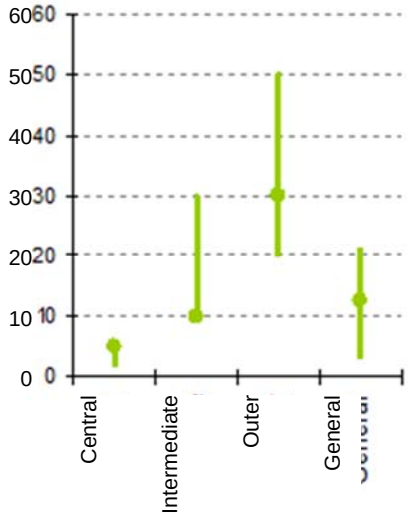
In the UK the site operator may be responsible for initial countermeasure decisions, where actions have been pre-agreed.

4. EMERGENCY PLANNING ZONES FOR NUCLEAR FACILITIES

4.1 What physical zones are pre-established for the purposes of countermeasure implementation (e.g. 5 km evacuation zone, 20 km sheltering zone)?

Figure 4.1 indicates the range of sizes for inner, intermediate, and outer zones for power plants only; as most countries have these facilities the information received was more robust than for other types of nuclear facility. Information was still not available in every case, so this chart shows the information as provided, and includes a column for general zone size if only one figure was supplied.

Figure 4.1: Ranges of sizes for inner, intermediate, and outer zones for power plants



As expected, the central, intermediate, and outer zones increase in size, with median values of 5, 10, and 30 km respectively. Hungary applies a 300 km outer zone for food restrictions, but this has been removed from the data as an outlier.

Central and intermediate zones were most often associated with evacuation, sheltering, and stable iodine, whilst outer zones defined areas where food restrictions would be in place.

Where countries supplied general exclusion zones, they tended to be similar to intermediate zones in size, with a median value of 12.5 km.

Austria, Ireland, Poland, and Turkey either do not have pre-established zones (which would not be unexpected for those countries with no nuclear facilities that could give rise to off-site consequences) or did not provide information about them. Canada confirmed that they do have pre-established zones, but did not give any detail on the size.

Czech Republic has zones of 13 km and 20 km around two power plants within which sheltering and stable iodine will be advised, similarly the Slovak Republic has 20 km and 21 km planning zones around two sites where power plants are located. The Republic of Korea has an 8-10 km emergency planning zone around nuclear power plants, however for fuel manufacture, research reactors, and waste storage sites the emergency planning zones extend only to the site fence. Finland has a 5 km exclusion zone and a 20 km planning zone

around operational power plants, though planning zones around research reactors only extend to the building perimeter. Italy conducts environmental radiological monitoring and food restriction/agriculture countermeasure within a few kilometres of the plants. Spain has a 10 km zone for the implementation of urgent countermeasures (including control access, sheltering and evacuation), a 30 km zone for long-term countermeasures such as food and water restriction, and a study is ongoing for decommissioning plants, storage facilities, and nuclear fuel manufacture sites. Planning zones in the UK vary by facility, from 1-3.4 km, and include extendibility zones out to 15 km (although the requirements are being reviewed).

Switzerland has inner planning zones of 3-5 km and an outer zone of 20 km around power plants, with a 5 km sheltering zone around waste storage facilities. Sweden has pre-established zones of 12-15 km for power plants, however no specific zones are in place around nuclear manufacture or decommissioning research reactor sites. Their nuclear waste storage site falls within the planning zones of another nuclear site.

The Netherlands has pre-established zones of 5 km for evacuation, 10 km for iodine prophylaxis and 20 km for sheltering around power plants. One research reactor has a 2.1 km iodine prophylaxis zone and a 3 km sheltering zone, and around decommissioning research reactors there is a pre-established zone of 0.3 km for sheltering. There are no pre-established zones for decommissioning power plants, fuel manufacture or waste disposal.

Romania plans for zones of 3 km precautionary action for evacuation, sheltering, and use of stable iodine, 10 km for urgent protective action including evacuation, sheltering, and iodine, and 50 km long-term protective action for food bans around power plants. Zones around operational research reactors are 1.6 km for precautionary action, a 12 km urgent protective zone and a 30 km long-term protective action zone. There is a 1 km protective action zone for evacuation and sheltering around decommissioning research reactors, and a 20 km long-term protective action zone where food bans would be in place.

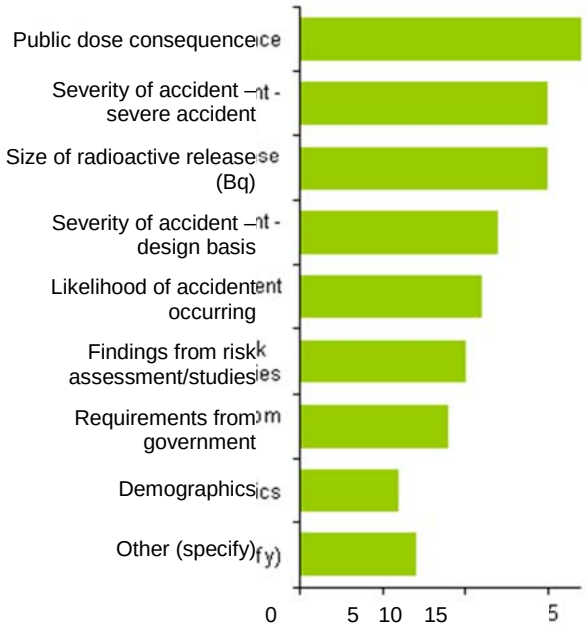
Hungary has a 3 km precautionary zone, a 30 km urgent protective zone and a 300 km food restriction zone around power plants. For research reactors the urgent protective zone covers the site, and the food restriction zone is a 1 km radius from the site fence. For waste treatment and storage (including spent fuel) the urgent protective zone covers the sites, with food restriction zones of 3 km from the site fences.

Japan recognises 5 km precautionary action zones, and 30 km urgent protective action zones around nuclear facilities. France has 5 km evacuation zones and 10 km sheltering and iodine zones around power plants, with specific zoning around other facilities. Germany defines three zones – a 2 km central zone, a 10 km intermediate zone for evacuation, sheltering, and iodine, and a 25 km outer zone for distribution of stable iodine.

4.2 What factors do you consider when determining the size of emergency planning zones?

The most commonly considered factor was the public dose consequence. Some countries noted that this was part of the regulations, and Canada noted that their public dose consequence planning was based on design base accident set at 250 mSv at the nuclear power plant boundary (which may be reduced in certain circumstances). In Switzerland, possible acute health effects without countermeasures must be restricted to the PAZ, and in the UK a “dose contour” is created for 5 mSv whole body effective dose to the public (assuming no countermeasures are used in first 24 hours).

Figure 4.2: Factors considered when determining the size of emergency planning zones



Severity of accident and size of release were also commonly considered factors. The Netherlands specified iodine release 1% of inventory; in Poland and Switzerland the maximum release is determined for each facility. The UK does not directly use size of release in determining the size of emergency planning zones, but it is used in estimating public dose consequence.

Severity of accident – design basis, and the likelihood of an accident occurring are often considered. Some countries state that likelihood must be below regulatory levels, but Canada specifies a probability of 1×10^{-5} and the Netherlands 1×10^{-7} probability of 1% iodine release.

Findings from risk assessments are also important to many countries, as are government requirements. Demographics seem to be considered less, although Finland stated in the "Other" category that it considers population centres to avoid drawing a planning zone boundary through settlements, and the UK also considers vulnerable groups. Communication networks, contamination, emergency capabilities, advice from local government, and geographical factors were also cited as "Other" considerations.

4.3 Does your country have a strategy for extending countermeasures beyond the planning zone for a very severe accident?

Fourteen (14) of the 20 countries who responded to the questionnaire have strategies for extending countermeasures in the event of a severe accident.

The Slovak Republic anticipates using radiological assessment and forecast data to make necessary decisions concerning protective measures. Romania acknowledges that evacuation may extend past the planned zone for domestic accidents, and that the long-term protective action zone could be extended for cross-border incidents; again, radiological measurements would be used to make these decisions. The Netherlands also would use source term information and meteorological data when considering extending the zones. The Republic of Korea would extend countermeasures based on operational and general intervention levels, with a similar situation in Japan where the duration of the exposure and intervention levels would be considered. France, Finland, Canada, Switzerland, and Turkey also have provisions for decision makers to use monitoring data to decide whether to extend countermeasures beyond the planning zones. In Spain, the evaluation of countermeasures depending on

accident severity may be performed by the regulatory authority according to the national plan. The UK is the only country to specify guideline distances – stable iodine and sheltering out to 15 km, and evacuation out to 4 km, although these guidelines are currently being reviewed.

The situation in Germany and Sweden is less clear. While there are no specific plans to extend countermeasures they do acknowledge that a situation may arise where this might be required.

Poland bases its countermeasure decisions purely on contamination and expected doses. The Czech Republic and Italy have no plans for extending countermeasures beyond planning zones. This question was not applicable in Ireland, and Austria did not respond.

4.4 Are there special permissions required for the construction of new residential settlements or industrial facilities within emergency planning zones?

Six (6) out of the 20 countries responding restrict construction within emergency planning zones. Romania bans any residential or industrial development within 900 m of power plants, the Czech Republic within 3 km. Proposed developments inside Finnish exclusion zones (about 5 km) undergo individual assessments. In Canada this applies up to 10 km, and construction within 1 km of the facility requires an additional environmental assessment. In France, developers must prove that no alternative exists, that they have been informed of the risks, and emergency plans must be updated. This is similar to the UK, where any proposed developments are reviewed to ensure emergency plans remain adequate.

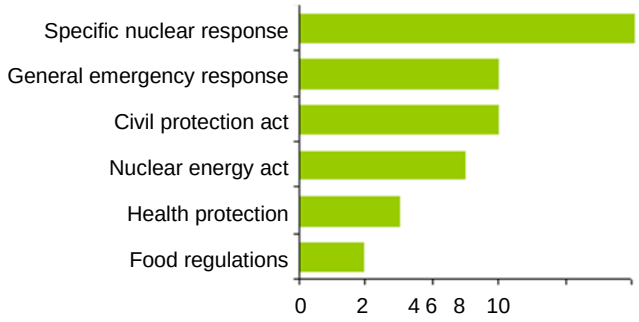
5. OFF-SITE EMERGENCY PLANS

5.1 Describe the national legal framework for the provision of off-site emergency plans.

In most countries, the requirements for off-site emergency plans was covered in legislation or regulations specifically relating to nuclear emergency response, although several countries included these requirements in general emergency response legislation, or civil protection acts.

Poland, Switzerland, the Netherlands, and Hungary also refer to off-site emergency plans in nuclear energy acts, whereas Switzerland covers some aspects of the off-site planning under food regulations. Canada and Finland cover other aspects in health protection legislation.

Figure 5.1: Description of the national legal framework for the provision of off-site emergency plans

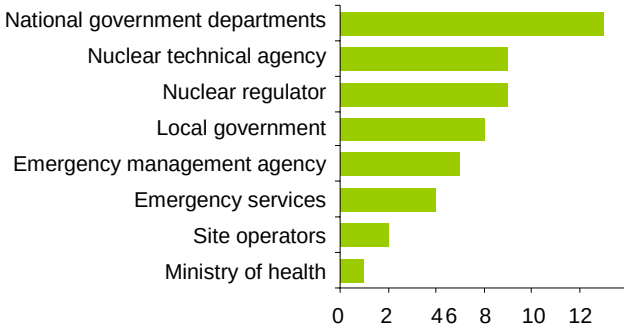


5.2 What organisation(s) developed the guidance for the implementation of the emergency plan?

In around half the countries, central government departments such as the ministries of interior, agriculture, economics or energy were involved in developing guidance for implementation of the emergency plan. In many countries nuclear regulators or safety agencies were also involved.

Sweden, France, Germany, Spain, Austria, and the UK all involve local authorities in developing the guidance, and Canada and the UK involve the nuclear site operators.

Figure 5.2: Organisation(s) developing the guidance for the implementation of the emergency plan

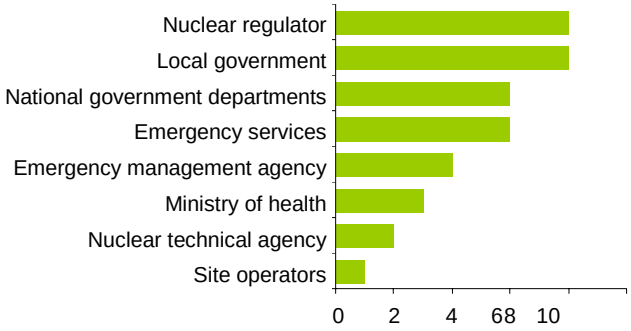


5.3 What organisation(s) developed the procedures for the implementation of short-term countermeasures?

Fewer countries involve national government departments such as the ministry of agriculture or interior affairs, in the implementation of short-term countermeasures. While the nuclear regulator still has a role to play in nearly half of countries who reported, there is a local emphasis, with regional authorities and emergency services playing a role in several countries.

Although guidance may be developed at a national level, implementation is planned at a local level with those who would be directly involved in the response.

Figure 5.3: Organisation(s) developing the procedures for the implementation of short-term countermeasures

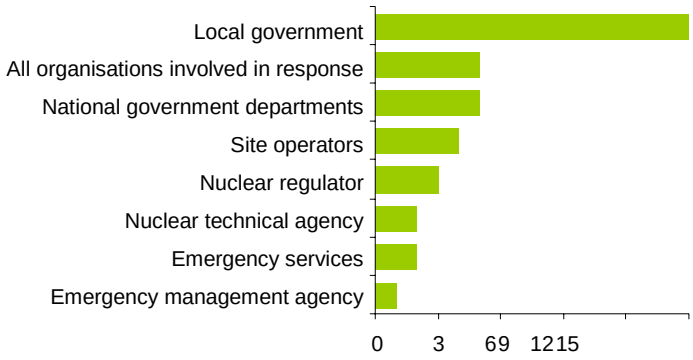


5.4 What organisation(s) are responsible for creating and maintaining the emergency plan?

In most countries local authorities are responsible for creating and maintaining the plan, although only in Spain and France are they solely responsible. Sweden, Romania, Finland, Ireland, and Hungary expect all organisations who would be involved in a response to maintain their sections of the plan.

The Slovak Republic, Hungary, Turkey, and the UK involve site operators in maintaining emergency plans, and nuclear regulators or technical agencies are involved in the Republic of Korea, Japan, Switzerland, and Ireland.

Figure 5.4: Organisations responsible for creating and maintaining the emergency plan



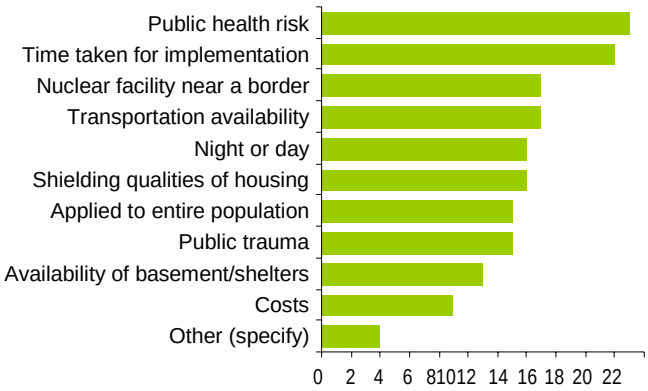
5.5 Which factors were considered in developing emergency plan guidelines?

All countries considered public health risk when developing their guidelines. Most also considered the time it would take to implement countermeasures. Similar numbers of countries considered whether the facility was near a border, whether transportation was available, whether an incident occurred at night or in daytime, and the shielding qualities of the average house.

Slightly fewer countries considered whether countermeasures would be applied to the whole population, or the public trauma it would cause. Fewer again considered the availability of shelters or the costs involved.

There were several "Other" responses received; Finland noted that they considered many other factors besides the ones listed, Ireland considered protection of agricultural produce, and Italy considered environmental, agricultural, and food contamination.

Figure 5.5: Factors considered in developing emergency plan guidelines



5.6 What stakeholders, including the public, are consulted in preparation or review of emergency plans?

Responses to this question were mixed, with many countries stating that those who were involved in developing and maintaining emergency plans were consulted and had the opportunity to contribute during the development phase.

Romania reported that stakeholders are not usually involved in preparation of emergency plans, whereas in the Slovak Republic the general public and institutions have the right to see and comment on emergency plans. The Netherlands state that citizens are consulted along with a range of institutions involved in the response, and in Switzerland the public can

comment on the legal rather than operational aspects of emergency plans. In the UK the public are consulted via local councillors or members of parliament, or through residents groups in the vicinity of nuclear sites.

5.7 What legal requirements are there for stakeholder consultation?

In many countries, particularly Italy, Austria, Spain, Switzerland, and Sweden there are no specific requirements for consultation, although in Sweden the collaborative nature of their planning efforts ensures that stakeholders are consulted in the planning process. Canada also has no legal requirements but good practice dictates that they consult with those who would have a role to play in response to a nuclear emergency.

France and the Slovak Republic reported that any plans were generally available through their transparency laws, whereas Poland, the Netherlands, Finland, Ireland, the Czech Republic, Hungary, and the UK have specific provisions in their emergency planning legislation relating to stakeholder consultation or to make plans available to the public.

5.8 What legislation and guidance details what should be included in emergency plans?

Answers to this question were varied, with some countries giving details of the plans rather than the legislation or guidance relating to them, and some left this section blank.

Of those who answered the majority stated that there was specific, nuclear-related legislation which set out the coverage of emergency plans, either as part of nuclear energy acts or in legislation relating specifically to response to a nuclear emergency. In Sweden, France, the Slovak Republic, and the Czech Republic there are certain aspects covered under civil protection legislation, and the Czech Republic and Poland also have provisions in their general emergency response guidance.

5.9 What details are required by legislation/guidance to be included in emergency plans?

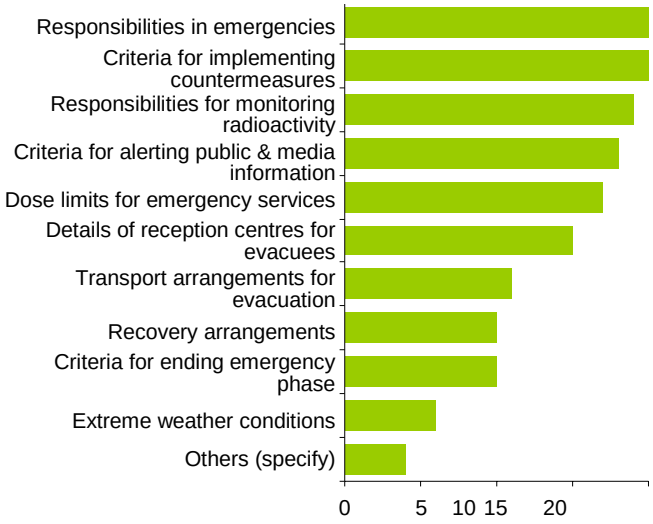
In all countries, plans are required to cover roles and responsibilities in an emergency, and the criteria for implementing countermeasures. All countries except the Netherlands include roles and responsibilities relating to radiation monitoring.

All except the Netherlands and Spain include criteria for alerting the public, and providing information, including to the media. All except the Netherlands, Turkey, and Germany include emergency dose limits for rescue service personnel.

Around three quarters of countries include evacuation details such as transportation or reception centres, and around half include details on recovery arrangements and the criteria for ending the emergency phase.

Sweden, the Slovak Republic, the Czech Republic, Finland, the Republic of Korea, and Canada all include information relating to severe weather conditions, and there were several “Other” answers received; Canada includes details of mass public decontamination, and Ireland includes procedures for assessment of technical information, consequences, and effectiveness of interventions. Austria includes further detail and templates to be used in areas such as communication, information flows, and decision support. Plans in Italy are very detailed concerning radiological monitoring and provide details of reception centres that can be used without evacuation for local contamination control.

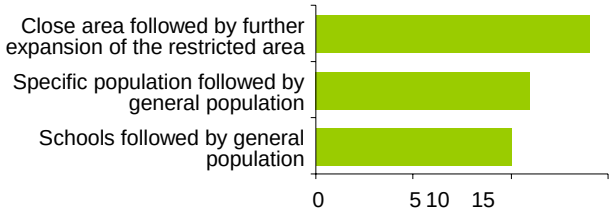
Figure 5.6: Details required by legislation/guidance to be included in emergency plans



5.10 Has a phased implementation of countermeasures been considered in emergency plans?

Turkey, Switzerland, Italy, and Spain had not considered any phased implementation. Around three quarters of countries considered implementation in the closest area, followed by expansion of the restricted area, and around half considered specific populations or schools followed by the general population. In the UK specific populations referred to vulnerable groups.

Figure 5.7: Phased implementation of countermeasures



5.11 How often do you undertake full exercises to test emergency plans for scenarios that form the basis of the emergency plan?

Table 5.1 summarises the most common answers given, although not all countries responded to all sections.

Most countries test on-site plans annually, although the Republic of Korea and Poland do this every two years. Turkey does not undertake exercises on a regular basis, and this is not applicable in Ireland as there are no nuclear facilities.

Off-site plans are tested annually in Romania, Japan, Finland, Canada, Hungary, and Spain, whereas Switzerland tests every two years. The Slovak Republic, the Czech Republic and the UK test every three years, the Republic of Korea tests every four years, and Sweden every five to six years.

Table 5.1: Frequency of full exercises undertaken to test emergency plans

Exercise type	Frequency
On-site	Every year
Off-site	Every year
National	Every 3-5 years
International	Dependant on international agencies

National exercises are conducted every year in Japan and approximately every year and a half in Finland. In Switzerland it is every two years, and every two to three years in the Czech Republic. The UK, Spain, and Poland run national exercises every three years, and Romania every three to four years. Ireland tests national response every three to five years, Hungary every four to five years. The Netherlands, the Republic of Korea, and Germany run national exercises every five years, and Sweden every five to six years.

Canada participates in international exercises every year, the Netherlands and Switzerland every two years, Ireland every three years, and Finland every three to four years. Most other countries state that participation at an international level is dependent on exercises organised by international agencies such as the OECD/NEA (INEX) or the IAEA (ConvEx), etc.

Answers relating to regional exercises are not shown due to ambiguity in question responses.

5.12 How often do you undertake full exercises to test the extension of the arrangements in the emergency plan to deal with a more severe accident?

Switzerland, Canada, and Japan have never tested the extension of emergency arrangements, and Turkey does not do so on a regular basis. Austria and Ireland are not in the near range of any NPPs, so all exercises tend to use severe accident scenarios. In Romania and Poland, it depends on the exercise scenario, and is more likely to form part of national or international exercises. Table 5.2 shows the most common responses received from countries that gave more detail on frequency.

Table 5.2: Frequency of full exercises to test the extension of the arrangements in the emergency plan to deal with a more severe accident

Exercise type	Frequency
On-site	Every year
Off-site	Every 3 years
National	Every 3-5 years
International	Dependant on international agencies

Sweden, the Slovak Republic, Finland, the Czech Republic, and Hungary test extension of on-site arrangements every year, the Republic of Korea every two years, and Germany every two to three years. Frequency is variable in the UK.

Finland and Hungary test extension of off-site plans every year, the Czech Republic and the Slovak Republic every three years, the Republic of Korea every four years and Sweden every five to six years. Germany has no defined frequency.

France and Finland test extension of national plans every one to two years, Germany and the Czech Republic every two to three years, and Hungary every four to five years. The Netherlands and the Republic of Korea test national extension plans every five years, and Sweden every five to six years. The Slovak Republic does not have any legislation requiring a test of national extension plans.

The Czech Republic, the Slovak Republic, and Ireland attempt to participate in international tests of extension plans when the opportunity arises. The Netherlands participates every two years, Hungary every two to three years, Finland every three to four years, and Sweden every five to six years.

6. IMPLEMENTATION OF SHORT-TERM COUNTERMEASURES

6.1 General points concerning the implementation of short-term countermeasures.

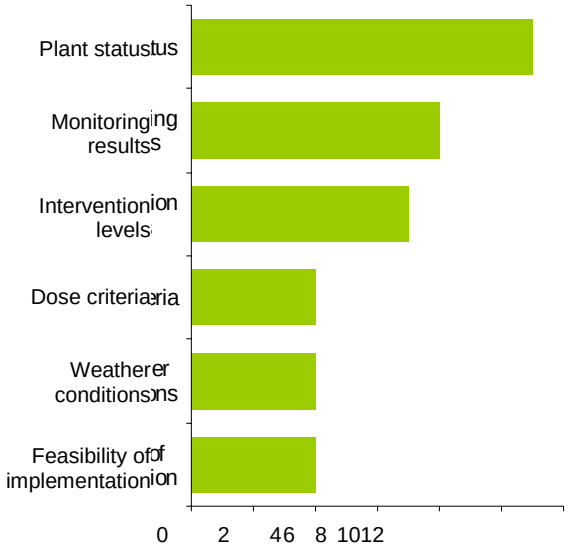
6.1.1 What information or criteria are considered necessary and sufficient to justify the implementation of short-term countermeasures?

Around half of countries considered plant status when deciding whether to implement short-term countermeasures. Together with monitoring results, most countries would use the available technical information about the accident in order to decide whether short-term countermeasures were necessary.

Many countries would refer to their defined operational intervention levels that specify when each countermeasure should be implemented.

Dose criteria are considered by Romania, Poland, Germany, the Netherlands, and Hungary, weather conditions would be considered by Sweden, Finland, Switzerland, the Netherlands, and Germany, and the practical aspects of application of countermeasures would also play a part in the decision-making process for the Netherlands, France, and Switzerland.

Figure 6.1: Information/criteria considered necessary and sufficient to justify the implementation of short-term countermeasures

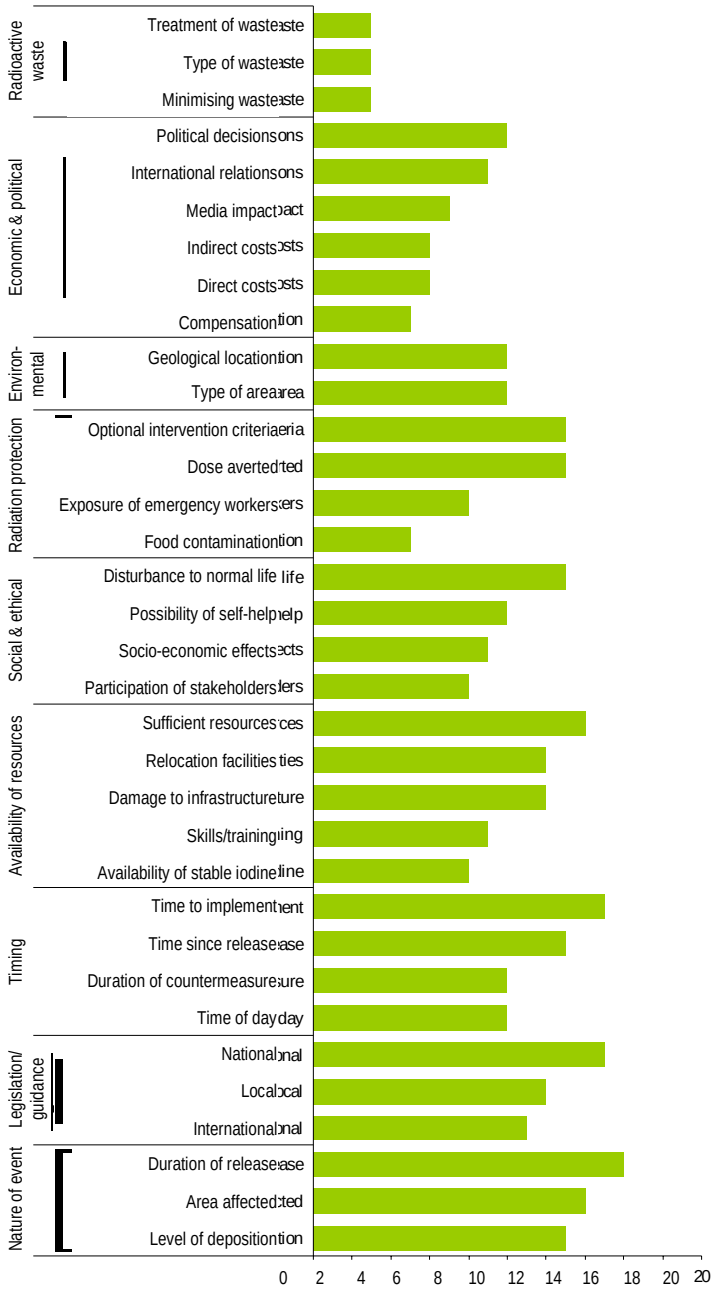


6.1.2 Which factors are likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement?

Evacuation

Treatment, type, and amount of waste is not considered by many countries when deciding whether to implement evacuation, but the Republic of Korea, Canada, and Turkey would take all three of these matters into consideration.

Figure 6.2: Factors likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement – evacuation



Over half of countries would consider political decisions and international relations when deciding whether to implement evacuation. Media impact, costs, and compensation would be considered by around a third.

Environmental considerations such as the local geology, geography, and land use are important considerations for around half of countries.

Nearly three quarters of countries would rely on operational intervention criteria and averted dose. Around half of countries would consider potential exposure of emergency workers, and around a third would consider food safety.

Disturbance to normal life was a key social consideration for three quarters of countries, with around half considering whether citizens were able to help themselves.

Availability of resources is important in decision making in three quarters of countries, with availability of relocation centres and potential damage to infrastructure close behind.

Time to implement evacuation is a key consideration for most countries, along with the time since release. Around half would take account of the expected duration of evacuation, and similar numbers would consider the time of day.

National legislation would be considered by most countries, with local and international guidance being important to around half of those who responded.

The nature of the event is an important factor in decision making for nearly all countries, and duration of release was the most commonly cited factor of all, with over three quarters of countries stating they would consider it when deciding whether to evacuate. Location affected and the levels of deposition were important factors in the decision to evacuate for more than half of countries.

Sheltering

Waste is only a consideration when deciding whether to implement sheltering for the Republic of Korea, Canada, and Turkey.

Around half of countries would consider international relations, political decisions, and media impact when deciding whether to implement sheltering, although slightly fewer than that take account of these issues when deciding whether to evacuate.

Environmental issues are less important than when considering evacuation, and the land use of the area (recreational, industrial or residential) is important to more countries than the geological features when deciding whether to implement sheltering.

Around half of countries consider the level of disturbance to normal life, and whether citizens are able to help themselves; this is fewer countries than consider these factors when deciding on evacuation.

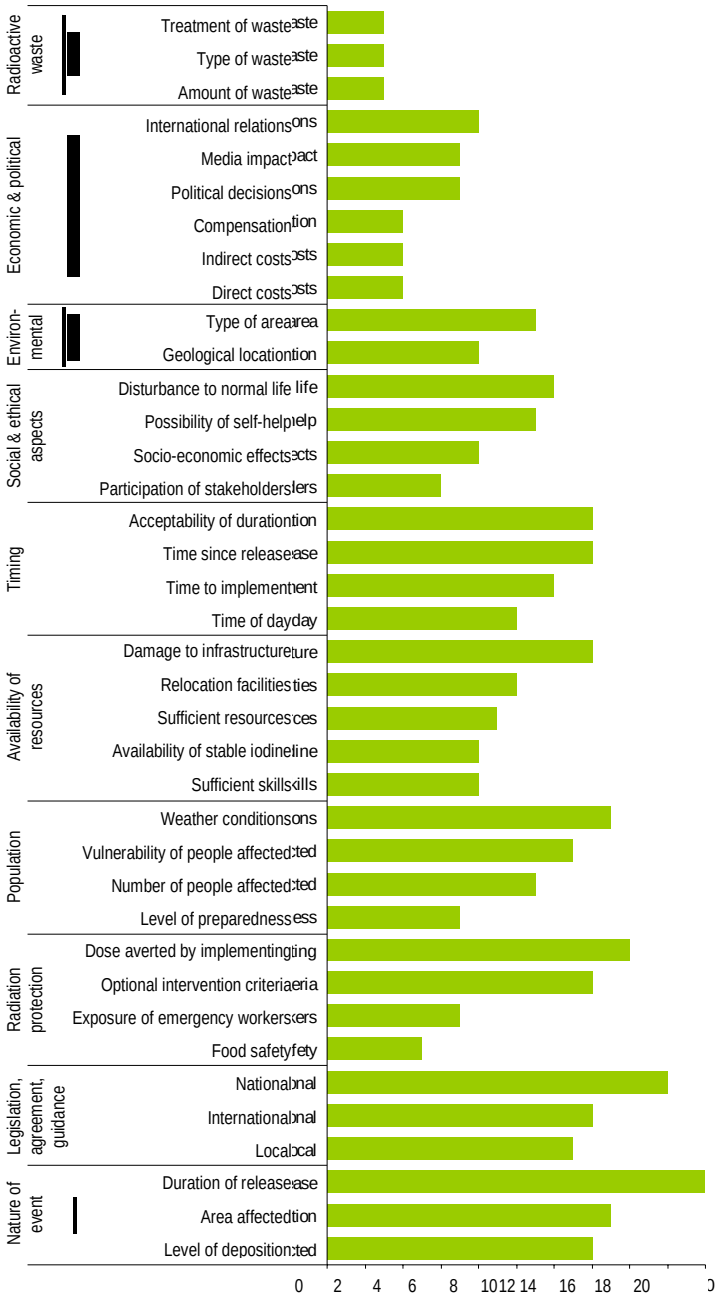
Almost three quarters of countries would take account of the time since release and the expected duration of sheltering.

Almost three quarters of countries would consider potential damage to infrastructure. Sufficient resources are less of a concern than when considering evacuation, possibly because fewer resources are needed. Availability of stable iodine is a consideration for around half of countries when considering implementation of sheltering. Weather conditions are important for three quarters of countries, and the vulnerability of the population is also a concern. The number of people affected would be considered by around half of countries, with the level of preparedness of the population being important to fewer countries.

Three quarters of countries consider averted dose, and around two-thirds would refer to operational intervention levels. National guidance is important to almost all countries, with international and local legislation considered by around two-thirds. The nature of the event is again a key consideration for many countries, with all stating they would consider the

estimated duration of release when deciding whether to implement sheltering. The level of deposition and the area affected would be considered by around two-thirds of countries.

Figure 6.3: Factors likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement – sheltering

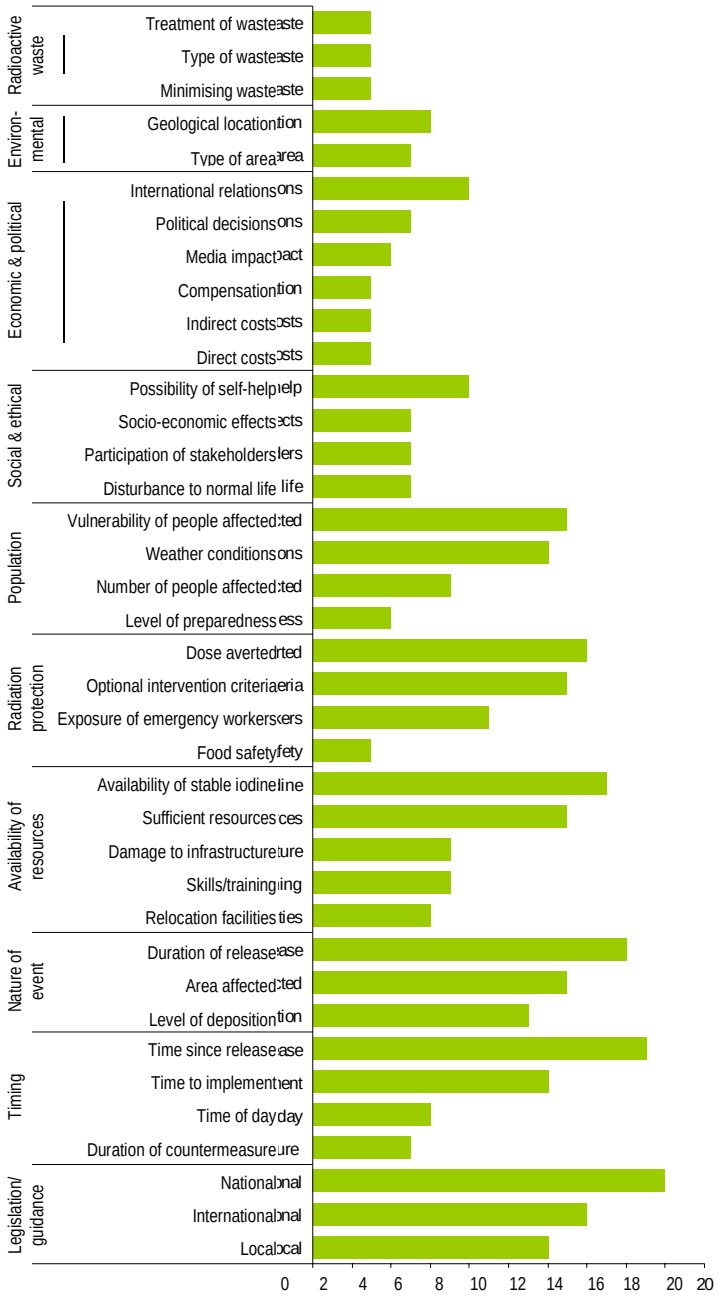


Stable iodine

The Republic of Korea, Canada, and Turkey are the only countries who would consider waste issues when deciding whether to implement stable iodine.

Around a third of countries would take into account the local geography and geology when deciding whether to implement stable iodine; this is fewer countries than would consider this factor when planning sheltering or evacuation.

Figure 6.4: Factors likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement – stable iodine



International relations would be considered by around a third of countries, but the other economic and political factors are taken into account by fewer countries.

Around a third of countries would take into account whether citizens could help themselves, but consideration of socio-economic effects or disruption to normal life was less common.

Around half of countries would consider the vulnerability of the population affected, as well as the weather conditions. The numbers affected and level of preparedness is considered by fewer countries.

Averted dose and operational intervention levels are again important, with nearly three quarters of countries stating these factors would play a role in decision making.

As expected, a key consideration for this countermeasure is the availability of stable iodine, with three quarters of countries saying this would be a factor in their decision to implement. The duration of release and the area affected would be considered by around three quarters of countries, with half considering the level of deposition. Time since release is a key consideration, with most countries using this as a factor in deciding whether to implement stable iodine, and just over half would also take account of the time it would take to implement. Most countries also consider national guidance when deciding whether to implement stable iodine as a countermeasure.

Food/water restrictions

Around a third of countries would consider the geology or geography of an area when deciding whether to implement food and water restrictions.

Slightly more countries would consider waste issues when deciding whether to implement food and water restrictions than with other countermeasures, around a third of countries would be concerned with treatment of waste and minimising the amount generated.

Nearly half of countries would consider resources when deciding whether to implement food restrictions, and around a third would be concerned with skills and training, or damage to infrastructure.

Nearly half of countries would take account of political decisions and indirect costs, with slightly fewer considering media impact and international relations. Compensation is an issue for more countries when deciding on food restrictions than for other countermeasures.

Around half of countries would consider vulnerable groups in the population, such as children, and around a third would take the weather and number of people affected into account.

Time since release was important to around half of countries, and time to implement would be considered by around a third.

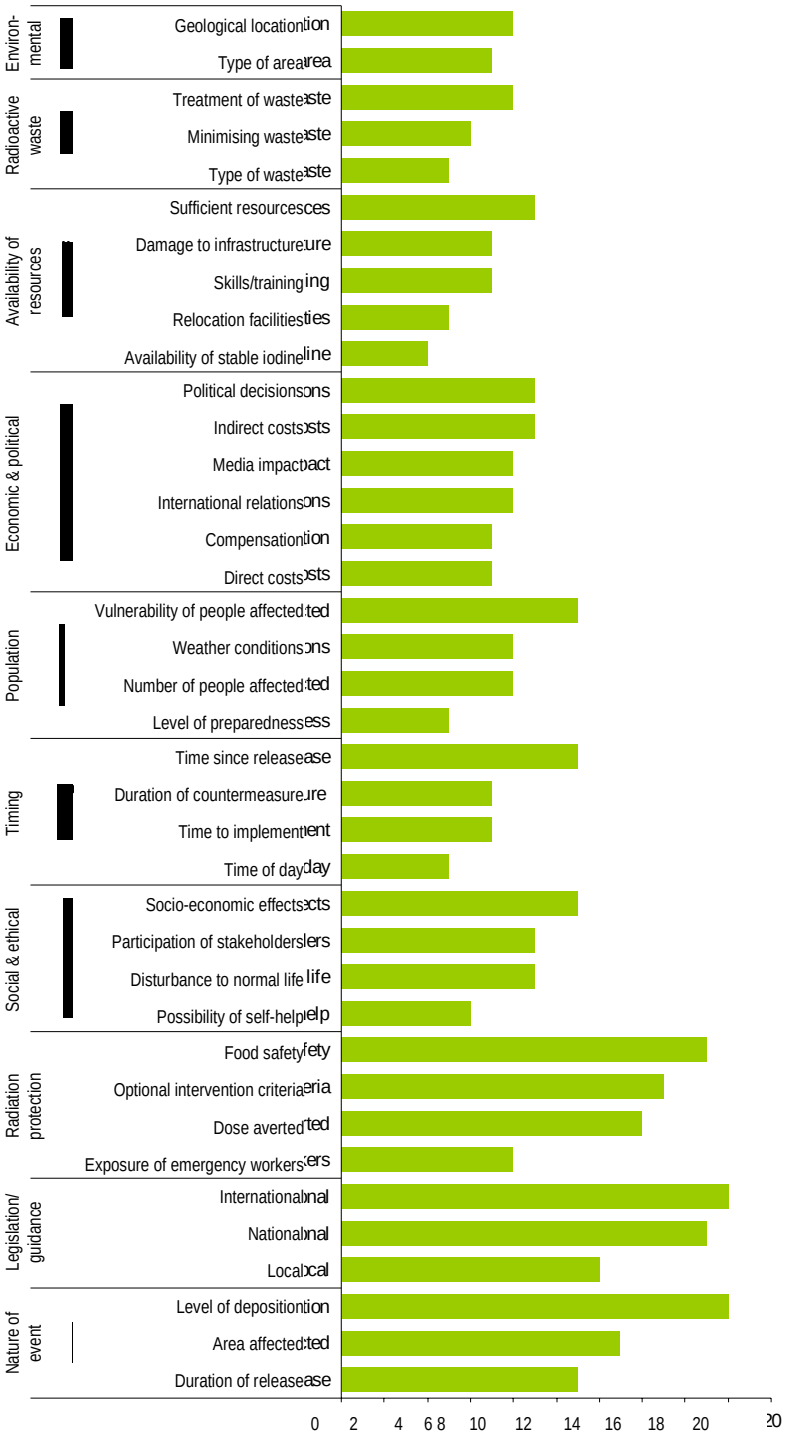
Socio-economic effects are considered by around a third of countries, and in this case the possibility for self-help is considered by fewer countries.

Food safety is a key consideration, with three quarters of countries taking this into account when deciding whether to set up food restrictions. Operational intervention criteria and averted dose are also important to many countries.

International legislation is considered by nearly all countries, with national legislation considered by slightly fewer.

The level of deposition is a key consideration when deciding whether to apply food and water restrictions, with almost all countries taking this factor into account. The size of the area affected and duration of release are important to over half of countries.

Figure 6.5: Factors likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement – food/water restrictions

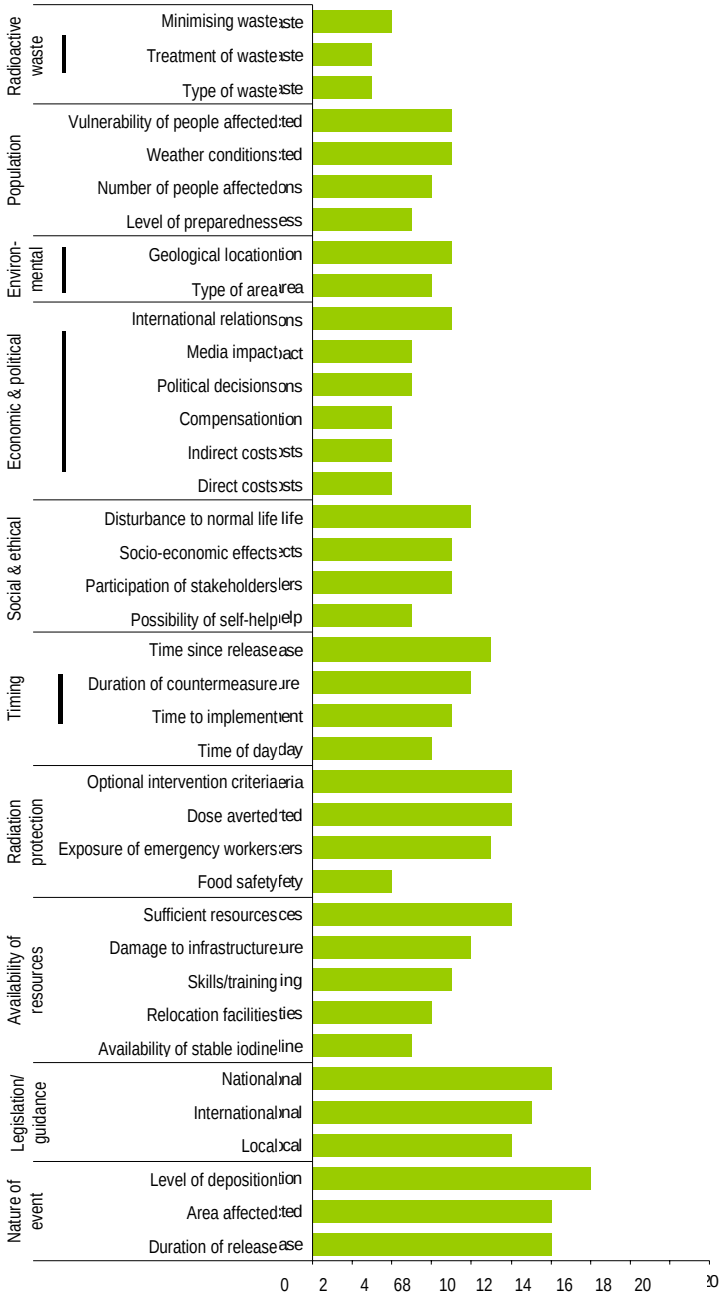


Access controls

Turkey, the Republic of Korea, and Canada consider all waste issues when deciding to implement access controls; Romania would aim to minimise the amount of waste.

Around a third of countries would take into account population factors such as weather, the numbers affected, level of preparedness, and any vulnerable groups in the population.

Figure 6.6: Factors likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement – access controls



Around a third of countries would also consider geological and geographical features of the affected area.

International relations are important to around a third of countries, with media impact, costs, and compensation being considered by fewer countries.

Around a third of countries take into account the disturbance to normal life, socio-economic conditions, or participation of stakeholders when deciding whether to implement access controls.

Time since release is important to around half of countries, along with the expected duration of the access controls. Around a third of countries use the time to implement access controls as part of the decision-making process.

Half of countries take into account operational intervention criteria and averted dose, and slightly fewer use the potential dose of emergency workers as a factor in decision making.

Half of countries would consider whether they had sufficient resources before implementing access controls, and around a third would be concerned with damage to infrastructure.

Just over half would refer to national or international guidance or legislation.

Around two-thirds of countries would take account of the level of deposition, and just over half would be concerned with the size and type of area affected or the duration of release when deciding whether to implement access controls.

6.1.3 Among the above-listed factors, which is the most important when deciding whether or not to implement a countermeasure?

In Japan, the nature of the event was the most important factor when considering evacuation, sheltering, or stable iodine, in all other countries radiation protection issues were the most important.

When considering food and water restrictions, radiation protection was the most important factor for most countries, except the UK, which considers the nature of the event to be most important, and the Netherlands, which would follow international guidance as a priority.

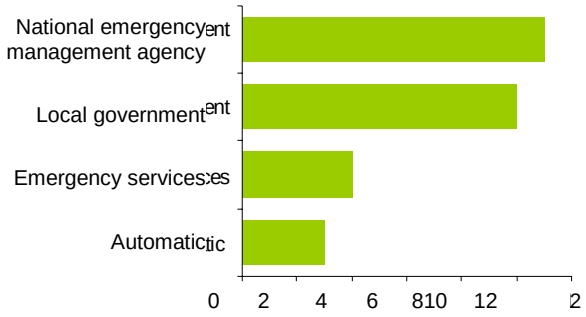
Again, for most countries radiation protection was the most important factor when considering access controls, except in Switzerland, where availability of resource and other practical considerations would be the most important factors, and the Czech Republic, where environmental concerns such as the type of area are thought to be most important.

6.1.4 Describe how your country co-ordinates the implementation of countermeasures.

Around half of countries who responded involve local government or central government emergency management agencies. This can depend on the type of accident, or control can begin at the local level and be handed over to national agencies if the situation escalates.

The UK, Canada, France, and Romania state that the emergency services are a key part of co-ordination of countermeasures, with the Slovak Republic, Poland, and the Republic of Korea stating that countermeasures are implemented automatically, according to existing plans.

Figure 6.7: Co-ordination of the implementation of countermeasures



6.2 Specific countermeasure: Evacuation

6.2.1 Has your country ever experienced evacuation for an actual or potential radiological emergency?

Only Japan has ever implemented evacuation for a radiological emergency. Around 78 000 people were evacuated within a 20 km radius following the Fukushima Dai-ichi NPP accident.

6.2.2 Has your country ever experienced evacuation as a result of non-radiological emergencies, such as a hurricane?

All of the countries who responded have experienced evacuation for non-radiological emergencies such as chemical spills, flooding, extreme weather, fires, etc. The affected populations ranged from a few hundred to thousands; over 100 000 people evacuated due to flooding in Poland, 1 000 due to flooding in Hungary, a few hundred for a typhoon in the Republic of Korea. In Canada around 225 000 people were evacuated due to a chemical spill from a derailed train, and there have been several, smaller evacuations (few thousands) due to floods, fires, and tornadoes.

Main learning points emphasised the importance of proper planning and preparation, and defined roles to avoid delays in decision making. Public information was highlighted by Poland and the Republic of Korea, emphasising that the public need to know how to evacuate in a safe manner. Canada and Poland both experienced problems with residents that refused to evacuate, and getting them to complete waiver forms took valuable time. In Canada, people evacuated without thought for valuable items or pets, which left the agencies with the extra duties of caring for the animals left behind. The main learning point for Hungary was planning for the acceptance of evacuees in neighbouring areas.

6.2.3 Has your country ever implemented real evacuation as part of an exercise? If yes, please identify whether actors or real members of the public were evacuated and provide significant learning points.

The UK and Austria have carried out on-site evacuations as part of exercises, whereas Hungary, the Czech Republic, the Slovak Republic, and Canada have all carried out test evacuations with various groups, usually schools. The Czech Republic found that this confirmed the thoroughness of their evacuation planning, and that it would be feasible in a real event. In 2008 Romania evacuated around 100 key players as part of an exercise, which highlighted the importance of good planning and support from emergency services. Major problems were experienced when evacuating important equipment and goods, and when making emergency funds available to evacuees.

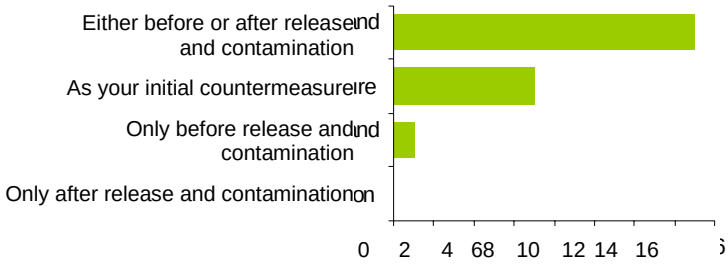
Sweden, the Netherlands, the Republic of Korea, Japan, and Spain have all evacuated members of the public as part of exercises. Spain experienced problems evacuating school children without their parents, and also with arranging police protection of evacuated areas.

6.2.4 *Do you foresee evacuation?*

Italy, Ireland, and Austria, given their distance from large nuclear facilities, do not foresee evacuation being necessary, but most countries are flexible about when they would implement evacuation, either before or after release or contamination. When or whether to evacuate will be decided based on individual events, taking into account the severity of the accident and whether there is time to evacuate people safely.

Japan was the only country to specify evacuation only before release, and also as an initial countermeasure, as they feel it is the most effective. Sweden, the Slovak Republic, the Republic of Korea, Romania, the Netherlands, and Finland also consider evacuation to be an initial countermeasure.

Figure 6.8: Points at which evacuation is foreseen

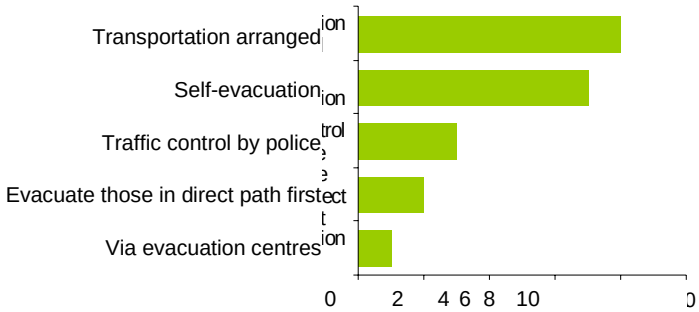


6.2.5 *Describe how evacuation within the emergency planning zone would be executed.*

Most countries would arrange transportation, many using existing public transport provision, although many acknowledge that a large proportion of citizens will choose to evacuate using their own vehicles, and some may do so without being instructed. The Slovak Republic, the Netherlands, and Canada have provisions for local police to control traffic in these situations.

The Slovak Republic and the Netherlands would prioritise those directly downwind of the accident, in line with keyhole theory. Sweden would evacuate everyone via evacuation centres for registration and decontamination purposes.

Figure 6.9: Execution of evacuation within the emergency planning zone



6.2.6 Describe how you identify and prioritise different groups within the population such as children, the medically infirm, etc.

Sweden, the Slovak Republic, the Netherlands, Turkey, Finland, and the UK have all made provision in emergency plans to prioritise evacuation of vulnerable groups, whereas France, Switzerland, the Czech Republic, Hungary, and Spain have not. Children, the elderly, hospitalised patients, and pregnant women are some of the groups identified for prioritisation. Finland organises transport specifically for vulnerable groups, while the UK uses maps of demographic data to help prioritise the evacuation.

6.3 Specific countermeasure: Sheltering

6.3.1 Has your country ever experienced sheltering for an actual or potential radiological emergency?

Only Japan has ever implemented sheltering due to a radiological emergency. Around 310 000 people within a 10 km radius were advised to shelter following the Fukushima Dai-ichi NPP accident.

6.3.2 Has your country ever experienced sheltering as a result of non-radiological emergencies, such as chemical spill or threat?

Fourteen (14) out of the 20 countries who responded have implemented sheltering for a non-radiological emergency such as fires, chemical spills, flooding, or pollution. Although these tended to be smaller scale events, some of the learning has proved useful for planning nuclear responses; the Czech Republic highlighted the importance of thorough planning, Ireland considered methods of initiation and communication, and Italy learned lessons around contingency planning, global co-ordination and definition of roles.

6.3.3 Has your country ever implemented real sheltering as part of an exercise? If yes please explain the results.

The Slovak Republic and the UK have both implemented on-site sheltering as part of an exercise, whereas Romania, Japan, the Czech Republic, Finland, Hungary, and Spain have all implemented sheltering of members of the public as part of exercises. In most cases this involved only sheltering within houses, but Finland has also tested sheltering in civil defence shelters.

6.3.4 Do you foresee sheltering as an initial countermeasure? Please explain.

All countries except Poland, Japan, and Italy see sheltering as an initial countermeasure. In Poland the law does not define initial countermeasures, and Japan would use evacuation rather than sheltering.

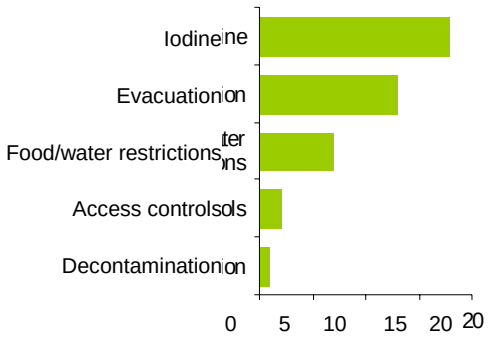
In Sweden, the Slovak Republic, and Canada sheltering is the first instruction given in case of emergency. Residents are advised to stay indoors and await further information from TV or radio broadcasts. Ireland advises sheltering as a first instruction to avoid residents taking their own decisions to evacuate. In the Czech Republic the first instruction is to stay indoors and take stable iodine. In France it depends on the nature of the incident; an accident with fast kinetics would indicate sheltering as an initial measure, with evacuation to follow if sheltering is expected to last more than one to two days. In an accident with slow kinetics it may be more appropriate to evacuate as soon as possible. Finland advises sheltering as an initial measure as it is simpler than evacuation and can be applied to a larger population, whereas Romania and Switzerland only advise sheltering where evacuation is not possible.

6.3.5 *What countermeasure(s) accompany or follow sheltering?*

Almost all countries would accompany sheltering with stable iodine consumption, and in situations where sheltering is expected to continue for a prolonged period, most would follow with evacuation.

Poland, France, Finland, Ireland, Austria, Hungary, and the UK would also consider imposing food and water restrictions alongside sheltering. The Republic of Korea and Finland would also implement access controls along with sheltering. The UK was the only country reporting that decontamination could follow sheltering.

Figure 6.10: Countermeasures that accompany or follow sheltering



6.3.6 *May sheltering be applied differently for different groups within the population, such as children, pregnant women, etc.?*

Around half of countries would consider applying sheltering differently for specific groups. The Slovak Republic, Romania, the Netherlands, Turkey, and Italy do not have specific plans to treat vulnerable groups differently but state that it is possible that plans could be adapted depending on conditions during an emergency. Children and pregnant women have higher priority in the Republic of Korea, Canada has specific plans for schools and day-care centres within the planning zones, and Finland would impose tighter restrictions on children in situations of partial sheltering. Switzerland and Austria have different dose criteria for children and pregnant women; 1 mSv compared to 10 mSv for the general population.

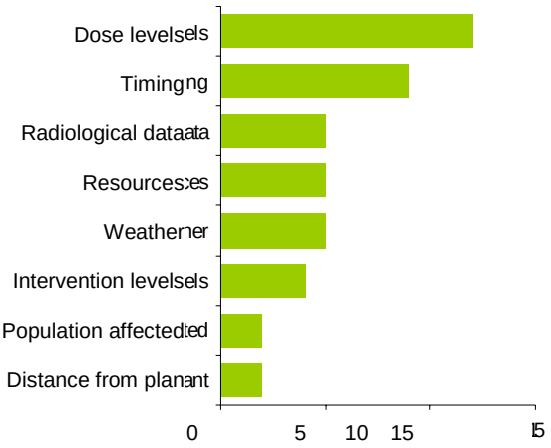
6.3.7 *What criteria are used when selecting between sheltering and evacuation?*

Around half of the countries consider dose levels when deciding between evacuation and sheltering, with Romania, Turkey, and Spain specifying that the operational intervention levels are set differently for the two countermeasures.

Timing was an important consideration for many countries, whether it was the time since release, or whether there was enough time to safely evacuate the population.

Monitoring data on the progress of the incident, available resources, and the weather conditions were considered by about a quarter of countries. The size of the population affected was a consideration for the Netherlands and the Republic of Korea, while Sweden and Finland consider the distances from the source of release.

Figure 6.11: Criteria used when selecting between sheltering and evacuation



6.4 Specific countermeasure: Use of stable iodine

6.4.1 Has your country ever experienced an actual or potential radiological emergency that has resulted in the consumption of stable iodine by the population?

The Slovak Republic, Romania, and Poland have all experienced an emergency resulting in stable iodine consumption. Romania distributed stable iodine to a few thousand people following the Chernobyl accident, while Poland administered Lugol's iodine solution to around 18.5 million of their population, mainly children. Sweden administered stable iodine to Swedish nationals in Japan following the Fukushima accident; there were no reported health effects.

6.4.2 Has your country ever implemented distribution of "simulated" stable iodine tablets (made of sugar for example) as part of an exercise? If so, explain the results.

The Slovak Republic, Poland, the Republic of Korea, the Czech Republic, Hungary, and Spain have all distributed simulated iodine tablets. The Slovak Republic used sweets during an on-site exercise as a visual representation of iodine pills, while Poland, the Czech Republic, and Hungary used sweets to simulate iodine with the general public, mostly schools. Hungary identified some problems with tablets being provided at a single location and no further dissemination, and distribution was limited by age, which was felt to be unjustified.

6.4.3 How is stable iodine distributed to individual members of the population?

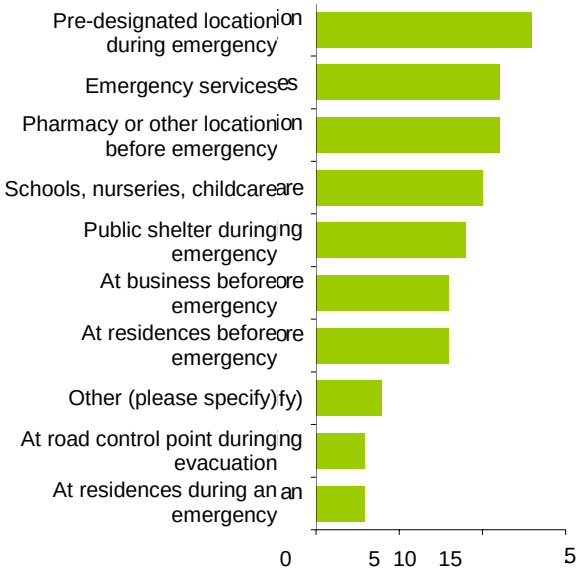
Over half of countries make stable iodine available at a pre-arranged location during an emergency. Around half distribute stable iodine through emergency services in an emergency, or make it available at a pharmacy or other community location prior to an emergency.

More countries distribute stable iodine through schools, nurseries, and childcare centres than at businesses or residences, indicating a slight prioritisation for children.

Few countries envisage distributing iodine at road control points during evacuation or directly to residences in an emergency.

There were four "Other" answers stated; Canada makes iodine available at health units, and hospitals in Ireland hold some stocks for local incidents. The Czech Republic holds stable iodine at all hospitals and social units, and Hungary would distribute stable iodine through the mayor's office.

Figure 6.12: Means of distribution of stable iodine to individual members of the population



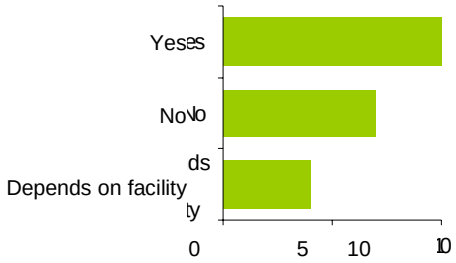
6.4.4 *Is there an area in which stable iodine is pre-distributed to the population?*

Half of countries who responded state that there is an area where stable iodine is pre-distributed around nuclear facilities and a fifth state that it depends on the facility.

Estimates of the areas involved range from 5-20 km radius, usually in line with emergency planning zones around each facility. Countries such as Finland and Germany will pre-distribute iodine within a certain radius, but make iodine available at community locations in a slightly larger radius, and have national stockpiles or commercially available iodine in the event it is needed in a larger area.

The size of the population affected varies widely across countries, with estimates per site ranging from a few hundred to tens of thousands. When considering all affected populations around all sites within each country, the estimates can be up to half a million people.

Figure 6.13: Pre-distribution of stable iodine to the population



6.4.5 *If stable iodine is not pre-distributed to the population within the emergency planning zone, how quickly do you assume it to be distributed? If this varies according to the size of the population or any other factors, please explain.*

Estimates ranged from 2-3 hours to 24 hours, but this depended on the population targeted and the method of distribution; Spain assumes distribution to take 2-3 hours after the decision to implement, Germany estimates 2-4 hours for those within 25 km and 12 hours for those within 100 km. The Republic of Korea will distribute stable iodine as part of the

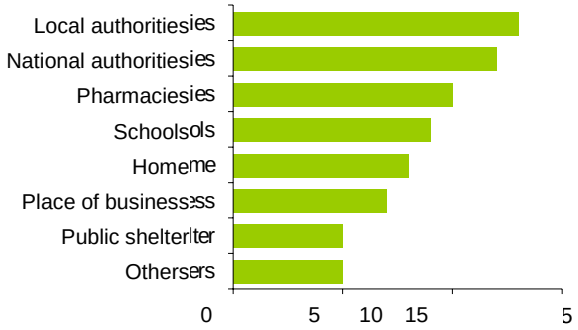
public evacuation plan, which is estimated to take 4 hours, while Romania plans to distribute stable iodine by emergency helicopters within 6 hours. Poland estimates the whole country could be covered within 24 hours, whereas Canada has never tested how long it might take to cover the estimated 250 000 people affected.

6.4.6 *Where is stable iodine stockpiled?*

Most countries stockpile stable iodine with local or national authorities. Stable iodine is also stockpiled at pharmacies in around half of the countries reporting. Schools store stable iodine in almost half of the countries reporting, while slightly fewer also provide stocks of stable iodine for homes and businesses.

A quarter of countries stockpile stable iodine at public shelters, and a quarter also stated that iodine is stockpiled at other locations; Sweden keeps central stores, France has complementary stores in several regions and also at the national army pharmacy, and Romania keeps stores at personnel assembly points on sites, and in local hospitals.

Figure 6.14: Location of stockpiled stable iodine

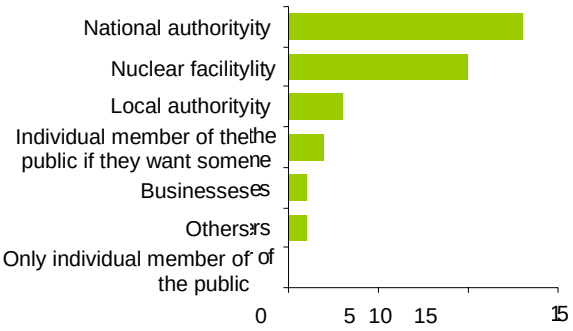


6.4.7 *Who pays for stable iodine?*

In most countries the national authorities and nuclear facilities fund stable iodine provision. No country expects members of the public to pay for iodine themselves if the countermeasure is recommended, but in Finland and Austria the public can purchase their own stock.

Only one “Other” answer was reported – in Switzerland the cantons of Zone 3 also help fund stable iodine provision.

Figure 6.15: Funders of stable iodine provision

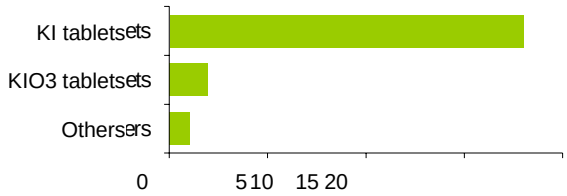


6.4.8 *What form of stable iodine is used?*

Almost all countries use KI tablets, Japan indicated that they use others alongside KI tablets, but did not specify what tablets these might be.

Ireland and the UK are the only countries using KIO_3.

Figure 6.16: Forms of stable iodine used



6.4.9 *Are stable iodine tablets commercially available at pharmacies?*

Stable iodine is commercially available at pharmacies in Finland, Canada, Austria, Germany, Switzerland, the Czech Republic, and Hungary. Some pharmacies in Sweden stock stable iodine, and Spanish pharmacies have stable iodine but in different doses to the tablets distributed in an emergency. In France and Japan stable iodine is only available with a doctor's prescription, except for those in pre-distribution zones in France who are given a voucher to access the tablets through pharmacies.

6.4.10 *What iodine dose (mg), is recommended in case of a nuclear emergency in your country for various populations?*

Dose limits vary by country but generally countries seem to decrease doses by half for the more vulnerable groups; Table 6.1 summarises the general pattern. For example, children will be advised to take half the adult dose, and babies half of the children's dose. Sweden, the Slovak Republic, Germany, the Czech Republic, the Republic of Korea, France, Finland, Canada, Turkey, and Italy all specify a dose of 130 mg for adults and pregnant women, in the form of two 65 mg pills. Most of these countries then advise children to take one 65 mg pill, Sweden and the Slovak Republic specifying that this is aimed at children aged over 3 years. France, Turkey, and Italy specify that all those under 3 years take half a pill, resulting in a dose of 32 mg. France, Finland, Germany, Canada, the Czech Republic, the Slovak Republic, and Sweden specify half a pill (32 mg) for children aged 3 months to 3 years, and quarter of a pill (16 mg) for babies between 0 and 3 months.

Table 6.1: Recommended iodine dose (mg) in case of a nuclear emergency

Group	Dose
Adults & pregnant women	2 pills
Children (3+)	1 pill
Children 3 months-3 years	½ pill
Babies under 3 months	¼ pill

Romania, Poland, the Netherlands, Japan, Switzerland, Austria, Hungary, and the UK all suggest a maximum dose of 100 mg for adults and pregnant women. The UK, Hungary, Austria, Switzerland, Romania, the Netherlands, and Poland all recommend a reduced dose of 50 mg for children, although the definitions are slightly different; Austria applies this to children under 12, the Netherlands to children under 4, and Poland to children under 6. A recommended dose for infants in Switzerland, Hungary and the UK is half of the child's dose

– 25 mg. In other countries the definition varies slightly; Austria advises a 25 mg dose for those aged 1 month to 3 years, Poland for those aged 3 months to 2 years. Romania, Poland, and Austria apply a further dose reduction for newborns, down to 12.5 mg. Spain applies a maximum dose of 50 mg for adults, reduced to 25 mg for children and pregnant women, with a further reduction to 12.5 mg for infants.

The Netherlands, France, Finland, Canada, the Czech Republic, Japan, Austria, Hungary, the UK, and Italy only advise one dose of stable iodine for any group in the population. Sweden would define dose frequency and duration on advice from authorities, with a maximum of two tablets for infants and pregnant women. Romania would define frequency and duration according to exposures. The Slovak Republic would advise a maximum of two doses for all groups except babies, who should only take one. Germany would also normally advise a single dose, with a maximum of two in exceptional circumstances, to exclude babies. In Switzerland there is no KI dose restriction on adults or children, but pregnant women and babies should only receive one dose.

6.4.11 Do you recommend maximum limits on intake for iodine for the general population? If so, what are the recommendations?

Sweden, the Slovak Republic, and Italy recommend no more than two KI doses for the general population, and only one for babies and pregnant women, while France and the Netherlands anticipate only one dose for everyone. Canada restricts dosage for babies and pregnant women, while Poland enforces a 100 mg dose limit for the entire population. Romania restricts dosage to 1 000 mg for the general population and 12.5 mg for newborn babies.

6.4.12 Do you recommend implementation differences, in term of dose (mg), duration or frequency, for territories with low dietary iodine levels? If so, what are the recommendations?

No country recommends different implementation levels for those with low dietary iodine as many feel it is not applicable. Switzerland, Austria, and Hungary add iodine to salt, therefore eliminating the risk of low levels of dietary iodine. The Slovak Republic does not set generic rules but would advise individuals to consult with a physician.

6.4.13 Are any precautions taken for members of the public who may suffer severe side effects from a high dose of stable iodine or may have thyroid disease?

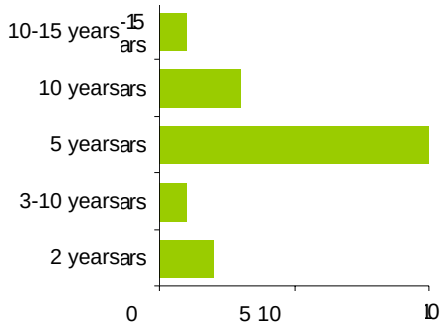
Most countries have given this some sort of consideration, with most relying on the patient information leaflet distributed with the tablets to give appropriate advice. Patients with known problems are expected to consult a doctor before taking the tablets in the Netherlands, the Slovak Republic, the Czech Republic, Spain, the Republic of Korea, Japan, and France. Poland keeps medical staff on hand when implementing stable iodine to provide advice on health impacts.

In Finland, the information leaflet advises against taking the tablets for those with iodine dysfunction, allergies, etc., while in Canada, Turkey, and the UK the leaflets present the contraindications and may advise medical supervision. In Switzerland the information leaflet advises those who may have side effects to contact their doctor after the end of the emergency. In Germany those aged 45 and over are advised not to take stable iodine, and Sweden, Ireland, Hungary, and Italy do not plan for any precautions of this type.

6.4.14 *What is the assumed shelf life of the stable iodine tablets?*

The majority of countries state that iodine tablets have a shelf life of 5 years if stored correctly. Germany report a shelf life of 10-15 years, similar to Austria and Switzerland, which both report a shelf life of 10 years but see no reason why this could not be extended.

Figure 6.17: Assumed shelf life of the stable iodine tablets



In France, tests have shown that tablets remain active for a very long time, and they now state a production date rather than expiry date.

Tablets last 3-10 years in the Republic of Korea depending on the manufacturer, and 4 years in Poland.

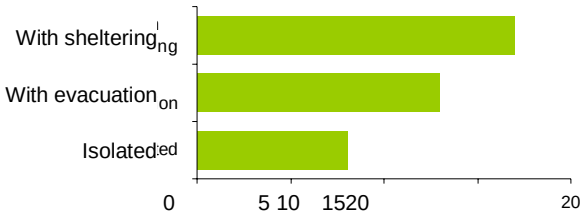
6.4.15 *May stable iodine be used as an isolated countermeasure or only together with sheltering or evacuation?*

Almost all countries would implement stable iodine along with sheltering or evacuation in certain circumstances.

France would implement alongside food restrictions.

The Slovak Republic, Japan, Poland, Turkey, Germany, the Czech Republic, and Italy would also consider it as an isolated countermeasure, and Sweden would do so for emergency workers or citizens abroad.

Figure 6.18: Stable iodine used as an isolated countermeasure or together with sheltering or evacuation



7. INFORMATION FOR THE POPULATION AROUND A NUCLEAR FACILITY

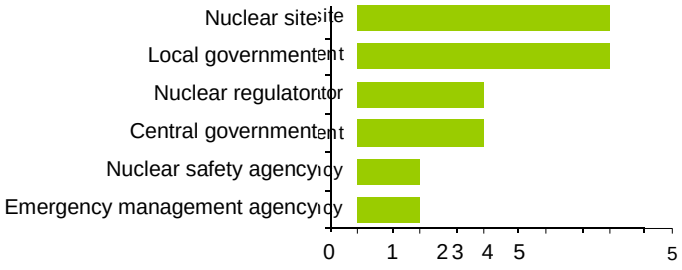
7.1 Does your country have educational programmes on the hazards and risks associated with the nuclear industry?

Of the 17 countries who responded to this question, around half had an educational programme of some kind and half did not. There seemed to be no obvious relationship between the range of nuclear facilities in a country and whether they provided educational programmes.

Around half of the countries who responded focus on providing written information, including Ireland, Romania, Spain, Switzerland, Sweden, and the Netherlands. Other countries take more varied approaches including public meetings and local training courses.

Local government and the nuclear providers are responsible for the education programmes in many countries, with support in some cases from central government (education, environment) and from nuclear regulators or safety agencies.

Figure 7.1: Providers of educational programmes on the hazards and risks associated with the nuclear industry



7.2 How are the public informed of the information detailed within emergency plans?

Around half of the countries who responded focus on providing written information, largely about general emergency management rather than specific nuclear information.

Ireland provides written information on emergency planning to every household. Romania and Sweden also provide written public information on emergency procedures. Switzerland provides written information on emergency procedures to those in emergency planning zones.

The Netherlands runs national campaigns on emergency preparedness, as well as providing nuclear information for those near the nuclear power plant. The public can visit a nuclear storage facility if they want to learn more. Poland is just beginning an educational programme relating to their nuclear power development programme.

Other countries have more varied approaches to their education programmes, some incorporating practical aspects of emergency management.

The Czech Republic distributes a “Public Protection Manual” as well as holding lectures based on off-Site emergency plans. Similarly, the Slovak Republic provides written

information to the population, as well as training local mayors in emergency procedures and providing a national PR centre for information and advice.

Hungary provides written information on emergency procedures to those near nuclear sites. A social association exists to communicate directly with the mayors of affected populations around nuclear sites to exchange specific information. General education for the population is provided through a museum and visitor centre at nuclear power sites, as well as a road show bus and promotion at festivals.

Italy provides the national and local plans to the public and institutional websites are used for public information. Spain provides public meetings and training courses. The Republic of Korea requires emergency workers to undergo legal education, and provides an outreach programme for the public and volunteers in case of radiological accidents. Japan provides elementary courses for affected residents. Canada has developed a training programme for those living near nuclear power plants, to educate them on risks and emergency procedures. France concentrates its education programme on school students, with exhibitions, teacher training, and a voluntary radiation protection workshop.

7.3 How is the population around a nuclear facility educated concerning the possibility and manner of implementation of a countermeasure by the authorities?

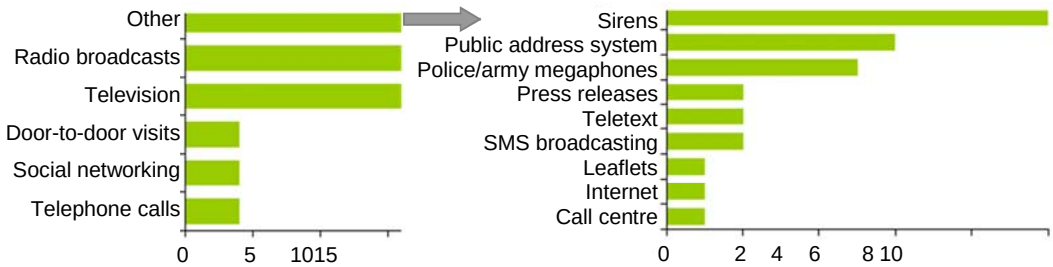
In addition to the public information described in Section 7.2, some countries provide specific information on countermeasures.

Sweden holds public meetings for affected populations to give specific information on emergencies related to nuclear power plants. Switzerland provides affected populations with written information during annual testing of sirens and iodine tablet distribution. The Netherlands provides specific nuclear information for those near the power plant, including where to access stable iodine. Spain provides courses for public information and Japan provides technical courses for countermeasures operators.

7.4 In case of an accident, how is the population around a nuclear facility alerted and kept informed concerning the practical implementation of countermeasures?

Most countries use radio and television broadcasts to alert the local population in case of an accident, although a similar number of countries also stated that they employed other methods.

Figure 7.2: Methods used to alert and keep informed the population around a nuclear facility in case of an accident



The most popular method specified in the "Other" category was sirens, followed by fixed public address systems, and then mobile public address methods carried out by police, army, or other emergency responders. In the Netherlands they are installing an SMS broadcasting system, and also have call centres and a website for people to access information themselves. In Italy, teletext and SMS broadcasting systems are used.

7.5 Is there a legal basis or obligation for the information of the public before and/or during an emergency?

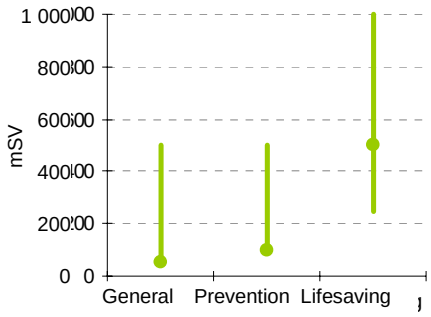
All of the countries who responded reported that there was a legal basis for providing public information. Just under half of countries stated that the basis was in general civil protection laws, whereas just over half cited more specific regulations relating to nuclear matters.

8. COUNTERMEASURES FOR SPECIAL GROUPS

8.1 Are there established dosimetric criteria for emergency workers?

All states except Turkey have established dosimetric criteria for emergency workers. The limits specified vary in different situations. Figure 8.1 shows the range of dose limits (in mSv) from general guidelines for emergency workers, to those involved in prevention of catastrophe, to those involved in saving human life. The lines show the range of limits set across countries, while the dots on each line show the median value for that situation. Most countries made it clear that exposure to higher doses than general levels is complete voluntary, and must be undertaken only by workers who are fully aware of the risks.

Figure 8.1: Established dosimetric criteria for emergency workers



General limits for emergency services workers range from 10 mSv in France, 20 mSv in Austria, to 500 mSv in the Republic of Korea. Spain, Sweden, Switzerland, and Hungary set their effective dose limits at 50 mSv effective dose. Canada and Poland have the same threshold but also include a stipulation that the dose should not exceed 100 mSv, effective dose over 5 years. Germany, Italy, Japan, and the Netherlands set their general doses at 100 mSv, while the Czech Republic sets a limit of 200 mSv per year.

Limits are slightly increased for those involved in actions preventing catastrophe or irradiation of large numbers of people; the Slovak Republic, Poland, Hungary, Austria, and France all set levels of 100 mSv, with France including a 1 Sv lifetime limit. Japan has temporarily increased the limit to 250 mSv following events at Fukushima, this is in line with the limits in the Netherlands. The Republic of Korea specifies no limits for this situation, so their general limit of 500 mSv applies.

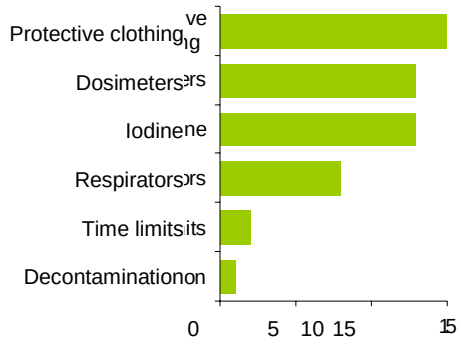
If emergency workers are involved in saving lives, the limits are higher again; Switzerland, Austria, and Hungary set limits at 250 mSv, although in Hungary low risk workers (older males) may go up to 1 Sv. France is the only country to set the limit for lifesaving actions at 300 mSv. Spain, the Slovak Republic, Poland, and Canada set this limit at 500 mSv, while the voluntary limit in the Netherlands is 750 mSv, and Germany has the highest specified level at 1 000 mSv. The Republic of Korea, Romania, and the Czech Republic do not have an advised limit for life saving, although they do specify that general or preventative limits can be exceeded on a voluntary basis.

8.2 Are there different countermeasures planned (stable iodine, dosimetry, protective clothing…) for emergency workers who may need to be outside in an affected area?

Most countries provide some sort of protective clothing for workers who may have to be outdoors during an emergency. Most also provide dosimeters and iodine (where appropriate).

Respirators are provided to emergency workers by around half of the countries who responded. Poland and the Netherlands attempt to limit the exposure times, and Hungary considers providing decontamination facilities.

Figure 8.2: Different countermeasures planned for emergency workers who may need to be outside in an affected area



8.3 Have other special groups been identified in your country for the implementation of short-term countermeasures?

In addition to emergency services personnel, five countries identified other groups considered for short-term protective measures. Sweden includes bus drivers and evacuation centre personnel, similarly Romania considers protective measures for those support workers involved in the response. Poland considers teachers and care workers in the affected region; Finland includes hospital workers, social workers, and utility workers. Canada includes hospitals and schools, and Ireland includes farmers.

8.4 Are there plans for early warning of farmers, hospitals, or others needing extra time to prepare for evacuation or sheltering?

Less than half of the countries who responded to the questionnaire had plans for early warning to specific groups. The Netherlands currently does not include this aspect in their plans but it may be updated in light of learning from exercises, and from Fukushima and Eyjafjallajökull. Finland plans early warning and countermeasures for farmers, social workers, and utilities workers; Switzerland will advise farmers and hospitals on what action to take. In Germany and the UK emergency plans for each site should include provision for hospitals, schools, prisons, etc., but in the UK this may vary between sites. Ireland plans to use existing networks for communication with farmers in the event that advice conflicts with that given to the general public.

8.5 Are there different countermeasures planned (stable iodine, dosimetry, protective clothing…) for farmers or other non-emergency workers who may need to be outside in an affected area?

The Netherlands provides respirators and dosimeters for those in vital industries, and limits exposure times where possible. Farmers and individuals living outside the primary zone in Canada will be given stable iodine, protective clothing, dosimeters, and may be advised to shelter or evacuate. The UK, Ireland, and Finland have no firm plans in place but would react depending on individual situations.

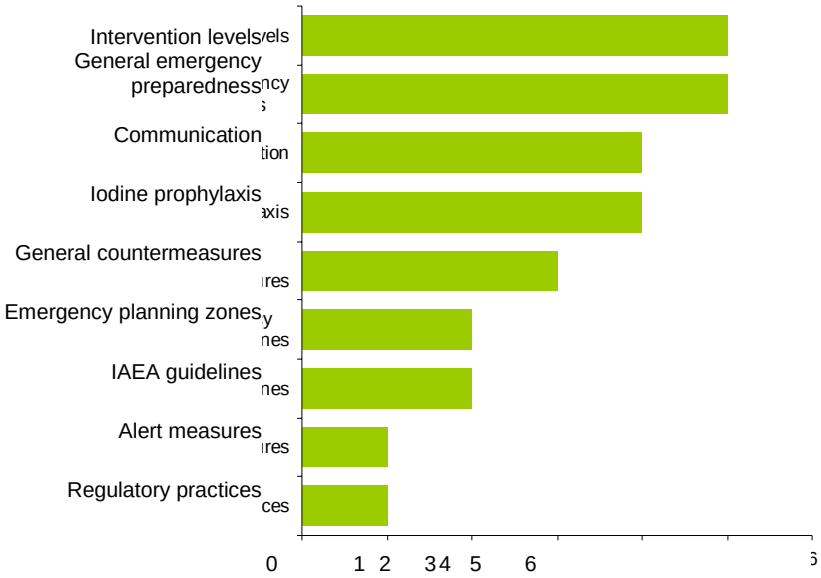
Around half of the countries that responded include special provisions for livestock, with guidelines advising to bring them indoors where possible, and avoid contaminated feed.

9. HARMONISATION OF COUNTERMEASURES

9.1 Has an attempt been made to harmonise basic rules or specific emergency plans, or intervention criteria with neighbouring countries (or states, provinces, Länder…)?

Of the 20 countries responding, 12 reported that harmonisation attempts had been made to various extents. The Czech Republic, Hungary, Italy, the Republic of Korea, and Japan stated that no efforts had been made; Poland reported that harmonisation was not necessary as there was no relevant facility within the vicinity of Polish borders. Ireland stated that no harmonisation methods were currently agreed but that this was under consideration. Spain stated the collaboration with the Working Group on Emergencies of HERCA, which is currently working on a harmonised approach with regard to the management of nuclear and radiological emergency situations.

Figure 9.1: Attempts made to harmonise basic rules or specific emergency plans or intervention criteria with neighbouring countries



Intervention levels and general emergency preparedness were the most common areas countries reported attempting to harmonise. Communication and iodine prophylaxis were also common responses. Two countries reported that they were following IAEA guidelines in an attempt to harmonise their responses with neighbours and others in the international community, whereas other countries reported local agreements over harmonisation.

Generally countries reported harmonisation with their direct neighbours – Canada with the USA, or Germany with France, Switzerland and the Netherlands. The UK response reported internal co-operation between England, Scotland, and Wales, but no further abroad, and the Nordic countries have drawn up a manual relating to co-operation in the event of a radiological emergency.

9.2 For nuclear facilities near a border of a country (or states, provinces, Länder…), is there co-operation/co-ordination between emergency management in the emergency planning zones of both countries (or states, provinces, Länder…)? Which organisations (type and jurisdictional level) are responsible for maintaining co-operation and co-ordination across such borders?

Most countries have bilateral agreements in place where there are nuclear facilities near a border.

Canada plans co-operation in all aspects of emergency planning where the primary zone of a facility extends over a border. The Slovak Republic, the Netherlands, and Switzerland report bilateral information sharing, and France adds that joint exercises are undertaken to test these processes.

Poland, Finland, and Austria have early notification systems in place with their neighbours despite the fact there are no relevant facilities near their borders.

Perhaps surprisingly, ministries of the interior are most commonly reported to be involved in maintaining cross border co-operation. There are joint commissions in place between the Netherlands, Germany, France, and Switzerland specifically for this purpose and a variety of other organisations are involved in various other countries, including nuclear regulators and emergency management agencies.

Figure 9.2: Organisations responsible for maintaining co-operation and co-ordination across borders for nuclear facilities near a border of a country

9.3 In case of an accident occurring in a neighbouring country (region), near the border, could information from the accident country (region) be sufficient for the implementation of harmonised countermeasures?

Most of the countries that completed this section felt that information from the affected country would not only be sufficient but would be the best source of information. The Slovak Republic referred to bilateral agreements on data sharing already in place, Switzerland outlined web-based methods for sharing information with neighbours if they experience a nuclear incident, and Romania stated that they were happy to implement protective actions for their population based on information gathered by the affected country. The Canadian submission draws on experience from exercises to conclude that data from the USA would be sufficient in the event of an incident.

Turkey did not feel that information gathered by the affected country would be sufficient, nor did France, which felt that there is further work needed to agree upon common procedures, exchange information and conduct exercises to test this aspect of the response.

10. CONCLUSIONS AND PERSPECTIVES

Twenty NEA member countries completed the questionnaire on short-term countermeasures, providing an updated overview of current practices and regulations regarding short-term countermeasures, as well as some insights into short-term countermeasure planning and implementation.

The information given in this report allows NEA member countries to compare national practices with other countries, and identify areas for further review and co-ordination. The information may also be used to understand the basis for decisions in various countries, and, if deemed necessary, as a basis for international harmonisation. This may help to explain to the public affected by an emergency why the decisions in neighbouring countries may vary.

The nuclear regulator was involved in completing the questionnaire for all countries. In many cases other key government departments such as health, environment, or emergency management agencies contributed to the response. In some countries the technical nuclear agencies provided expertise where required. In some countries, competencies and duties in connection with short-term countermeasures are shared between different levels, e.g. federal and regional levels such as Länder or provinces.

Most countries plan to use stable iodine, sheltering, evacuation, access controls, and food restrictions in the case of a near field accident. Countries are more likely to have planned food and water restrictions in the case of a far field accident, although many still do not rule out use of iodine and sheltering. Evacuation is much less likely but still considered. Most countries have national legislation that defines intervention levels. Many also used IAEA or ICRP guidance, while others turned to WHO, EURATOM, or EC guidelines.

In terms of harmonisation of the countermeasures, more than half of the respondent countries reported that harmonisation attempts had been made to various extents. Most countries have bilateral agreements in place where there are nuclear facilities near a border. It was pointed out that further work is needed to agree upon common procedures, exchange information, and conduct exercises to test this aspect of the response.

The WPNEM supports the updating of this survey of national policies regarding short-term countermeasures on a regularly basis, e.g. every five years.

APPENDIX A: LIST OF NEA MEMBERS RESPONDING TO SURVEY

Austria	Federal Ministry of Agriculture, Forestry, Environment, and Water Management, Division V/7, Radiation Protection
Canada	Canadian Nuclear Safety Commission (CNSC), Emergency Management Programs Division, Health Canada (HC), Radiation Protection Bureau
Czech Republic	State Office for Nuclear Safety (SÚJB)
Finland	Radiation and Nuclear Safety Authority (STUK)
France	Nuclear Safety Authority (ASN), Directorate for Environment Protection and Emergency Preparedness International Co-operation for Radiological Emergency Preparedness and Response
Germany	Bundesamt für Strahlenschutz (BfS)
Hungary	Hungarian Atomic Energy Authority (HAEA), Nuclear Safety Inspectorate
Ireland	Radiological Protection Institute of Ireland (RPII), Environmental Surveillance and Assessment
Italy	National Institute for Environmental Protection and Research Department of Nuclear (ISPRA), Technological and Industrial Risks Division of Nuclear Activities Control
Japan	Japan Nuclear Energy Safety Organization (JNES), Nuclear Emergency Preparedness and Response Division, Office of Radiation Regulations (Nuclear Safety Division), Science and Technology Policy Bureau
Republic of Korea	Korea Institute of Nuclear Safety (KINS), Nuclear Emergency Preparedness Department, Emergency Management Division
Netherlands	Ministry of Infrastructure and Environment, Crisis Management Department
Poland	National Atomic Energy Agency, Radiation Emergency Centre (CEZAR)
Romania	National Commission for Nuclear Activities Control (CNCAN)
Slovak Republic	Slovak Nuclear Regulatory Authority (UJD SR), Department of Emergency Planning, Informatics and Personnel Training
Spain	Consejo de Seguridad Nuclear (CSN), Deputy Direction of Emergencies, Emergency Planning, and Preparedness
Sweden	Swedish Radiation Safety Authority (SSM), Department of Radiation Protection, Section for Emergency Preparedness and Response
Switzerland	Federal Department of Defence, Civil Protection and Sports, Federal Office for Civil Protection, National Emergency Operations Centre
Turkey	Turkish Atomic Energy Authority (TAEK)
United Kingdom	Office for Nuclear Regulation (ONR)

APPENDIX B: SURVEY ON SHORT-TERM COUNTERMEASURES

1. NEA member information

1.1 What types of nuclear facilities/applications are located/conducted within your country?

Practice	Own country
Operational nuclear power plant	
Decommissioning nuclear power plant	
Nuclear fuel manufacture	
Nuclear fuel reprocessing	
Operational research reactors	
Decommissioning of research reactors	
Operational defence facilities [1]	
Decommissioning defence facilities	
Nuclear radioactive waste processing	
Nuclear radioactive waste disposal/storage	
None	
Other (specify)	

1.2 What type of facilities/applications are located within your neighbouring countries?

Practice	Neighbouring country
Operational nuclear power plant	
Decommissioning nuclear power plant	
Nuclear fuel manufacture	
Nuclear fuel reprocessing	
Operational research reactors	
Decommissioning of research reactors	
Operational defence facilities	
Decommissioning defence	

1. Defence facilities including weapons and naval reactors.

facilities
Nuclear radioactive waste processing
Nuclear radioactive waste disposal/storage
None
Other (specify)

1.3 What organisations (type and jurisdictional level) were involved in completing this questionnaire?

2. General objectives and criteria for short-term countermeasures

2.1 What are the objectives of implementing short-term countermeasures in the case of a nuclear emergency?

2.2 Describe the urgent countermeasures for the general public planned in your country to protect the public, agriculture, food manufacturing.

	Near field accident[2]	**Far field accident**[2]
Evacuation		
Sheltering		
Use of stable iodine		
Food/water restrictions		
Access controls		
Other (specify)		

2.3 What intervention levels and operational intervention criteria are used to initiate countermeasures, and how quickly should they be implemented?

	Intervention levels (mSv)[3]	**Operational intervention criteria**	**Time to implement**		
			0-1 hr	**1-3 hrs**	**>3 hrs**
Evacuation					
Sheltering					

2. A near field accident is defined as an accident that takes place in close proximity to the affected population. These locations are likely to be covered by detailed emergency plans which are exercised regularly. Far field accidents are accidents that take place at a greater distance to the affected populations (including in a neighbouring country), and these populations are only likely to be affected during a severe accident. These locations are likely to be covered by less-detailed emergency plans and are not routinely exercised.
3. Describe intervention applied, e.g. if intervention is dose, specify which dose is used: averted dose for an unprotected person, anticipated dose, effective dose, organ dose, and give integration period (one day, one week?). Please also include any information regarding particular consideration taken into account, e.g. pathways, integration time, etc.

Use of stable iodine
Food/water restrictions
Access controls
Other (specify)

2.4 What criteria are used for ending countermeasures?

	Criteria for ending a countermeasure
Evacuation	
Sheltering	
Use of stable iodine	
Food/water restrictions	
Access controls	
Other (specify)	

2.5 On which basis did you develop your intervention levels?

3. National organisation for nuclear accidents

3.1 What organisation(s)[4] developed the legal framework for your emergency preparedness and response system?

3.2 What organisation(s)[4] makes recommendations concerning the implementation of countermeasures in case of a nuclear emergency?

3.3 What organisation(s)[4] has the authority to make the decision whether or not to implement countermeasures in case of a nuclear emergency?

4. Emergency planning zones for nuclear facilities

4.1 What physical zones are pre-established for the purposes of countermeasure implementation (e.g. 5 km evacuation zone, 20 km sheltering zone)?

Type of facility	**Pre-established zones for countermeasure implementation**
Operational nuclear power plant	
Decommissioning nuclear power plant	
Nuclear fuel manufacture	

4. Specify both the type of organisation and its jurisdictional level within the country, i.e. federal, state, etc.

Nuclear fuel reprocessing
Operational research reactors
Decommissioning of research reactors
Operational defence facilities[5]
Decommissioning defence facilities
Nuclear radioactive waste processing
Nuclear radioactive waste disposal/storage
Other (specify)

5. Defence facilities including weapons and naval reactors.

4.2 What factors do you consider when determining the size of emergency planning zones?

Factor	Y/N	Comment (ex: frequency of likelihood applied)
Likelihood of accident occurring		
Size of radioactive release (Bq)		
Public dose consequence		
Severity of accident – design basis		
Severity of accident – severe accident		
Prescriptive requirements from government		
Findings from risk assessments/studies		
Demographics		
Other (specify)		

4.3 Does your country have a strategy for extending countermeasures beyond the planning zone for a very severe accident?

Yes ☐ No ☐

If so, please describe.

4.4 Are there special permissions required for the construction of new residential settlements or industrial facilities within emergency planning zones?

Yes ☐ No ☐

If so, what criteria are used to determine whether the construction will be permitted?

5. Off-site emergency plans

5.1 Describe the national legal framework for the provision of off-site emergency plans.

5.2 What organisation(s)[6] developed the guidance[7] for the implementation of the emergency plan?

5.3 What organisation(s)[6] developed the procedures for the implementation of short-term countermeasures?

6. Specify both the type of organisation and its jurisdictional level within the country, i.e. federal, state, etc.
7. Includes both legislative and non-legally-binding guidance/advice.

5.4 *What organisation(s)[6] are responsible for creating and maintaining the emergency plan?*

5.5 *Which factors were considered in developing emergency plan guidelines (general rules)?*

Public health risk	Yes ☐	No ☐
Time necessary for the implementation	Yes ☐	No ☐
Shielding qualities of average house	Yes ☐	No ☐
Availability of basement and shelters	Yes ☐	No ☐
Transportation availability	Yes ☐	No ☐
Public trauma	Yes ☐	No ☐
Night or day	Yes ☐	No ☐
Nuclear facility near a border	Yes ☐	No ☐
Costs	Yes ☐	No ☐
Countermeasure applied to entire population	Yes ☐	No ☐
Other (specify)		

5.6 *What stakeholders, including the public, are consulted in preparation or review of emergency plans?*

5.7 *What legal requirements are there for stakeholder consultation?*

5.8 *What legislation and guidance details what should be included in emergency plans?*

5.9 *What details are required by legislation/guidance to be included in emergency plans?*

Criteria for implementing countermeasures	☐
Roles and responsibilities in emergencies	☐
Roles and responsibilities for monitoring radioactivity	☐
Details of reception centres for evacuated members of the public	☐
Transport arrangements for evacuation	☐
Criteria for alerting/providing information to the public (including media interactions)	☐
Criteria for determining the end of the emergency phase	☐
Recovery arrangements	☐
Emergency dose limits for emergency services personnel	☐
Extreme weather conditions	☐

Others (specify)	☐

5.10 *Has a phased implementation of countermeasures been considered in emergency plans, for example?*

Close area followed by further expansion of the restricted area	Yes ☐	No ☐
Specific population followed by general population	Yes ☐	No ☐
Schools followed by general population	Yes ☐	No ☐
Other (specify)		

5.11 *How often do you undertake full exercises to test emergency plans for scenarios that form the basis of the emergency plan?*

Level of exercise	**Frequency**
On-site	
Off-site	
National	
International	
Regional	

5.12 *How often do you undertake full exercises to test the extension of the arrangements in the emergency plan to deal with a more severe accident?*

Level of exercise	**Frequency**
On-site	
Off-site	
National	
International	
Regional	

6. Implementation of short-term countermeasures

6.1 *General points concerning the implementation of short-term countermeasures.*

6.1.1 What information or criteria are considered necessary and sufficient to justify the implementation of short-term countermeasures?

6.1.2 Which factors are likely to be taken into account at the time of a nuclear accident when selecting which countermeasures to implement?

	Evacuation	Sheltering	Stable iodine	Food/water restrictions	Access control
Legislation, agreement, guidance					
International					
National					
Local					
Nature of event					
Estimated duration of release					
Level of deposition					
Location and size of area affected					
Population					
Number of people affected					
Vulnerability of people affected, e.g. children					
Level of preparedness of the population					
Weather conditions					
Timing					
Time of day					
Time elapsed since release/contamination					
Time it would take to implement					
Acceptability of duration of countermeasure					
Radiation protection					
Exposure of emergency workers to implement					
Food safety, contamination of food stuffs					
Dose averted by implementing					
Operational intervention criteria					
Availability of resources/infrastructure/tools					
Sufficient resources					
Sufficient skills/training					
Damage to infrastructure					
Availability of stable iodine tablets					
Availability of relocation facilities					
Environmental concerns					
Type of area: residential, industrial, recreational					
Geological location: coast, mountainous					
Economic & political					

	Evacuation	Sheltering	Stable iodine	Food/water restrictions	Access control
Direct costs					
Indirect costs					
International relations					
Political decisions					
Media impact					
Compensation					
Waste containing radioactive substances					
Minimising amount of waste					
Type of waste					
Treatment of waste					
Social & ethical aspects					
Disturbance to normal life conditions					
Possibility of self-help					
Participation of stakeholders (population, groups of interest)					
Socio-economic effects					
Other					

Answer "Yes" or "No", give priorities if possible.

6.1.3 Among the above-listed factors, which is the most important when deciding whether or not to implement a countermeasure?

Evacuation
Sheltering
Stable iodine
Food/water restrictions
Access controls

6.1.4 Describe how your country co-ordinates the implementation of countermeasures.

6.2 Specific countermeasure: Evacuation

6.2.1 Has your country ever experienced evacuation for an actual or potential radiological emergency?

Yes ☐ No ☐

If so, what was the size of the population and of the area affected?

What was the impact on the evacuated population?

6.2.2 Has your country ever experienced evacuation as a result of non-radiological emergencies, such as a hurricane?

Yes ☐ No ☐

If so, what was the size of the population and of the area affected?

Did you apply this non-nuclear experience to your nuclear emergency planning and preparations?

If so, please provide details of significant learning points from these events.

6.2.3 Has your country ever implemented real evacuation as part of an exercise?

Yes ☐ No ☐

If yes, please identify whether actors or real members of the public were evacuated and provide significant learning points.

6.2.4 Do you foresee evacuation?

As your initial countermeasure	☐
Only before nuclear release and contamination	☐
Only after nuclear release and contamination	☐
Either before or after release and contamination	☐

Explain.

6.2.5 Describe how evacuation within the emergency planning zone would be executed.

6.2.6 Describe how you identify and prioritise different groups within the population such as children, medically infirm, etc.

6.3 Specific countermeasure: Sheltering

6.3.1 Has your country ever experienced sheltering for an actual or potential radiological emergency?

Yes ☐ No ☐

If so, what was the size of the population and of the area affected?

What was the impact on the sheltered population?

6.3.2 Has your country ever experienced sheltering as a result of non-radiological emergencies, such as chemical spill or threat?

Yes ☐ No ☐

If so, what was the size of the population and of the area affected?

Did you apply this non-nuclear experience to your nuclear emergency planning and preparations?

6.3.3 Has your country ever implemented real sheltering as part of an exercise?

Yes ☐ No ☐

If yes, explain the results.

6.3.4 Do you foresee sheltering as an initial countermeasure?

Yes ☐ No ☐

Explain.

6.3.5 What countermeasure(s) accompany or follow sheltering?

6.3.6 May sheltering be applied differently for different groups within the population, such as children, pregnant women, etc.?

6.3.7 What criteria are used when selecting between sheltering and evacuation?

6.4 Specific countermeasure: Use of stable iodine

6.4.1 Has your country ever experienced an actual or potential radiological emergency that has resulted in the consumption of stable iodine by the population?

Yes ☐ No ☐

If so, what was the size of the population and of the area affected?

Were there any identifiable health impacts on the affected population resulting from the consumption of stable iodine?

6.4.2 Has your country ever implemented distribution of "simulated" stable iodine tablets (made of sugar for example) as part of an exercise?

Yes ☐ No ☐

If so, explain the results.

6.4.3 How is stable iodine distributed to individual members of the population?

At their residence before an emergency	Yes ☐	No ☐
At their businesses before an emergency	Yes ☐	No ☐
At their residence during an emergency	Yes ☐	No ☐
At schools, nursery schools, and other childcare	Yes ☐	No ☐
At a pharmacy or other location before an emergency	Yes ☐	No ☐
At a pre-designated location during the emergency	Yes ☐	No ☐
At a public shelter during the emergency	Yes ☐	No ☐
At a road control point during	Yes ☐	No ☐

evacuation		
By the emergency services	Yes ☐	No ☐
Others (please specify)		

6.4.4 *Is there an area in which stable iodine is pre-distributed to the population?*

Yes	☐
No	☐
Depends on the nuclear facility	☐
Other	☐

If so, what is the size of the area?

What is the range of population, in numbers, around nuclear facilities with pre-distributed stable iodine?

6.4.5 *If stable iodine is not pre-distributed to the population within the emergency planning zone, how quickly do you assume it be distributed? If this varies according to the size of the population or any other factors, please explain.*

6.4.6 *Where is stable iodine stockpiled?*

Home	☐
Schools	☐
Place of business	☐
Public shelter	☐
Pharmacies	☐
Local authorities	☐
National authorities	☐
Others	☐

6.4.7 *Who pays for stable iodine?*

Individual member of the public if they want some	☐
Only individual member of the public	☐
Businesses	☐
Nuclear facility	☐
Local authority	☐
National authority	☐
Others	☐

6.4.8 What form of stable iodine is used?

KI tablets	☐
KIO3 tablets	☐
Others	☐

6.4.9 Are stable iodine tablets commercially available at pharmacies?

6.4.10 What iodine dose (mg), ingestion frequency, and duration are recommended in case of a nuclear emergency in your country for various populations?

Population	**Dose (mg)**	**Frequency**	**Duration**
Infants			
Children			
Adults			
Pregnant women			
Others			

6.4.11 Do you recommend maximum limits on intake for iodine for the general population?

Yes ☐ No ☐

If so, what are the recommendations?

6.4.12 Do you recommend implementation differences, in term of dose (mg), duration, or frequency, for territories with low dietary iodine levels?

Yes ☐ No ☐ Not applicable ☐

If so, what are the recommendations?

6.4.13 Are any precautions taken for members of the public who may suffer severe side effects from a high dose of stable iodine or may have thyroid disease?

6.4.14 What is the assumed shelf life of the stable iodine tablets?

6.4.15 May stable iodine be used as an isolated countermeasure or only together with sheltering or evacuation?

Isolated	☐
With sheltering	☐
With evacuation	☐

7. Information for the population around a nuclear facility

7.1 Does your country have educational programmes on the hazards and risks associated with the nuclear industry?

Yes ☐ No ☐

What kind of educational programme has been developed?

What type of organisation is responsible for these educational programmes?

7.2 How are the public informed of the information detailed within emergency plans?

Leaflets/documentation	☐
Public meetings	☐
Training courses	☐
Other (please specify)	☐

7.3 How is the population around a nuclear facility educated concerning the possibility and manner of implementation of a countermeasure by the authorities?

7.4 In case of an accident how is the population around a nuclear facility alerted and kept informed concerning the practical implementation of countermeasures?

Telephone calls	☐
Television broadcasts	☐
Radio broadcasts	☐
Social networking	☐
Door-to-door visits	☐
Other (please specify)	☐

7.5 Is there a legal basis or obligation for the information of the public before and/or during an emergency?

Yes ☐ No ☐

If yes, specify.

8. Countermeasures for special groups

8.1 Are there established dosimetric criteria for emergency workers?

Yes ☐ No ☐

If yes, specify.

8.2 Are there different countermeasures planned (stable iodine, dosimetry, protective clothing…) for emergency workers who may need to be outside in an affected area?

Which countermeasures?	For whom?

8.3 Have other special groups been identified in your country for the implementation of short-term countermeasures?

Yes ☐ No ☐

If yes, specify.

8.4 Are there plans for early warning of farmers, hospitals, or others needing extra time to prepare for:

Evacuation: Yes ☐ No ☐

If so, explain.

Sheltering: Yes ☐ No ☐

If so, explain.

8.5 Are there different countermeasures planned (stable iodine, dosimetry, protective clothing…) for farmers or other non-emergency workers who may need to be outside in an affected area?

Which countermeasures?	For whom?

Are there any special requirements for the welfare of livestock during the emergency or recovery phases?

9. Harmonisation of the countermeasures[8]

9.1 Has an attempt been made to harmonise basic rules or specific emergency plans, or intervention criteria with neighbouring countries (or states, provinces, Länder…)?

Yes ☐ No ☐

If yes, which parts of the emergency plan are (will be) harmonised?

With which country (or region)?

9.2 For nuclear facilities near a border of a country (or states, provinces, Länder…), is there co-operation/co-ordination between emergency management in the emergency planning zones of both countries (or states, provinces, Länder…)?

Which organisations (type and jurisdictional level) are responsible for maintaining co-operation and co-ordination across such borders?

9.3 In case of an accident occurring in a neighbouring country (region), near the border, could information from the accident country (region) be sufficient for the implementation of harmonised countermeasures?

8. Due to differences in regulations and other boundary conditions real harmonisation on both sides of a national border may not always be possible, but each side should be aware of the concepts of the other in order to understand possible differences and communicate these to the public.