

WORLD HEALTH ORGANIZATION  
REGIONAL OFFICE FOR EUROPE

WELTGESUNDHEITSORGANISATION  
REGIONALBÜRO FÜR EUROPA



ORGANISATION MONDIALE DE LA SANTÉ  
BUREAU RÉGIONAL DE L'EUROPE

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ  
ЕВРОПЕЙСКОЕ РЕГИОНАЛЬНОЕ БЮРО

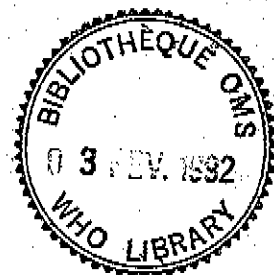
38519

EUR/ICP/CEH 102(S)  
7711B  
ORIGINAL: ENGLISH

## SUMMARY REPORT

### Working Group on Strategy for Public Health Action in Relation to Nuclear Emergencies

Solothurn, Switzerland  
15-18 October 1991



1991

EUR/HFA target No. 11

SUMMARY REPORTS are issued by the Regional Office in English, French, German and Russian. They may be reproduced, or translated into any other language, providing due acknowledgement is made.

Les RAPPORTS SOMMAIRES sont publiés par le Bureau régional en allemand, anglais, français et russe. Ils pourront être librement reproduits, ou traduits dans une autre langue, avec mention de la source.

KURZBERICHTE werden vom WHO-Regionalbüro in Deutsch, Englisch, Französisch und Russisch herausgegeben. Nachdruck oder Übersetzung in andere Sprachen mit Quellenangabe gestattet.

КРАТКИЕ ОТЧЕТЫ издаются Региональным бюро на английском, немецком, русском и французском языках, но могут быть размножены или переведены на любой другой язык при наличии соответствующего указания на источник.

## Abstract

Over the years, and particularly since the Chernobyl nuclear accident in 1986, the Regional Office has amassed a wealth of experience on the public health aspects of nuclear power production, and has published extensively on the subject. The Working Group was convened to bring all this work together and make recommendations on the public health aspects of contingency planning for and response to nuclear accidents. The conclusions and recommendations thus cover definitions, general considerations, special considerations in the near field (countermeasures and the management of irradiated and contaminated individuals), stable iodine prophylaxis in the near and far fields, special considerations in the far field, communication with the public, the rapid exchange of information and provision of advice, and the follow-up to the Chernobyl accident.

### TARGET 11

#### REDUCING ACCIDENTS

*By the year 2000, deaths from accidents in the Region should be reduced by at least 25% through an intensified effort to reduce traffic, home and occupational accidents.*

#### Index:

NUCLEAR REACTORS  
ACCIDENTS  
RADIOACTIVITY  
DISASTER PLANNING  
PUBLIC HEALTH  
EUR

## Introduction

The WHO Regional Office for Europe has, progressively over the years, developed a series of reports and publications providing guidance on the public health aspects of nuclear power production. Immediately after the Chernobyl disaster in April 1986, the Regional Office established an emergency operation to provide technical cooperation and communication links with Member States during the first three months after the accident.

A special project on the public health dimensions of nuclear accidents was subsequently established, which carried out a series of activities related both directly to Chernobyl and to contingency planning for any future accidents. Although collaboration on the follow-up to Chernobyl will continue, the special project is now in its final phase. It was considered important that the experience gained and recommendations made should be brought together and developed into an overall scheme for action, to serve public health needs in relation to all types of major nuclear emergency within the European Region.

Thus, at the invitation of the Government of Switzerland, a working group was held to review and make recommendations on the public health aspects of contingency planning for and response to nuclear accidents. The meeting comprised experts in the areas of public health administration, radiation protection, clinical medicine, epidemiology, the behavioural sciences, emergency planning of health services and risk communication, as well as representatives from the International Atomic Energy Agency and the Commission of the European Communities.

## Conclusions and recommendations

### 1. Definitions

#### 1.1 The near field

1.1.1 The near field at the generic level is defined as any of the following:

- (a) the area within which deterministic effects cannot be ruled out;
- (b) the area in which decisions relating to the health of the population must be made immediately, on the basis of the release from the source;
- (c) an area that may have been so defined by regulating authorities for the purposes of special emergency planning.

1.1.2 The main pathways for acute exposure in the near field are as follows, in approximate order of importance:

- (a) external irradiation from airborne radionuclides;
- (b) inhalation of airborne radionuclides;
- (c) external irradiation from radionuclides on the ground;
- (d) external contamination and inhalation from airborne radionuclides;
- (e) ingestion of contaminated foodstuffs.

1.1.3 The size of the near field will be determined mainly by the source term.

1.1.4 It is of primary importance for emergency planning in the near field that it be based on the site-specific characteristics, which may be provided by the community profile and environmental parameters.

1.1.4.1 Community profile

(a) population (number, density, age, distribution, etc.);

(b) accessibility of the area (transport, traffic infrastructure, etc.);

(c) availability of emergency services (fire, police, medical, other specialized services);

(d) housing quality (referring to its shielding properties).

1.1.4.2 Environmental parameters: land use, season and meteorological parameters at the time of the accident.

1.1.5 This will help to maximize the beneficial effects and any countermeasure, and to minimize cost and disruption of social life.

1.2 The far field

1.2.1 The far field is characterized by the absence of the risk of deterministic health effects and more time for action. Important aspects of the far field are the medium- and long-term problems caused by the contamination of the environment. Whereas the exposure pathways are in principle the same as in the near field, the most likely and important are external irradiation from radionuclides deposited on the ground and the ingestion of contaminated foodstuffs.

1.2.2 Prolonging the time for action allows for decisions on the introduction of countermeasures to be based on environmental measurements, and for judgement of the most effective means of dose reduction.

2. General considerations

2.1 The consequences of a radiological accident involve a complex mix of radiological, economic, social and psychological issues, often with a transboundary impact. Measures to reduce exposure of the public to radiation should be determined in relation to the dose that can be averted and the economic and social costs that would be incurred.

2.2 The advice of the International Commission on Radiological Protection (ICRP) on the subject is in the process of major revision and is unlikely to be available before November 1992. The Regional Office should review its advice following publication of the ICRP revision.

2.3 It is important to reduce undue public anxiety. Psychological pressures exert a strong influence on public behaviour both at the time of an accident and in its aftermath. The perceived risks are more likely than actual risk to influence public reaction.

2.4 In view of the very severe and widespread stress-related effects on health as a result of the Chernobyl accident, the Working Group considered that education of the various professionals and the public is a key factor in minimizing undue anxiety. It was recommended that the Regional Office organize a consultation on the psychosocial dimensions of contingency planning for response to nuclear accidents.

### 3. Near field

#### 3.1 Countermeasures

3.1.1 The Group considered the choice of countermeasures in the early phase. This will depend on both the timing and the extent of the accident. Countermeasures should be undertaken according to pre-planned procedures. An accident with only local consequences may allow for procedures (such as evacuation) that might not be possible over a larger area.

3.1.2 Sheltering is a less disruptive countermeasure than evacuation, with reduced psychological and social consequences as well as costs. However, it requires careful planning and timing to ensure a dose reduction, and can only be considered as a short-term measure (hours or days) as social life will become disrupted and ultimately break down. To increase dose reduction, other measures can be considered together with sheltering.

3.1.3 Evacuation provides a clear reduction in dose but is very costly in psychosocial and economic terms. Spontaneous unplanned evacuation from the near field by members of the public is also likely to occur and has to be taken into account in planning.

#### 3.2 Management of irradiated and contaminated individuals

3.2.1 It should be recognized that there are three main categories of patient with radiation exposure.

(a) Patients who have received external radiation. Exposure ceases when the individual is removed from the source, and the individual presents no danger to emergency personnel.

(b) Externally contaminated individuals. Exposure of the individual continues until the contamination is removed. As there is potential exposure of emergency personnel, appropriate radiation protection procedures need to be followed.

(c) Internally contaminated individuals. Exposure of the individual continues until the contamination is either eliminated by natural processes or by specialized medical intervention. Such individuals would not normally be a source of exposure to emergency personnel.

Any of the categories of exposure outlined above may be combined with each other and be associated with other non-radiation injury, which could be life threatening and therefore require urgent treatment.

3.2.2 Experience from previous nuclear accidents suggests that the number of people exposed to radiation doses that could produce deterministic effects is likely to be limited. One of the worst nuclear accidents to date occurred at Chernobyl where the number of people with acute effects did not exceed 250, and previous nuclear accidents have involved smaller numbers.

3.2.3 Prompt (local) intervention may be necessary:

- (a) to limit further exposure either by removing the individual from sources of external radiation or by removal of external contamination or elimination of internal contamination;
- (b) for other non-radiation injuries, particularly those associated with disturbance of vital functions;
- (c) to protect the thyroid by administration of stable iodine;
- (d) to reduce emotional stress and its health effects (cf. 6.1.2).

3.2.4 Initial treatment involving "life support" may need to be initiated on site before transfer to hospital.

3.2.5 Assessment and treatment involving external decontamination and emergency treatment for the intake of certain radionuclides should preferably be initiated on site, or can be carried out in the decontamination centre or in a local hospital with an accident/emergency department, decontamination facilities and monitoring equipment. Mobile equipment could also be used.

3.2.6 Transportation of patients from the site of the accident should take account of the needs of the patient and the problems of containment of contamination.

3.2.7 There should be adequate facilities for external decontamination and monitoring in the local hospitals.

3.2.8 Special documentation of patients, including monitoring data, must start at the outset and be maintained throughout. Continuous updating of the exposure assessment is necessary.

3.2.9 Patients identified as having received significant exposure and requiring specialized treatment should be transferred to a designated medical centre with appropriate medical and radiological expertise.

3.2.10 Member States should develop the necessary medical, radiological and psychosocial expertise to cope with the consequences of a nuclear accident. Countries lacking this capability may call on international medical assistance through WHO collaborating centres, from neighbouring countries or via the IAEA Convention on Mutual Assistance. WHO should compile a register of facilities available for medical treatment of casualties following radiation accidents, based on information provided by individual Member States.

#### 4. Stable iodine prophylaxis

##### 4.1 General

4.1.1 Data at present available endorse the view that the risk of severe side-effects from a single dose of stable iodine is very low. Repeated doses might increase this risk however, especially intrathyroid side effects in the older population.

4.1.2 It was recommended that the full report of the meeting include recommendations on optimal formulation, packaging, storage and shelf life of iodine tablets.

## 4.2 Near field

4.2.1 The thyroid might be exposed to a high radiation dose by different iodine radioisotopes, and inhalation would be the main route of exposure. If the predicted thyroid dose is likely to exceed the predetermined intervention level, iodine prophylaxis should be given to all population groups.

4.2.2 As the time of implementation of prophylaxis is critical, prompt availability of the tablets to individuals should be ensured. One important option could be their predistribution to households with provision for storage in places that can be controlled by authorized persons.

## 4.3 Far field

4.3.1 Compared to the near field, far field areas are likely to be considerably larger and the population much greater, and radioactive contamination after a nuclear accident would be delayed. As the major part of radioiodine exposure will be by ingestion, the introduction of appropriate food control measures, especially in relation to milk and vegetables, should effectively reduce the radiation dose to the thyroid.

4.3.2 If, nevertheless, the thyroid dose is likely to exceed predetermined intervention levels, iodine prophylaxis might be considered and implemented by the designated public health authority for certain members of the population.

4.3.3 Predistribution of stable iodine tablets to individual households would not be feasible in the far field. Stocks of iodine should be stored strategically at points including hospitals, schools, and fire and police stations. The designated authority should plan for issuing, controlling and reviewing such stocks.

## 5. Far field

5.1 Emergency planning for the far field is expected to be less detailed than that for the near field, reflecting the feasibility and desirability of determining responses as the situation develops and in the light of the community profile. This enables implementation of the basic principle that remedial action should both be justified and optimized by the measure of risks averted in relation to the costs of that action (including economic and social costs).

5.2 Response in the early phase of the accident will concern the short-lived nuclides and, particularly in the case of an accident to an operating or recently operating nuclear reactor, the isotopes of iodine. The principal route of entry into the body is likely to be ingestion and this will be particularly important in areas where fresh vegetables are grown and cows are farmed, and where fresh milk and leaf vegetables are major dietary items. Appropriate measures are likely to be of short duration (unless emission of radioactivity is prolonged), to be relatively cheap and to bring the psychological benefits associated with taking effective remedial action.

5.3 Long-lived nuclides such as caesium-134 and caesium-137 can present a long-term hazard to the far field. When their distribution is widespread in food producing regions, there will only be scope for limited overall dose reduction through control of foodstuffs, and measures are likely to be expensive in financial and social terms. For this reason, intervention levels cannot be specified in advance of the accident and must take account of the

availability of alternative food supplies. Methodologies to relate individual doses to food contamination levels have been developed by WHO and can be utilized in respect of subsequently determined reference doses. The Codex Alimentarius Commission has determined levels for international free trade.

5.4 While in the near field decisions on countermeasures are dictated entirely on the basis of individual exposures, for the reasons given in paragraph 5.3, an overall or collective dose assumes greater importance in the far field. Indeed, the severity of the accident will be reflected to some degree in the magnitude of the unavoidable collective dose. Under such circumstances, control of foodstuffs may serve to influence the distribution of dose among individuals through the distribution of contaminated foodstuffs or the dilution of contaminated foods with relatively uncontaminated supplies. Guidelines for acceptable values of the ratio between maximum individual dose and average dose should be developed, so as to assist in optimal management of the post-accident situation in the far field.

5.5 It is important that inhabitants of far field regions are adequately informed about the risks of the exposure that they individually incur. Where exposure is to the whole body (as with caesium isotopes) an appropriate comparison is to natural background radiation exposure rates and their geographical variability. Such a comparison is less useful where only specific tissues are irradiated (as for the thyroid) and here, best estimates of individual risk may be appropriate.

## 6. Communication with the public

### 6.1 General

6.1.1 Perception of radiation risk is often greater than the actual risk, and this may be due to misrepresentation of information or selective listening by the public. Information should be accurate, up-to-date and accessible.

6.1.2 Awareness of possible contamination may lead to widespread symptoms of illness, greater use of the health services and diagnostic responses. There may be a need to counsel not only those who have actually been contaminated but also non-exposed population groups. Consideration should be given both to the form of counselling of such groups and to the education of health professionals dealing with such cases.

### 6.2 Channels of communication

6.2.1 Information should be issued from an authoritative source. It is imperative that a good rapport be established between this source and the media in order to give confidence and credibility. This should be established in advance of any emergency. Member States should designate the national public health authority to be in charge of information dissemination and presentation. This authority should consider the optimum channel of communication for giving instructions to the public.

6.2.2 It should be remembered that although the media provides the main vehicle for informing the public, individual journalists are not usually specialists in the field.

6.2.3 The media will look for news from any source, and this often results in conflicting information. This requires a positive stance from official sources to combat rumours and give a responsible view.

### 6.3 Information content

6.3.1 The Group concluded that the radiological impact of any contamination should be expressed as the appropriate comparison of the exposure rate from any contamination with that from natural background exposure.

6.3.2 The Group recommended that the Regional Office convene a working group, including members of the media, to consider in further detail communication with the public. To assist this group, Member States should be requested to supply examples of their information documents.

### 7. Rapid exchange of information and provision of advice to safeguard public health

7.1 The Working Group approved the draft scheme developed by the Regional Office, taking account of experience gained following the Chernobyl accident. This will now be transmitted to ministries of health in the Member States of the European Region.

7.2 The Group emphasized the importance of instituting this scheme as quickly as possible, in close coordination with contingency plans developed by other international organizations.

7.3 There was a general welcome for the proposal that a WHO staff member would, in case of a major radiological emergency, be immediately seconded to the emergency room of the International Atomic Energy Agency in Vienna to participate in an interagency team and to provide rapid information to the Regional Office in Copenhagen. The Regional Office would be in direct contact, using appropriate methods of communication, with focal points nominated by national health administrations. It was considered essential that these focal points should be people closely associated with the overall emergency operational scheme in the country concerned.

7.4 In order that there should be effective harmonization of effort among the international bodies concerned, with best use being made of limited resources, it was agreed that a common format be used for reports, with consistent use of agreed terms and units.

7.5 In order that the emergency scheme should function effectively, it was important that the Regional Office devote adequate resources for its development and management. To maintain optimum efficiency, the scheme should be periodically tested in exercises involving WHO and Member States.

7.6 Steps should be taken to ensure comparability of data, and appropriate training should be ensured for all personnel involved.

### 8. Follow-up to the Chernobyl accident

8.1 The Working Group emphasized the importance of making the best possible use of experience gained in relation to past major radiological emergencies, in order to improve contingency planning for, and response to, future accidents.

8.2 The role of the WHO Regional Office for Europe following the Chernobyl accident was recognized, particularly in relation to behavioural aspects, to the effects on the thyroid of exposed individuals, and in the development of methodologies for epidemiological studies. The Working Group encouraged the

Regional Office to further develop its programme. In addition, it considered the Office well placed to undertake a clearing-house function concerning the various health-related programmes now in progress, involving international bodies and bilateral assistance to the Soviet authorities.