

ANNEX 4

International and national actions in response to a radiation emergency

Information in Tables 1–4 summarizes the actions of the World Health Organization, the International Atomic Energy Authority, other international organizations, and local health authorities in response to a nuclear accident, in compliance with the Convention on Early Notification and the Assistance Convention.

Table 1. International response during the early phase of an accident¹

IAEA	WHO/HQ	Regional offices	Other international organizations
1. Establish direct telephone links with the accident State and States that might be affected.	1. Develop communication with Regional Offices and Member States. This includes developing links with the Ministries of Health of the accident country, of the affected States and of those that may be affected.	1. If information about an accident was obtained from an accident country or an affected country, inform WHO/HQ.	FAO —Collect and assess information from IAEA, the accident country or affected countries, on possible food contamination. Disseminate relevant information.
2. Identify States within a 1000km radius from the release location that might be affected.	2. Request that the accident State, IAEA and WMO provide computer modelling maps of the radioactive cloud.	2. Establish communications with WHO/HQ, the Ministries of Health in accident and affected countries, and with WHO/REMPAN members in the Region.	WMO —Information on the direction of any released radioactive material should be issued regularly by designated WMO centres, for transmission to States and international organizations.
3. Contact affected States and provide them with special numbers for contacting the IEAE.	3. Request ICRP and IRPA assist in evaluating health consequences.	3. Undertake actions according to emergency plan.	UNOCHA —Assist in coordinating the mobilization of resources to overcome
4. States outside the 1000km zone will also be rapidly informed of the release, but not on a priority basis.	4. Request that REMPAN and GERMON members provide WHO with information on their readiness to assist (upon request) the accident country and affected States. The information should specify the type of assistance available (e.g. workforce, finance).	UNEP —Provide environmental and natural resources information through GEMS, GRID and GERMON, for analysis.	
		4. Regularly inform WHO/HQ about any progress in the development of the situation.	

Table 1. (Continued)

IAEA	WHO/HQ	Regional offices	Other international organizations
	5. Contact Regional Offices to mobilize resources (including financial) for the accident countries and affected States.		consequences of the accident.
	6. Follow-up on the accident development and, if necessary, convene expert group meeting to obtain recommendations.		United Nations International Emergency Network -Assist in distributing relevant information after a radiation emergency.

¹ Abbreviations: FAO = United Nations Food and Agriculture Organization; GEMS = Global Environment Monitoring System; GERMON = Global Environmental Radiation Monitoring Network; GRID = Global Resource Information Database; IAEA = International Atomic Energy Agency; ICRP = International Commission on Radiological Protection; IRPA = International Radiation Protection Association; REMPAN = Network for Radiation Emergency Medical Preparedness and Assistance; UNEP = United Nations Environment Programme; UNOCHA = United Nations Office for the Coordination of Humanitarian Affairs; WMO = World Meteorological Organization.

Table 2. National and local response priorities

National and Local level	<ol style="list-style-type: none"> 1. First medical care to radiation victims. 2. The accident State and affected States provide IAEA and FAO with information on food and drinking-water contamination. 3. If necessary, implement the following countermeasures: sheltering, radioprotective prophylaxis, iodine prophylaxis, body protection, evacuation, personal decontamination. (See Annex 5). 4. If necessary, request assistance of international community.
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Table 3. International and local response during the intermediate phase of an accident

IAEA	WHO/HQ in cooperation with WHO/ROs		
	No request for assistance	Request ¹	Local level
1. Transmit requests for assistance and relevant information.	<ol style="list-style-type: none"> 1. Monitor and study the situation. 2. Communicate between WHO/HQ, WHO/ROs, Ministries of Health of the affected countries, and information exchanges, etc. 3. Maintain REMPAN & GERMON in operational readiness. 	<ol style="list-style-type: none"> 1. Acknowledge receipt of the request. Notify the requesting State directly or through IAEA if it is in a position to render the requested assistance and of the terms of such assistance. 2. Within the limits of WHO/HQ and WHO/RO's capability, identify and notify the IAEA of experts, equipment and materials that could be available for provisional assistance. 	<ol style="list-style-type: none"> 1. Specify the scope and type of assistance required. 2. Provide the assisting party with information that allows it to determine the extent to which it is able to meet the request. 3. Unless otherwise agreed: provide overall direction, control, coordination and supervision of the assistance; in consultation with the requesting State, designate a person to a
2. Offer to coordinate assistance efforts to States requesting support.			
3. Provide the resources for			

Table 3. (Continued)

IAEA	WHO/HQ in cooperation with WHO/ROs		
	No request for assistance	Request ¹	Local level
an initial assessment of the accident or emergency.	4. Mobilize resources.	3. Inform IAEA and other State Parties (directly or through IAEA) of WHO-competent authorities and points of contact.	supervisory role, who should cooperate with the appropriate authority of the requesting State.
4. Develop appropriate monitoring programmes, procedures and standards.	5. Request additional information from the accident country, affected countries, IAEA and other relevant organizations.	4. Request information in compliance with the checklist.	4. Provide local facilities and services for administering the assistance.
5. Send radiological and emergency teams to the site of the accident.	6. If necessary, convene a meeting of experts to obtain recommendations.	5. Request additional information, if the information is seen at WHO/HQ as insufficient.	5. Ensure the protection of personnel, equipment and materials brought into its territory by, or on behalf of, the assisting party.
		6. Inform the country about the type of assistance to be sought by WHO from its REMPAN Collaborating Centres.	6. Ensure the return of the equipment and materials to the assisting party.
		7. Describe the Collaborating Centres that will be approached.	7. Inform WHO about the termination of assistance.
		8. Ask the selected Collaborating Centre for available assistance.	8. <i>Applicable countermeasures:</i> sheltering; radioprotective prophylaxis; body protection; decontamination of areas; evacuation.
		9. Establish link between the requested country and assisting centre(s), inform REMPAN of the outcome of the request.	9. <i>Applicable or essential countermeasures:</i> evacuation; personal decontamination; relocation; food control.
		10. Keep all REMPAN centres informed about the details of the accident and progress in its management.	

¹May come directly from the accident or affected countries, via IAEA, or other international intergovernmental organizations

Table 4. International and local actions during the recovery phase of an accident

International level	Local level
1. Actions depend on the requests of the accident countries or affected countries. They may relate to providing humanitarian assistance to the accident country or affected countries, or to facilitating medical and epidemiological follow-up.	1. <i>Applicable countermeasures:</i> personal decontamination; relocation; control of access. 2. <i>Applicable or essential countermeasures:</i> food control; decontamination of areas.

ANNEX 5

Selected information from the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources¹

The management of accident situations outlined in the standards are based on principles of the International Commission on Radiological Protection (ICRP) for planning and deciding interventions to cope with a radiological emergency. These principles are:

- All possible efforts should be made to prevent serious deterministic health effects.
- The intervention should be justified, in the sense that introduction of the protective measure should achieve more good than harm.
- The levels at which the intervention is introduced and later withdrawn should be optimized, so that the protective measure(s) will produce a maximum net benefit.

The main criterion for deciding on intervention is the mean individual dose that is expected to be avoided by the intervention.

Dose levels at which intervention is expected to be undertaken under any circumstances (be justified) are given in Tables 1 and 2.

Table 1. Acute exposure levels for intervention

Organ or tissue	Projected absorbed dose (Gy) to the organ or tissue in less than 2 days
Whole body (bone marrow)	1
Lung	6
Skin	3
Thyroid	5
Lens of the eye	2
Gonads	3

Note: Doses greater than about 0.1 Gy (over less than two days) could have deterministic effects on a foetus, which should be taken into account when justifying and optimizing interventions for immediate protective action.

Table 2. Chronic exposure dose rates for intervention

Organ or tissue	Equivalent dose rate (Sv.a ⁻¹)
Gonads	0.2
Lens of the eye	0.4

¹Jointly sponsored by FAO, IAEA, OECD/NEA, PAHO, WHO, Vienna 1996 (International Atomic Energy Agency, 1996).

Intervention levels in emergency exposure situations are expressed in terms of avertable dose, i.e. a protective action is indicated if the dose that can be averted is greater than the corresponding dose for the intervention level. Standard dose values have been developed by IAEA, and these can help set dose levels for emergency exposures (Table 3).

The recommended generic action levels for foodstuffs are presented in Table 4. Table 4 is based on, and consistent with, the Codex Alimentarius Commission's guideline levels for radionuclides in food moving in international trade following accidental contamination, but it is limited to the nuclides usually considered relevant to emergency exposure situations.

Optimized generic avertable doses recommended for temporary relocation and permanent resettlement interventions are given in Table 5. The avertable dose levels apply to situations where alternative food supplies are readily available. If food supplies are scarce, higher avertable doses may apply.

Table 3. Recommended generic intervention levels for urgent protective measures

Protective action	Generic intervention level (dose avertable by the protective action)
Sheltering	10mSv in a period of no more than two days
Temporary evacuation	50mSv in a period of no more than one week
Iodine prophylaxis	100mSv (absorbed dose due to radioiodine) ¹

¹For children, WHO recommends 10mSv.

Table 4. Generic action levels for foodstuffs

Radionuclides	Food for general consumption (kBq/kg)	Milk and infant foods, drinking-water (kBq/kg)
Cs-134, Cs-137, Ru-103, Ru-106, Sr-89	1000	1000
I-131	1000	100
Sr-90	100	100
Am-241, Pu-238, Pu-239	10	1

Table 5. Recommended generic avertable doses for temporary relocation and permanent resettlement interventions

Action	Avertable dose
Initiating temporary relocation	30 mSv in a month
Terminating temporary relocation	10 mSv in a month
Permanent relocation	1 Sv in a lifetime

ANNEX 6

Checklist of hygiene practices that protect health in emergencies and disasters

The following is an extensive list of hygiene practices that protect health in disasters and emergencies. The list may be used as an aid to assessing hygiene practices and risks, and as a means of focusing hygiene messages on a few practices that influence health in a particular situation.

People's ability to achieve these protective actions depends on the availability of material resources, such as adequate clean water, soap, toilets, etc., and personal resources, such as time and energy.

Water safety

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| At the source | <ul style="list-style-type: none"> ■ Water for drinking is collected from the cleanest possible source. ■ If necessary, a distinction is made between water for drinking and water for other uses, such as bathing, laundry, watering animals. ■ Water sources are protected from faecal contamination by fencing (to keep animals away), and by siting latrines or defecation fields at least 10–30 metres away, depending on ground conditions. |
| Collection, storage and use of water at household level | <ul style="list-style-type: none"> ■ Water is collected and stored in clean, covered containers. ■ Water is taken from the storage container with a clean, long-handled dipper or through a tap placed slightly above the bottom container. ■ Efforts are made not to waste water. |
| Use of water | <ul style="list-style-type: none"> ■ If there is a risk that water is not safe, it is filtered and/or chlorinated or boiled¹ ■ Water for making food or drinks for young children is boiled. |
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Excreta disposal

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| Use of designated places for defecation | <ul style="list-style-type: none"> ■ Defecation is avoided near water sources and water-treatment plants, uphill of camps and water sources, in fields destined for crops, along public roads, near communal buildings such as clinics, near food-storage facilities. ■ Defecation is done in latrines, trenches, defecation fields, etc. ■ People avoid going barefoot to defecate. ■ Children do not visit a defecation area alone. ■ New arrivals at emergency settlements are aware of the arrangements for defecation and the importance of complying with them. |
| Children's sanitation | <ul style="list-style-type: none"> ■ Uncontrolled defecation by children is stopped. (The faeces of young children are more harmful than those of adults). ■ The stools of young children or babies are wrapped in leaves or paper and buried or put in a latrine. ■ Young children are helped to defecate into an easily-cleaned container that can be emptied into a toilet and washed out. ■ Children are cleaned promptly after defecation and have their hands washed. ■ People who clean children wash their own hands thoroughly afterwards. |
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Waste disposal

Solid waste

- Refuse is not scattered about. (This encourages insect breeding and attracts rats which can be a nuisance and transmit disease).
- In the immediate post-disaster period, if organized refuse collection has not been set up, household solid waste is buried by families.
- Once collection arrangements have been made, refuse is placed in the bins provided.
- Filled bins are not left in food-preparation areas.
- Bins are kept securely covered to prevent scavenging by children or animals.

Liquid waste

- Manure from livestock is collected and disposed of as safely.
- Standing pools of polluted wastewater (from washing, food preparation, wasted tap water) are not allowed to form. (They encourage mosquito breeding, which is a health hazard).
- Children are prevented from playing in or near hazardous pools of water.
- Arrangements for disposing of liquid waste, such as using soakage pits, are understood and followed.

Vector controlPersonal protection
against disease
vectors

- Household refuse is removed regularly to avoid build-up of houseflies and rat infestations.
- Foodstuffs are kept in rodent-proof stores or containers.
- Cooked foods, which may have been contaminated by houseflies, are properly reheated to a boil.
- Clothes are laundered frequently and insecticidal shampoos are used to prevent lice.
- In areas where mosquitoes are a problem, bed nets or bedroom screens are used, if available.

Personal hygiene

Water for washing

- If possible, plenty of water is used for washing.
- Clothing is laundered regularly.
- The most readily-available water is used for personal and domestic hygiene.

Hand-washing

- All family members wash their hands regularly: after defecating; after cleaning a child who has defecated and disposing of the stool; before preparing food; before eating; before feeding a child.
- Adults or older children wash the hands of young children.

Shelter

At the disaster site

- Where people are trying to house themselves in the ruins of their previous homes, they take steps to avoid risks from the lack of structural integrity of their buildings.
- If their homes are definitely unsafe, people move.

In longer-term
emergency
settlements

- People take part in residents' committees to voice their views about the setting up and running of a camp.
- Residents participate in cleaning the settlement.
- Children do not enter dangerous areas of the settlement and, if necessary, volunteers guard unsafe areas.

Food safetyDealing with
contaminated food

- Food that has been contaminated as a result of a disaster is disposed of or, if there is a food shortage, cleaned thoroughly (possibly by submerging in an antiseptic solution) and cooked for an extended period.
- Contaminated fruit is always peeled.
- Perishable food that has spoiled is salvaged by cutting out bad bits, prolonged washing and prolonged cooking (but milk, eggs, meat and fish that have not been stored properly are discarded).

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| Food handling and preparation | <ul style="list-style-type: none">■ Surroundings are kept clean; waste is disposed of properly; and food is stored in closed containers to avoid contamination by insects and vermin.■ Food is prepared in a clean place, using clean pots and utensils.■ Uncooked food is washed in clean water before it is eaten.■ Cooked food is eaten while still hot, and previously prepared food is thoroughly reheated.■ Kept foods are covered. |
| Feeding babies | <ul style="list-style-type: none">■ Children up to 6 months of age are breastfed.■ Weaning foods are clean and nutritious.■ Drinks are given with a cup and spoon rather than a bottle.■ People wash their hands before preparing weaning food and feeding a baby. |
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¹To make water safe for drinking, it should be brought to a vigorous rolling boil. If boiling or chlorination are not possible at household level, then low-turbidity water may be disinfected by exposing it to bright sunlight for at least one day (Reed 1997).