



KEEPING THE PUBLIC INFORMED IN RADIOLOGICAL EMERGENCY



Risk and Safety

Keeping the Public Informed in Radiological Emergency

This brochure is intended for state and local authorities who are authorized to inform the public in emergencies.

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Contents

| | |
|---|----|
| Introduction..... | 3 |
| Part I. Summary of Radiation Hazard..... | 7 |
| Threat Assessment..... | 9 |
| International Nuclear Event Scale..... | 10 |
| Control of Radiation Environment..... | 15 |
| Intervention Criteria..... | 17 |
| Decision-Making Principles for Protective Measures..... | 18 |
| Strategic Planning During Radioactive Contamination..... | 20 |
| Retrospective of Protective Measures Following Major Radiological Emergencies..... | 21 |
| Part II. Emergency Public Information..... | 28 |
| Notification and Communication..... | 28 |
| Why it is Necessary to Keep the Public Informed..... | 29 |
| Obligations and Responsibilities..... | 31 |
| Issues of Information Activity..... | 32 |
| Items of Mutual Communication..... | 34 |
| Arrangements for Notification in Radiological Emergency..... | 36 |
| Interaction with Mass Media..... | 40 |
| Part III. Arrangements for Emergency Public Information..... | 41 |
| Information Provision..... | 41 |
| Response to Public Concerns..... | 43 |
| Public Information Coordination..... | 44 |
| Joint Public Information Center..... | 45 |
| Planning of Information Activity in Radiological Emergency..... | 46 |
| EPI Organizational Structure..... | 50 |
| Content of Information Messages..... | 51 |

Introduction

One of the most important objectives in emergency is to provide the public with vital information. In any emergency, when a threat to public safety arises, the efficiency of all protective actions depends to a great extent on what information and when local residents and the public will receive.

When recurring events like a fire or a flood take place, the affected public and the emergency responders not only know what and how to do but also often have the appropriate practical experience. The only thing required in these cases is to provide efficient management of the overall situation and the resources available. The matters stand quite different in the case of rare or extremely rare types of emergencies, as the level of readiness for practical actions pertaining to public protection is significantly lower.

Radiological emergencies, i.e. the emergencies with radiation impacts, relate to the latter category. Their peculiarity is that people cannot evaluate what threatens them, as a human cannot see nor feel radiation. Apart from it, the majority of people lack personal experience and, as a rule, the widely spread myths and prejudices govern their behavior. Radiological emergencies can differ fundamentally in their scale and health effects; therefore, the protective measures will depend on a specific situation, as no standard measures exist for any case. Under these conditions, the role of information activity on the part of authorities significantly increases and often predominates.

Having this in view, not only nuclear sites should be taken into account by the authorities. Radiological emergencies may occur in nuclear-free regions, and one should be prepared for them.

The experience shows that correct arrangements even in a

heavy radiological emergency may prevent large-scale health effects. On the contrary, public physical or mental health may be damaged without any accident, under normal operation at nuclear sites. In information crises, some event, being irrelevant to public safety, suddenly causes extreme anxiety or even a panic among the public. Such information crisis took place, for example, at the Balakovo Nuclear Power Plant (NPP) in November 2004.

Both in a radiological emergency and in the information crisis, efficient organization of emergency public information (EPI) is of paramount importance. The issue is pressing for all nuclear countries. The International Atomic Energy Agency (IAEA) believes it to be one of the priorities; therefore, it has formalized a number of recommendations for EPI arrangements at a nuclear site in emergency.

In Russia, the obligations to timely notify and inform the public of emergencies or their threat are assigned by the federal law to all emergency responders. To follow not only the letter but also the spirit of the law, all EPI managers need appropriate knowledge. Experts in public protection should understand the actual extent of radiation hazard, be aware of radiation protection principles and be able to forecast the long-term effects of these or those countermeasures. The EPI officers from local administrations should know where to get trustworthy information on the matter and how to interpret to laypeople the technical information through plain language statements. For this purpose, one is not required to be a nuclear physicist but one should know the radiation safety fundamentals.

Part I of the brochure titled “Summary of Radiation Hazard” briefly presents basic information. The reader will find out what sites may be hazardous and to what extent; how great of a hazard may be the accident consequences and what protective measures should be taken. The reader will also become aware

of what agencies or services are responsible for radiation safety of the public or for provision of the appropriate public information.

Part I also narrates about the decision-making process and the long-term strategy as to protective measures in a radiological emergency. It is of paramount importance for the authorities to understand the final goal of their efforts immediately after the accident and to define their appropriate information policy. One may speak of the exclusion of contaminated areas only in the epicentre of a heavy radiological emergency. In all other cases, the ultimate aim is to normalize the life activity sooner or later. The consistent information policy from the standpoint of a long-term prospect is one of the main conditions to preserve public confidence. In this context, the authors evaluate those counter-measures that followed the accidents at the Chernobyl NPP and at the Mayak Facility (South Urals).

If the reader was not earlier involved in the issues of radiation safety, some facts from this brochure may surprise him. First, it relates to the consequences of large accidents at the Chernobyl NPP and at the Mayak facility about which so many myths exist. The brochure presents only such data that has been multiply checked and certified by authoritative international organizations, including the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the World Health Organization (WHO), and the IAEA.

Part II of the brochure addresses the key items of the EPI arrangements in a radiological emergency. The authors describe the goals and objectives of emergency communication; the responsibility for timely provision of appropriate information to the public; and arising objective difficulties. The reader will also find out that the EPI starts at the moment of public notification of the accident and that the interaction between the authorities and mass media becomes multiply complicated in the crisis.

Part III of the document gives an idea of the reverse side of the EPI: how one should keep the public informed, what and when should be notified, and how one should response to public concerns. The document takes into account the items of coordination of information messages from the standpoint of vertical or horizontal management. For instance, the reader is offered the experience of the US Federal Emergency Management Agency (FEMA) in formalizing the EPI organizational structure.

The attachment covers the extracts from the federal legislation which tackle the items of keeping the public informed, as well as mutual communication of the emergency responders.

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Reference materials:

- Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency Updating IAEA-TECDOC-953, 2003.
- Arrangements for Preparedness for Nuclear or Radiological Emergency. New Safety Guide. IAEA. DS1005, 2005.
- Major Radiation Accidents: Consequences and Protective Measures, R. M. Aleksakhin, L. A. Buldakov, V. A. Gubanov et al. Edited by L. A. Iliin and V. A. Gubanov. — M., IzdAt, 2001, 752 p.
- Humanitarian Consequences of Chernobyl Accident. Remediation Strategy. UNDP report, Unipak, Minsk, 2002, 76 p.
- Guide for All-Hazard Emergency Operations Planning. SLG101, Federal Emergency Management Agency, 1996.

Part I. Summary of Radiation Hazard

Where may a radiation hazard come from? The response is evident: it may come from NPPs, research reactors or nuclear facilities. It is the right but incomplete answer.

It is true that the largest sources of radioactive substances are concentrated in nuclear industry. Unlike combustion products in the traditional thermal power industry based on organic fuel, fission products of nuclear power as waste from energy production do not enter the environment. It is a great ecological advantage of nuclear power plants. Its reverse side, though, is a high potential hazard from NPPs, as a huge amount of radioactive substances is concentrated in reactor installations.

Therefore, even the first NPP projects envisaged multiple safety systems to prevent severe accidents involving radioactive releases outside the protective barriers. Worldwide, there are more than 400 power units of NPPs. The practical experience of their operation shows that overall this objective is being successfully managed. No release of radioactive substances into the environment occurs during operational failures, including emergency stops.

Though, failures take place at all NPPs, in total, amounting on average to 300 times a year. At the same time, severe accidents did take place in the history of nuclear power. In 1979, a heavy core damage accident occurred at the Three-Mile Island NPP in the USA. In that case, a special containment prevented the environment from severe consequences; as a result, the radioactive release was quite limited. The situation at the Chernobyl NPP was much worse: vast areas were contaminated, mass evacuation as well as many other protective measures were required. Until now, negative social and economic consequences of the accident have not been eliminated.

The severe accidents have made nuclear authorities toughen the approaches to safety provision in nuclear industry. Though, however high the safety level might be, nobody can give a 100% guarantee.

Nuclear facilities are not the sole potential source of a radiation hazard. Today, ionizing radiation sources are widely used. For instance, above 1,300 sources of rather high activity exist only in one of the industrially developed subjects of Russia. They are used at metallurgical and engineering plants, chemical/wood-working/mining facilities, geological organizations and medical centres.

Radioactivity of these sources is significantly less than that of the power units of NPPs; still, they also can be very hazardous. Loss of control over such sources due to their theft, loss or other reasons is the main cause of radiological emergencies or public exposure in many countries of the world. For example, in 1987, unauthorized dismantlement of an orphan medical source took place in Brazil, resulting in the death of several people and radioactive contamination of the environment. Unfortunately, the incidents associated with orphan or stolen sources occur in Russia as well.

The peculiarity of radiological emergencies is that radiation is not detected by human sense organs, as it has neither odour, nor taste, nor color. A human cannot assess a radiation-related threat. As a rule, the overwhelming majority of people learn of a radiation accident either from mass media or at second hand. Usually, rumours greatly exaggerate the extent of a hazard. In its turn, mass media focus their attention on public response to the event, rather than on the actual risk level.

Therefore, this section briefly summarizes the information which will allow the reader to grasp on one's own the scale of a radiological emergency, as well as the basic terms.

Threat Assessment

In the very general case, the radiological emergency is a loss of control over a source of ionizing radiation due to malfunction in the equipment, erroneous actions of personnel, natural disasters or other reasons that might entail or have entailed public exposure beyond the established standards or radioactive contamination of the environment (from the Federal Law “On Radiation Safety for the Public”, Article 1).

Radiological emergencies can be divided into two types: accidents with radiation-producing equipment and nuclear accidents at nuclear power installations or at facilities of nuclear fuel cycle.

See below for some examples that fall under the definition of a radiological emergency:

1. Information that a container with radionuclide source has been stolen;
2. Local radioactive contamination in the facility’s area;
3. Roshydromet’s information about considerable change in radiation environment (the level of the gamma background has increased by a hundred times).
4. Declaring the “emergency situation” at the nuclear-hazard facility;

The first and the second cases do not require any measures to protect the public. In two other cases, the actual threat to public safety may arise, including as a result of airborne transfer of radioactive substances. Therefore, radiation accidents can be classified as the emergencies of any level: from local to federal or transnational.

International Nuclear Event Scale

Accidents and failures during the operation of nuclear facilities or nuclear industry are traditionally the focus of attention of mass media and the public. To provide them with operative information on the significance of events at nuclear installations from the safety standpoint as well as on their consequences, the IAEA and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (NEA OECD) have developed the Special Nuclear Event Scale (INES). The scale is widely used by all nuclear states-members of the IAEA.

When defining the threat level by the international scale, the following three criteria are used:

- Off-site effects;
- On-site effects; and
- Degradation in the multi-barrier protection system.

Initially, the INES scale was mainly used to assess the events at NPPs. Afterwards, it was enlarged to be used for the accidents at all civil nuclear installations, as well as for transport accidents involving radioactive substances. Russia has been utilizing the INES scale since 1990.

The scale has seven threat levels. The lowest ones relate to malfunctions/incidents, though, the levels below 4 do not represent a risk to the public. At level 5 and above, the safety barriers become significantly damaged and radioactive contamination may affect vast areas. For the overall history of nuclear power, the severest accident (classified as level 7) was at the Chernobyl NPP (1986). The severe core damage accident (level 5) occurred at the Three-Mile-Island NPP, USA; though, there was no radioactive release outside the protective cupola. The heaviest accidents at the facilities of nuclear fuel cycle took place in 1957 at the Mayak facility in the South Urals (level 6) and at the Windscale plant, Great Britain (level 5).

Apart from possible off-site radioactive releases, other criteria are used to classify nuclear events. Among them are severity of health or environmental effects and the need in protective measures. The emergency classification used in Russia also utilizes such criteria as the number of injured persons, material damage and the size of the emergency zone.

It seems rather difficult to establish simple correspondence between the traditional emergency classifier and the INES scale. Though, the table given below can be of practical use.

Russian Emergency Classifier and INES Scale

(The 1998 RF Federal Law “On Civil Defense” and the 1994 RF FL “On Protection of the Public and Areas from Natural or Human-Induced Emergencies” Amended and Supplemented by RF FL No. 122 dt. August 22, 2004).

| Emergency Type | Number of Affected People* | Material Damage** (thous. of Low-Limit Salary) | Emergency Zone Within Limits | INES Level |
|-----------------|----------------------------|--|---|------------|
| Federal | > 500 | > 5,000 | Areas of two or more RF subjects | 6,7 |
| Inter-regional | 50—500 | 50—5,000 | Areas of two or more RF subjects | 5,6 |
| Regional | 50—500 | 50—5,000 | Areas of one RF subject | 5,6 |
| Inter-municipal | 10—50 | 1—50 | Areas of two or more municipal formations | 4,5 |
| Municipal | 10—50 | 1—50 | Areas of one municipal formation | 4,5 |

| | | | | |
|-------------------------|-----------------|-----|------------------------------------|-------|
| Local | No more than 10 | < 1 | Areas of production or social site | 3,4 |
| Outside Emergency Scale | None | < 1 | Areas of specific site | 0,1,2 |

* Affected people — those who died or were injured;

** Material damage — material losses on the day of the emergency occurrence, including the costs to recover the violated conditions of life activity.

Estimating a Threat from Facilities/Sites

If nuclear facilities exist in the region, it is possible to preliminarily assess, proceeding from the nature of their activity, the maximum probable scale of accidents, the probability of off-site radiation effects, and the need in public protective actions at these or those distances from the site of the accident. Such assessments are used worldwide, when organizing the emergency planning, including the IAEA recommendations.

Scale of Probable Off-Site Effects

The facilities that manufacture radioisotopes for industrial/medical/research purposes:

- Acute radiation injuries of the public are impossible. However, in the case of a fire at the facility, the need in emergency intervention at a small distance may arise;
- A threat of radioactive contamination as a result of explosions, hurricanes, floods or leakages is extremely low.

Utilization of ionizing radiation sources (in industry/medicine/geology, etc.):

- If a source is under control, excess offsite emergency

exposure levels are impossible;

- If a source is lost or stolen, fatal exposure (if a source is without containment) or heavy radiation injuries of the tissue may occur from among those individuals who have been in contact with it.

The facilities of Nuclear Fuel Cycle (NFC): Natural uranium mining/processing; uranium concentration, and fuel production:

- Environmental contamination (for instance, of water) may occur as a result of the damage to the repository with radioactive waste. The event will require intervention;
- If violation of the technology takes place when concentrating or processing deplete uranium, fatalities may happen outside the industrial site due to high chemical toxicity of etching acid generated while deplete uranium is in contact with aerial water vapors;
- If certain malfunctions in the fuel production technology take place, a chain nuclear reaction may occur. In this case, one may obtain doses exceeding the emergency criteria within 200—500 m from the industrial site;
- Sizeable fires or explosions may also entail excess exposure doses in the vicinity of the facility.

The NFC industrial complexes with reactor productions and Spent Nuclear Fuel (SNF) management:

- In adverse coincidence, for instance, in the case of damage to the SNF containers in the pond lacking for water, it is possible to obtain doses above the emergency criteria, including the cases of acute radiation sickness. The distance representing such a threat depends on the quantity of spent fuel in the pond and its design peculiarities;
- Excess exposure doses are impossible at SNF dry storage;
- Severe accidents are theoretically possible at industrial reactor installations;

- When processing the SNF, a chain nuclear reaction of a low probability for excess exposure doses may occur;
- Sizeable fires or explosions may lead to obtaining high doses within several kilometers of the facility;
- Seal failures in large reservoirs for Liquid Radioactive Waste (LRW) storage may entail contamination that will require expensive intervention. The scale of effects will depend on the LRW quantity available and its content.

The nuclear installations of thermal power above 100 MW:

- It is probable that the severe core damage accidents may lead to serious health effects for personnel, including fatalities from acute radiation sickness. It is possible to obtain excess doses at considerable distances of the facility;
- Radioactive fall-outs are possible at large distances of the facility; exposure doses and airborne concentrations may exceed the emergency limits;
- For an accident caused by other reasons than the core damage, the probability for the emergency criteria to exceed is low.

The research/transport reactors of thermal power of 2 to 100 MW:

- It is possible to obtain excess doses due to inhalation of radioactive iodine as a result of a heavy accident (for instance, at the core melt).

The research/transport reactors of thermal power below 2 MW:

- Excess exposure doses are hardly probable.

Transportation of radioactive containers:

- Intermediate or high level radioactive material is transported in the containers that warrant their leak-proof

seals for any types of road accidents. Special transportation status minimizes possible unauthorized actions with respect to such cargo;

- The containers meant to transport low level substances or radio-contaminated objects have the lower safety margin. In emergency, excess emergency limits are possible only in immediate proximity to the container damaged. Surface contamination as a result of the accident may require actions to decontaminate the local contaminated zone.

Lost or stolen hazardous source:

- Fatal acute radiation injuries are possible from among those who had a contact with the source. Considerable contamination of the area that entails excess doses is possible.

Control of Radiation Environment

The Russian System for Emergency Prevention and Elimination (RSE) has a network of laboratory control to supervise the environmental status and potentially-hazard sites on the Russian Federation's territory. The network comprises the enterprises pertaining to different ministries, agencies and areas. The Roshydromet services regularly monitor radiation environment. Rospotrebnadzor controls the radionuclide content of the foodstuffs and consumer goods. Veterinary and agrochemical laboratories perform control over the radionuclide content of agricultural production.

There are the Automated Radiation Monitoring Systems (ARMS) around all NPPs and other Rosatom's nuclear- and radiation-hazard facilities. Tens of sensors are located on the territory of the buffer and control areas of the radius of up to 30 km or more around the NPP. As a rule, the ARMS information boards available in large localities in the vicinity of NPPs indicate the on-line level of radiation background. Radiation control of the

areas is performed automatically. Sensors make measurements with the interval of 20 to 60 seconds (depending on the sensor type) and do even often in the emergency mode; accumulate the result and deliver regular information to the dispatcher point of the NPP's local crisis centre.

If necessary, territorial authorities can organize control of radiation environment on their own. The Civil Defense/Emergency (CD/E) services, bodies of state sanitary and epidemiological inspection and a number of other organizations must have dosimeters or radiometric devices. The obligatory condition for arranging such extra control is a check-up of the device workability, as well as availability of experts to interpret the results of measurements.

When evaluating the radiation status, it is also necessary to take into account that the range of changes in natural background is quite wide. For instance, typical values of the background for the Moscow streets (in the open area) make up 0.08—0.12 microsievert/hour ($\mu\text{Sv/h}$). However, these values significantly increase (by 2 times), for example, when it rains or after the rain. It happens due to the fact that natural radioactive substances, i.e. decay products of the radon gas, fall out from the atmosphere to the ground jointly with the rain drops. In rural areas, the dosimeter readings can increase several times, for example, in locations of potassium fertilizer storage, as potassium-40 is a natural radioactive isotope. In some geographical regions of this country, the natural background is much higher due to the high content of natural radioactive substances (uranium, thorium and potassium) in rocks. As a reference point, one may use the following table:

| Dosimeter Readings | Situation Estimate |
|--------------------|-----------------------------------|
| 0.5 Sv/h | Within the standard |
| 0.5—1.2 Sv/h | It is necessary to make inquiries |
| 1.2 Sv/h | Emergency is possible |

The 0.5 $\mu\text{Sv/h}$ bottom level in the table corresponds to the Russian standards of radiation safety as the safe limit for extra dose of human-induced exposure makes up 5 mSv/year (8,760 hours per year). The 1.2 $\mu\text{Sv/h}$ upper level correlates with the annual dose of 100 mSv, which is a practical threshold of harmful effects of radiation for a human.

Intervention Criteria

See below for protective measures to be used in emergency, starting from the phase of accident threat (preventive measures) and during the first year, if the accident has occurred.

- Sheltering;
- Iodine prophylaxis;
- Decontamination of the area and the dwelling;
- Evacuation;
- Temporary or permanent relocation;
- Restrictions on contaminated foodstuffs.

Every countermeasure has its recommendations based on the objective dose criteria.

The criteria are developed by competent international organizations, such as the International Commission on Radiological Protection (ICRP), IAEA, the European Commission, the World Health Organization (WHO), and the Food and Agricultural Organization (FAO). The approaches used by various entities differ in details, though, the emergency levels are established by them almost identically.

The intervention criteria accepted in Russia fully correspond to the international recommendations.

Decision-Making Principles for Protective Measures

A scientifically justified approach has been developed for the decision-making on the items of radiological protection, and experts adhere to it. Though, specific decisions on performing this or that protective measure are made by the officials duly authorized within the scope of respective emergency response systems. As a rule, the decision-makers take into account public opinion and many other factors, including their personal perception of the radiation risk. Priority of expert recommendations over other considerations is not fixed legally.

The scientifically justified approach for the decision-making on protective measures assumes that:

- Protective measures, if necessary, intervene or disrupt normal conditions of life activity;
- Intervention should be justified, i.e. should bring more benefit than harm. It means that damage decrease due to dose reduction should be sufficient enough to justify harm from the intervention and its costs, including social expenses;
- The intervention form/scale/duration should be optimized so that the benefit from exposure reduction, apart from the intervention-related damage, would be maximum.

When evaluating the efficiency of protective measures, experts are guided by the value of costs required to prevent the collective dose equal to 1 man-Sievert (1 man·Sv). In the majority of the countries, the countermeasure is considered ineffective, if the costs for 1 man·Sv prevention exceed 20,000 USD.

The table given below represents some intervention measures implemented after the Chernobyl accident. The costs for a day's or two days' sheltering prior to public evacuation from the Pripjatj city were less than 1 USD for 1 man·Sv. This measure was, certainly, warranted and quite efficient. As for

planned relocation of the inhabitants from the contaminated localities 4—5 years after the accident, every averted man-Sievert cost from 130,000 to 500,000 USD. From the very beginning, experts considered that protective measure inexpedient; nevertheless, the relocation programs entered the state long-term Chernobyl policy.

| Protective Measure | Period of Utilization | Cost Range, USD/ 1 man · Sv |
|---|-----------------------------|--------------------------------|
| Emergency Relocation | April—May 1986 | 1,000—15,000 |
| Planned Relocation | 1990—1991 | 130,000—500,000 |
| Taking children and pregnant women away | May—September 1986 | 4,000—400,000 |
| Sheltering | Pripyatj, April 26—27, 1986 | 0.02—1 |

In practice, a situation may occur when the objective reasons to implement protective measures do not exist, though, public response to the event is very acute. In this connection, inactivity of the authorities may lead to the loss of public confidence. Taking into account the Chernobyl lessons, it is necessary to find such measures that may relieve public concerns and, at the same time, will not bring greater damage or require excess costs.

The radiological emergency is not only a health threat. It also means social and economic losses, such as decrease in the economic activity due to mass departure of the most active part of the public; recession in demand for local production; growth of public and political pressure on the authorities, including the requirements of compensation for losses; the growth of conflicts, etc. Negative effects of non-radiological factors can be reduced, if the decisions on protective measures or their lack are warranted and clear to the community. This topic will be discussed in detail in the section titled “Response to Public Concerns”.

Strategic Planning During Radioactive Contamination

The authorities should approve the strategy of actions on mitigation of radiation effects at early stages of elimination of accident consequences. The two basic options exist:

- Exclusion strategy for the areas in the epicenter of a severe accident; and
- Remediation strategy for all other cases.

Exclusion Strategy. Emergency protective measures for public evacuation and following exclusion of the areas should be organized in the epicenter of a severe radiological emergency. The probability for such a heavy accident is extremely low. However, if this sort of event occurs, the accident will be classified as emergency of the federal or regional level; therefore, serious support can be expected, including that on scientific and technical aspects.

Remediation Strategy. If radiological environment does not require the long-term exclusion of the area and compulsory relocation of people, the actions program should cover the following two milestones:

- Solving emergency issues; and
- Recovery/normalization.

The first milestone may require consequent efforts to reduce public exposure, owing to utilization of protective measures, such as sheltering, iodine prophylaxis, or even temporary relocation, as well as due to restrictions on contaminated foodstuffs, etc. The objective in this phase is to define and solve the most acute safety issues for the most vulnerable public segments.

The main objective for the remediation milestone is to provide maximum reintegration of the affected people with the community, as well as normalization of life activity in the region. The

activity at this stage should be aimed at the complex approach to provision of human requirements and the localities. Social assistance to the sufferers should be built on general fundamentals of the valid system of social protection.

To what level should the radiation risk be reduced during the normalization period? It depends on the costs for extra dose prevention and the correlation with other health risks. If the resources are sufficient, it is necessary to reduce all risks to the acceptable level. However, for lack of means for pressing needs, it is important to spend available funds for elimination of the gravest risks. Otherwise, everything will be turned upside down.

Duration of the milestones may vary with the heaviness of radiation accident and the efficiency of emergency management. For lack of the precisely developed strategic planning at the early stage, the milestone of emergency measures may drag out for years, as it took place in Chernobyl.

Retrospective of Protective Measures Following Major Radiological Emergencies

The 1957 Accident

On September 29, 1957, an explosion occurred in one of the reservoirs of the radioactive waste repository at the Mayak Facility (the South Urals). The significant amount of radioactive substances fell out in the site of the industrial complex, and part of those agents spread over a vast territory. A radioactive trace, called afterwards the East Urals trace (EURT), covered the area of 1,000 km². At that time, approximately 270,000 people lived in 217 localities of the contaminated lands.

Immediately after the explosion, as a result of the radioactive cloud passage, above 5 thousand people in the industrial

site were affected by single exposure in the doses from 100 to 1,000 millisievert (mSv).

Evacuation. Personnel from the industrial complex were evacuated within a day. The predictions with respect to the public showed that doses in several localities for the first 10 days might exceed 1 Gy. The emergency evacuation for 1,383 residents started on the 7th day following the accident and terminated on the 10th.

Relocation. Afterwards, due to impossibility of decreasing high contamination of local production, a decision was made to additionally relocate the residents. About 12,700 people were relocated within two years.

Restrictions on Public Access to Contaminated Areas. The 400 km² protected buffer area was created on the most contaminated lands of the radioactive trail.

Decontamination. Since the first day following the accident, sanitization of humans involved in the activities on contaminated lands was under way. Decontamination began quite early. However, it was soon revealed that at large-scale decontamination it was practically impossible to decontaminate the areas, just as the dwellings, clothing, and appliances, including on account of recurring contamination.

Foodstuffs Control and Actions in Agricultural Sector. By the moment of the accident, part of the harvest had not been gathered yet, owing to which, hay/grain/home-made bread was greatly contaminated at the head of the EURT. To reduce radionuclide entering the harvest, the area of 20,000 ha was ploughed up again. Afterwards, various technologies for safe agriculture were applied to the lands affected.

Keeping the Public Informed. Actions on public communication were of restricted nature.

Medical Examination of the Public. Such examination was implemented immediately after the accident and is still in process. For the first ten months, above 2,000 residents from the neighbouring settlements were examined, including those from the evacuated localities. In the years that followed, permanent medical examination was performed by local medical enterprises and the Urals scientific and practical centre of radiation medicine. The many years' observation has not revealed any remote radiation effects.

Social and economic consequences of the accident have not been mitigated up to now. The 1993 Law "On Social Protection of the Citizens Affected by Radiation as a Result of the 1957 Accident at the Mayak Facility and due to Radioactive Waste Discharges into the Techa River", as well as approval of respective federal target programs made the public and the regional administration believe in serious help of the state and the life quality improvement. Naturally, non-execution of the programs alongside with actual decrease in the living standards in the 1990s has intensified social tension in the region.

The Chernobyl Accident

The accident at the Chernobyl NPP occurred on April 26, 1986. By that time, national and international organizations had already gained considerable practical knowledge of radiological emergency consequences. Part of them was fixed as recommendations/standards/rules/criteria. Unlike the South Urals accident, the Soviet society was more open. Due to the transnational transfer of radioactive substances, the world community became aware of the Chernobyl accident on the second day.

When mitigating the Chernobyl accident consequences, practically all possible countermeasures were implemented. See below for the main ones:

Evacuation and Relocation. Urgent evacuation of personnel from the Chernobyl NPP took place, followed by evacuation of people from the city Pripyatj, the inhabitants of the 10 km zone and, afterwards, those of the 30 km zone around the Chernobyl NPP. In total, by late 1986, more than 116,000 people were evacuated from the 30 km zone and some localities outside it. In the period of 1989—1992, a new relocation campaign that involved above 100,000 people was initiated. However, it was not implemented to the full.

Iodine prophylaxis. Since 26 April, 1986, iodine prophylaxis was under way among population of the city Pripyatj and personnel of the plant. Delay in the decision-making as to mass utilization of this protective measure outside Pripyatj significantly reduced its efficiency.

Sanitary and Hygienic Actions. Sanitary processing, use of radio-protectors, triage of the sufferers, etc. were conducted for the evacuated people in medical enterprises in Kiev/Moscow/Leningrad, in the district and regional centres. For the purpose of sanitary processing of the liquidators and the public from contaminated lands, bath-houses and shower rooms in the localities, as well as mobile sanitary washing points of the CD forces were used. The dosimeter control posts were established at the entrance to the 30-km zone and in all public sites of that area (in canteens, dormitories, enterprises, etc.).

Restrictions on Access to Contaminated Areas. The area of accident was cordoned off in the very first hours of the event. A few days after, the 30-km exclusion zone of admission by order was established. Afterwards, the exclusion zone comprised the most contaminated lands in Byelorussia/Russia/Ukraine, and all kinds of economic activity were practically absolutely banned.

Restrictions on Consumption of Contaminated Food. The first Temporary Permissible Levels (TPLs) for foodstuffs and drinking water were approved on May 6, 1986. Their actual imple-

mentation on contaminated lands in mid May was delayed. Afterwards, the TPLs were corrected, and the list of products/indicators under control changed. Though drinking water was on the TPL list, no problems occurred with respect to its contamination by radioactive substances.

Measures in Agricultural Sector. For lack of information and appropriate fodder reserves, agricultural animals were heavily contaminated. In the initial period, they were evacuated and, afterwards, triaged by the extent of their contamination. Quite a large number of animals were slaughtered. However, the production failed to be completely processed.

The first comprehensive recommendations on reduction of the radionuclide content in agricultural production were formalized in late May. Besides, a great number of temporary recommendations, reminders, and instructions that regulated single kinds of the activity and technological processes were prepared. Considerable volume of activities in the agricultural sector was aimed to create safe labour conditions.

Apart from prohibitive and restrictive measures for the public, the recommendations for managing subsidiary or individual farms were developed. In the most contaminated regions, liming and potassium fertilizing was implemented on all plough lands and adjoining personal plots affected.

Local authorities were repeatedly recommended to provide ameliorated grazing lands for the private cattle. However by a number of reasons, those recommendations were partly followed. As a result, the milk, one of the basic ration components, often turned out to be contaminated beyond the permissible levels. In the 1990s, the practice was launched to feed cows with special boluses that contained ferrocyan and decreased by several times the cesium content in milk. The practice widely spread among the public, as it served a guarantee for passing the radiological control performed prior to the sale of milk.

Measures for Improvement of Localities. Some measures were implemented during the 1986—1989 decontamination. Further construction or repair of the water and gas supply systems, the sewerage systems, roads, public utilities facilities, etc., was performed, taking into account not only the extent of radioactive contamination but also social significance of those measures.

Keeping the Public Informed. The first official information on the accident was brought to the notice of the inhabitants living in Pripyatj only; it happened the day following the event. The mass media obtained respective information only in the evening of the third day. Apart from it, neither actual geographic delineation of the zone where elementary protective measures were required nor the most hazardous factors of the impact were mentioned. Such information at the initial stage could not perform the role of protective factor.

Until the late 1980s, a considerable part of the data on the accident consequences was top secret. During that period, the information obtained by mass media was very restricted. At the same time, local authorities of the contaminated areas kept the residents informed (as far as they knew) as to the radiation status, involving local mass media. Plenty of experts working in those areas attended local meetings, explained the situation and gave their recommendations. Afterwards, along with the censorship mitigation and its full abolition, coverage of the Chernobyl information in the mass media intensified abruptly. At the same time, owing to various reasons, unreliable data on the accident impacts and the role of implemented protective measures prevailed.

Overall, the information policy of the state with respect to the accident was extremely inefficient. One of its consequences was that the public developed stable perception of health effects of the accident as catastrophic for millions of people.

Medical and Dosimeter Examinations. Large-scale programs for

children's examination aimed to diagnose the thyroid pathologies were implemented in the first summer months. Afterwards, mass screening for the overall public was conducted for the purpose of early detection of thyroid tumors. For the 20 years' observation, about 4,000 cases of thyroid cancer have been revealed on contaminated lands in Byelorussia/Russia/Ukraine. Part of them is associated with the Chernobyl exposure.

Part II. Emergency Public Information

Notification and Communication

The EMERCOM of Russia's documents define the emergency information as a message of a hazard or a threat of the emergency occurrence and the recommended actions. It is delivered through the RSE notification system to its bodies of every day management, forces and facilities, as well as the public.

To notify of the emergency means to bring to the notice of the RSE bodies of every day management, forces and facilities, as well as the public the notification signals and appropriate information of the emergency through the RSE notification system. To notify the public means to warn it of a forthcoming danger or deliver the information of the accident/catastrophe that has occurred. With this aim in view, all kinds of communication, such as wire/radio/television, are used. The notification in Russia is performed by the two-stage scheme, namely: a signal of the acoustic siren rings and the local radio/TV broadcasts as to what has happened and what should be done first.

At the same time, the international nuclear and radiation safety system has currently accepted a broader approach. The emergency public information in radiation accident envisages as follows:

- Timely provide the public, including the media and the residents of the emergency zone, with respective information; and
 - Respond to public concerns, including justification of the need and sufficiency of protective measures for the public.
- Timely provision of respective information means as follows:
- Prepare and disseminate by various information channels

the messages for local and general public throughout the overall period of the accident;

- Respond operatively to incorrect information or rumours; and
- Respond to information inquiries on part of the news or information media.

Therefore, the notification represents the first obligatory milestone of information provision to the public. After the emergency notification is delivered, the authorities should properly respond to the increased attention of the media to the event; the offers of volunteers to help, and to the inquiries regarding extra information. Part III of the brochure will explain the above in detail.

Why it is Necessary to Keep the Public Informed

The analysis of various emergencies reveals that a panic multiplies the scale and the severity of their consequences. Usually, the panic results from inconsistent, contradictory and misleading information or its lack when it is most needed. When representatives of the authorities or the officials address the public with their unmatched or contradictory statements through the mass media, humans distrust their formal recommendations and behave as they think it right, trying to protect themselves, their families and their property.

Apart from it, a delayed, uninformative and uncoordinated response on part of the official quarters and responsables to such attention of the media and the public to radiation accident causes psychological, economic and political damage to the community.

Effective public communication allows the authorities to regain control over the public response to the event and reduce the

scale of radiological and, especially, non-radiological impacts of the accident.

If it is a question of a serious accident at the nuclear facility, for instance, at the NPP, the goals of information activity outside the industrial site are clearly defined by the IAEA. They are as follows:

- Avert or minimize the cases of overexposure, including acute radiation injuries;
- Avert or minimize adverse social and psychological accident consequences;
- Avert or minimize damage to the citizens' property from radioactive contamination; and
- Create conditions for normalization of human life and economic activity.

In emergency, including nuclear and radiation accidents, the authorities liable for public protection assume the responsibility for keeping the public informed (See below for details). In order to timely provide the public with appropriate information, the interaction with experts should be arranged:

- If the emergency occurred at the facility or in the organization that performs nuclear activities (the operator), it is necessary, first, to establish contacts with this operator;
- If the emergency occurred when transporting nuclear or radioactive material/substances, it is required to establish contacts with the shipper and the transporter;
- If the emergency source is unknown, one should establish contacts with the on-duty dispatcher services of federal executive bodies (Rosatom, Rosprom, Rosmorrechflot, etc.) and with the nuclear operator being in immediate proximity to the site of emergency. That includes, in particular, the majority of Rosatom's facilities, as well as the research centres with their own nuclear installations, etc. These

organizations necessarily comprise the experts who are able to assess the radiation status adequately.

Obligations and Responsibilities

Adequate public information in emergency should proceed, first, from the fact that obligations and responsibilities of all emergency responders in the EPI field are defined by the federal legislation.

Very often, humans distrust the official information. They ask themselves such a question as “Are there any guarantees that we will be told the truth?” The legislation provides such guarantees. It envisages obligatory public information on safety items, including in radiological emergencies, and defines the liability for suppression of respective information.

According to the law, the following appropriate executive authorities and organizations are liable, in the case of a radiological emergency, to provide public information within their competence:

- Services of the state system for radiation monitoring and sanitary and epidemiological welfare (Roshydromet/Rospotrebnadzor);
- Services of the Russian system for emergency prevention/actions (RSE);
- State authorities of the Russian Federation’s subjects;
- Local governments;
- Nuclear operator;
- Nuclear authorities; and
- State safety regulation authorities.

The organizations pertaining to different departments control the parameters of radiation environment. That provides a

guarantee that environmental deterioration will be inevitably detected and the public will be informed. For instance, the Roshydromet services monitor the airborne radioactive content. If something serious happens, a change in the radiation level will be detected, apart from Roshydromet's services, by Rospotrebnadzor's sanitary and epidemiological services, by those organizations that have their own radiation monitoring systems, and, finally, by the citizens with personal dosimeters. If the Automated Radiation Monitoring System (ARMS) is available in the region, increase in radiation background will be detected much quicker.

However, while various organizations from different agencies collect the data and analyze the radiation environment, Roshydromet is the only official source of such information. It bears full responsibility in this field. Roshydromet's liabilities/functions are defined by the appropriate provision.

Issues of Information Activity

As was mentioned above, one of the basic EPI objectives is to provide adequate public response to the accident. In a radiological emergency, it is rather difficult to achieve due to a number of objective reasons.

The first and paramount obstacle is peculiar perception of radiation. The current gap between public perception and scientific knowledge of biological effects of radiation is huge. The scholars of authority have pointed it out many times. A hyperbolic human fear of radiation entails inappropriate behavior and increases the accident consequences.

The lack of primary data required for adequate assessment of the radiation status is inevitable in the acute phase of the accident. Comprehensive analysis of the situation and reliable prediction takes time. Therefore, uncertainty of estimates/

recommendations on protective measures is inevitable in the acute phase. However, those humans who were notified of the radiation hazard require clarity and definiteness, and the sooner the better.

The decisions on serious intervention measures are often made without taking into account their long-term impacts for the community. Representatives of the authorities regard radiation with same excess caution, as all others. The wish on the part of responsables “to play safe” and protect the public at most is natural. Therefore, the officials often choose overprotective measures. These excess and unjustified countermeasures confuse the public, as individuals believe that if the authorities take such serious steps, the hazard is, indeed, extremely high.

Inactivity is also bad. If in the radiological emergency or during the information crisis the public is seriously concerned and the top management does not issue any directives with respect to protective measures, it is high time for the authorities to act. Otherwise, the public will claim the information as being suppressed. Local authorities always have the opportunity to arrange radiation control on their own.

Readiness of antinuclear forces to dramatize any emergency represents another difficulty. Their purpose is to convince the public of extreme hazard posed by nuclear technologies and of the need to bar all nuclear activities. From the standpoint of time, odds are in favor of antinuclear activists, as they are not responsible for their assumptions and their interpretation of the events, they launch their information campaign earlier and run it more aggressively.

Another issue is a wide range of expert opinions on the low dose effects. The majority of scientists, including the ICRP and the UNSCEAR, support the conservative hypothesis (i.e. based on the precaution principle) that the lower dose the less harm is. Though, there are proponents of the hypothesis on the low

dose benefits; besides, some scientists come out with exotic suggestions that low doses are more hazardous than the high ones. Public statements of the scientists with extreme opinions confuse the public in emergency and make it difficult to accept the scientifically justified decisions.

Finally, another grave obstacle for information activity is public distrust in the authorities and official information in general. In the case of radiation accident, same as in any other human-induced emergencies, people are inclined to suspect that they are not told the whole truth and that the worst is concealed. Many, especially journalists, analyze every word in the official news, trying to find contradictions. However, for fear “to say too much”, the authorities should not cut information to the minimum. It is not the best way out.

The above mentioned issues relate to the objective reasons being outside the emergency response system. However, there are items associated with the imperfect EPI infrastructure, first, with mutual communication between the emergency responders.

Items of Mutual Communication

If the emergency or the crisis situation at a nuclear- or a radiation-hazard site represents an on-site threat, one may suggest (such cases have happened in practice) that the operator will not make haste to inform off-site authorities and the public of the event and will try to solve the issue on one’s own. The letter of the law is not violated in this case, as the emergency notification is delivered to the CD/E authorities without fail if only the accident is significant from the safety standpoint (level 3 or above by INES scale). However, it is important to understand that any information leak will inevitably entail public scandal. As a result, the reputation of the operator, the nuclear industry and that of other emergency responders will be at stake. To prevent such situations, the operator and the authorities may

develop the interrelated information policy for any, even insignificant incidents. It is evident that the above mentioned relates to the operator's current activity aimed to improve its image, rather than to the emergency communication. The interaction of the operator with the off-site parties concerned in environmental aspects of its activity may be developed within the system of ecological management according to the ISO-14001 international standard. At present, the Russian NPPs and other nuclear facilities are in the process of accepting this standard.

If the source of radiation accident is unknown, coordination of the actions of emergency responders may present a difficulty. Some participants involved in the emergency response may not be aware of or acknowledge the liability of other organizations. That brings to confusion and delay in the decision-making. There were cases when off-site ministries or agencies not covered by the emergency response plans tried to assume the responsibility for organizing emergency-rescue activities only on account of their own disorientation by public opinion or top management. The only recipe in this case is to carefully elaborate and agree the emergency plans with all parties concerned.

Another problem is the level of readiness of the authorities and local governments liable for the emergency response (for instance, the heads of national governments or the governors). If these persons are not trained and not involved in emergency trainings, they do not know what to do when they are assigned liable for the emergency response or they find themselves in extreme stress situation. In this case, preparation for the EPI should start with an attempt to convince high responsables of their personal participation in the exercises and trainings.

Planning of the information activity in the radiological emergency makes it possible to avoid a lot of serious errors. As the EPI is an integral element of the common emergency response system, it is expedient for the general emergency plan of the

organization to comprise a plan of the information activity as a special attachment. Such approach is accepted, for example, by the FEMA. Part III of the brochure outlines this attachment.

Arrangements for Notification in Radiological Emergency

When the authorities are informed of the radiological emergency, their primary objective is to timely notify the residents of the risk and protective measures.

If an accident or a serious incident takes place at the nuclear or the radiation-hazard site, the authorities obtain respective information from the operator. The tables below represent the criteria, levels and deadlines for the emergency information submission to the authorities.

Criteria and Levels of Submitting To Authorities Operative Data on Emergencies Involving Radioactive Releases (Extracts from Attachment No. 1 to EMERCOM of Russia's Decree No. 382 dt. July 7, 1997)

| Data Criteria | Level of Data Submission | |
|--|--|--|
| | EMERCOM of Russia | Regional Centre, CD/E Authority pertaining to Executive Body of RF Subject |
| Accidents at nuclear installations, including NPPs, storage points for nuclear/radioactive substances and NFC facilities | Level 5,6, or 7 by INES scale | Levels 3 or 4 by INES scale |
| | Any loss, theft or revealing of ionizing radiation sources or nuclear material | |

| | |
|--|--|
| Accidents involving nuclear weapons at sites of nuclear complex or in military units | Any loss, theft or revealing of ionizing radiation sources |
| | Any accident with nuclear weapons, charges or ammunition |

Deadlines for Managers of Facilities/Enterprises/Organizations to Submit Information on Human-Induced Emergencies

| Name of Information (Reports) | Authority | Periodicity and Submission Deadlines |
|---|---|--|
| Information on emergency threat (1/E Report) | Chairman of the Emergency Committee of the city, the regional district or the republic. | Immediately by any available communications through operative on-duty dispatcher services. The status is specified every four hours or immediately, if it becomes worse. |
| | Respective federal executive authorities and the agencies within their jurisdiction | |
| Data on emergency occurrence and its main parameters (2/E Report) | Chairman of the Emergency Committee of the city, the regional district or the republic. | Immediately by any available communications through operative on-duty dispatcher services. |
| | Respective federal executive authorities and the agencies within their jurisdiction. | Immediately by any available communications through operative on-duty dispatcher services. The status is specified every four hours during first 24 hours; afterwards — every day as of 6 o'clock (Moscow time) by any communications available or in writing. |

| | | |
|--|---|---|
| Data on protective measures for the public and areas, the emergency-rescue activities and other first aid (3/E Report) | Chairman of the Emergency Committee of the city, the regional district or the republic. | In writing no later than two hours since the moment of notification of the emergency occurrence; afterwards — every day by 6 o'clock (Moscow time). |
| | Respective federal executive authorities and the agencies within their jurisdiction. | Same. |
| Data on efforts and means involved in emergency elimination(4/E Report) | Chairman of the Emergency Committee of the city, the regional district or the republic. | In writing no later than two hours since the moment of notification of the emergency occurrence; afterwards — every day by 7 o'clock (Moscow time) as of 6 o'clock (Moscow time). |

In compliance with the IAEA recommendations, the deadlines for the operator to notify and activate the emergency plans depend on the category of threat for the site. For the most hazardous facilities, including NPPs, local authorities should obtain essential information within an hour.

Rosenergoatom that operates Russian NPPs has accepted stricter notification requirements. If the status “Emergency Preparedness” or “Emergency” is declared or in the case of other events that may entail radiation accident (a fire, a natural disaster or attempts of criminal elements to perform illegal actions), the administration must immediately deliver a message, according to the list as follows:

- Dispatcher on duty from Rosenergoatom;
- Rosatom of Russia’s Situation-Crisis Center;
- EMERCOM of Russia’s territorial authorities by federal subjects;
- Inspection chief from Rostekhnadzor at the particular NPP;

- Regional committee of environmental protection;
- Heads of administration from the city of the NPP and the region (the autonomy district);
- Dispatcher from the appropriate division of Russia's Unified Energy System "RAO EES";
- Medical and sanitary unit of the Federal medical and biological agency;
- State fire prevention service department for NPP protection and the regional fire prevention body;
- Military unit of domestic forces of Russia's Ministry of Internal Affairs for NPP security;
- Bodies of Russia's Federal Safety Service and Ministry of Internal Affairs that service NPPs;
- Roshydromet's territorial body servicing NPPs.

Along with the RSE Automated Centralized Notification Systems (CNS), Local Notification Systems (LNS) are in operation in the sites of all Rosatom's nuclear- and radiation-hazard facilities. The LNS systems notify top management and personnel of the facilities/organizations, as well as the public in the area of the LNS operation. Overall, in the areas of this country where the risk of radioactive contamination exists, including from the sources outside Rosatom's activity, almost a quarter of sites has the LNS systems. The LNSs run notification services for 5 minutes; for lack of the LNS, the public obtains emergency information within 30 minutes.

As was mentioned above, in emergency or in a serious incident at the operator's (level 3 or higher by the INES scale), state authorities or local governments will get information quite operatively. The question as to how fast local and general public should be informed depends, first, on how great a threat to the population is. Though, in any case, the public should be informed quite operatively, even if actual health risk does not exist.

If a threat to the public is great, for instance, in the case of nu-

clear accident at the NPP, it is necessary to broadcast through the earlier defined information channels the information message preliminarily prepared for this case, along with the risk notification. Further, it is required to regularly inform the residents from the most threatened areas of what is going on, what measures are taken to mitigate the source of risk, to protect personnel and the public, and what measures of self-defense are recommended for risk reduction. Such messages should be specified as new information becomes available. Part III of the brochure will describe it in detail.

Interaction with Mass Media

As for local mass media, no problems usually exist to provide interaction. Local media and the authorities responsible for public protection need each other equally and, as a rule, know each other quite well. They both are interested in the well-being of local public and both are liable for qualitative execution of their functions. Local journalists, when responding to the residents' concern in connection with this or that situation, can timely obtain appropriate information from the authorities and deliver it, if necessary, in their news broadcasts.

The problems arise when, along with the information exchange at the local level, numerous journalist inquiries from central or regional mass media emerge, as well as from local media of the neighbouring regions. One should early prepare oneself to such situations and plan one's actions, including re-allocation of the objectives between the emergency responders. Otherwise, the media may originate unfavorable development of the crisis situation. See below for details.

Part III. Arrangements for Emergency Public Information

As was mentioned above, public information in a radiological emergency comprises timely provision of public information as well as the response to public concerns. Let us consider each task in detail.

Information Provision

Timely provision of appropriate information to the public envisages that the following three main functions be performed:

- Compile and disseminate the messages for local and general public through varied information channels for the entire period of the accident;
- Respond operatively to incorrect information and rumors;
and
- Respond to information inquiries on part of the news and information media.

At the same time, the information flows should be structured by basic target groups of the public, such as the public within the emergency zone, off-site public and general public presented by the media. Each target group has special information requirements.

For the inhabitants of the area where the protective measures are recommended, it is required upon notification of the accident to immediately provide the data on available risks and the intervention measures under way, as well as the recommendations on self-defense. At the same time, the recommendations/instructions distributed should indicate those competent sources that have delivered the information.

Extra communication should be arranged with the early defined and trusted people of the local community able to be public leaders, including physicians, teachers, church and public representatives.

It is important to provide all concerned citizens/organizations with the results of medical examinations/monitoring/sampling or other kinds of activities in which residents, their dwellings, facilities, areas of household utilization or workplaces are involved.

For off-site public, it is necessary to provide information as to what actions they should take and what they should not, and why.

Mainly the media represents the interests of general public. Upon declaration of the emergency or receipt of a considerable number of inquiries on part of the media as to the probable accident, state authorities and the operator should take immediate actions to regulate overall information coming from the sources considered official by the public.

The journalists being in the vicinity of the place of accident should be informed as to the extent of the risk to them, as well as about essential restrictions and preventive measures which they must take to protect themselves. Journalists may be considered employees of the emergency-rescue teams, as they ought to provide the public with reliable information. They may enter the list of persons secured by appropriate radiation protection and long-term medical control.

It is necessary to arrange control over the media, as well as immediate response to any misleading, inaccurate or confusing information. It is required to reveal public inadequate response during the emergency and provide information to the media to improve the situation.

Response to Public Concerns

The authorities and the operator should arrange a response to public concerns, anxiety or alarm in the actual radiological emergency or perceived as such by the public. The priority target groups in this connection are the inhabitants from the emergency zone and adjoining areas.

The response to public concerns envisages as follows:

- Interpret any questions associated with the health risks, recommended or undesirable self-protection measures;
- Make arrangements for monitoring of, revelation of and response to the health risks associated with the situation;

- Oppose to inadequate actions of personnel and the public. Such actions may include social isolation of potentially exposed people; spontaneous evacuation; excess accumulation of the goods stock, etc. Assign one or a few organizations responsible to trace the signs of such behavior, reveal their reasons (for instance, obtaining false information from the mass media) and give recommendations to the authorities, including the state level.

The recommendations on protective measures should be supported by appropriate explanations that the recommended (approved) measures provide safety for the inhabitants and their families, including the unborn children. Along with the dose criteria, one should use the notion "safety" expressed by the plain language statements. Prior to its dissemination, the compiled material should be tested on the representatives of the selected audience to reveal possible issues in its perception.

If in the acute phase of the accident the public perceives the recommended protective measures as insufficient, extra measures should be taken, including those of radiological protection (though not quite warranted from the purely radiological standpoint) to make people feel safe. At the same time, it is

required to take into account that harm from these intervention measures should be minimum.

The decisions on the long-term programs for remediation of areas and social protection of the public should be made only after the actually existing radiation risk is reduced. When elaborating the long-term programs, it is important to withstand pressure on part of the public/political structures/the media, if the pressure is dictated by inadequate perception of radiation hazard, the group or bureaucratic interests. The decisions should be based on the comprehensive estimate of long-term social and economic consequences of the decisions approved, including analysis of their impact on social psychology. It is a large independent topic going beyond the present brochure.

Public Information Coordination

Coordination of the information obtained for the public and the media from the authorities, the operator, other emergency responders, other states and the IAEA is one of the main conditions for efficient communication.

In this connection, it is required that the procedure for coordination of formal information through vertical /horizontal management structures, as well as for message submission to the media be elaborated and approved beforehand. It is of primary importance to define the common source of official information in the emergency response system. The following is required for these purposes:

- Compile and distribute the press-release which defines a certain organization (an authority) as the source of official information on the situation;
- As soon as possible, create in the above organization the common source of official information. In severe cases, a Joint Public Information Center (JPIC) is created in the vicinity of the place of accident;

- Notify other entities that all inquiries from the media and other parties concerned should be sent to the organization defined;
- Establish contacts with the information services of other organizations for operative discussion of information messages;
- Allocate respective human and technical resources.

It is of extreme importance to early prepare and agree the information material for its further dissemination in the accident, as well as to broach the most probable questions and fears typical of the emergency. The material should be checked up and tested prior to its dissemination during the emergency.

Apart from it, all emergency responders that have a direct contact with the public (for instance, the radiation monitoring teams) should be instructed as to how to behave themselves with the public and the journalists.

Joint Public Information Center

In severe radiological emergencies, the EPI objectives can be solved to the required extent only when creating the JPIC where representatives of the operator and those of local/federal authorities work.

Every employee from the JPIC performs the tasks of his own organization, coordinating the available information. That authority heads the JPIC that is liable for arrangements for public protection in the particular situation, for instance, the CD/E municipal management.

The JPIC location should be defined beforehand. In emergencies at the operator's, the IAEA recommends that JPIC be located nearby the emergency site but outside the buffer and control zone. At present, many Russian NPPs have the well equipped

information centers in satellite towns. It is expedient to use them for the purposes of the JPIC. The Center's activity start-up recommended by the IAEA in a severe radiological emergency at the NPP is 4 hours after establishing the fact of the accident.

At the same time, it is necessary to secure safety for all persons working in the JPIC, as well as to accredit those journalists who will be involved in press-conferences and briefings at the JPIC. The Center is required to have sufficient area and respective infrastructure, including technical facilities to deliver not only texts but also audio and video material.

The JPIC basic functions are as follows:

- Compile messages for the public;
- Coordinate the content of public information;
- Arrange briefings/press-conferences for the journalists;
- Prepare public speeches for responsables, proceeding from the events;
- Monitor the electronic mass media, including telecasting and broadcasting;
- Arrange "a hotline" (by telephone/Internet) to respond to the questions of the public and the journalists;
- Review the frequently asked questions;
- Refute doubtful information;
- Chronology of events.

Planning of Information Activity in Radiological Emergency

The peculiarity of radiological emergency is that a great number of emergency responders to this or that extent liable for public information are involved in the process. Coordination of

their information activity can be performed only on the base of thorough preliminary planning.

As communication is one of the most essential elements of the emergency response, it is quite warranted to make the Emergency Public Information (EPI) plan a part of general emergency plans. Such practice exists, for instance, in the US FEMA. Each FEMA's department develops a special attachment to the emergency plan which describes the means, organization, and processes by which the authorities will provide throughout the emergency timely, accurate and useful information, as well as the instructions to the public from the affected areas. See below for details.

Special Attachment to Emergency Plan

I. Situation

This section describes the emergencies that require activation of the EPI subsystem as well as the assumptions as to what public response may be in these cases.

Emergencies. Types of radiological emergencies and crisis situations that require the EPI response.

Means of Public Information Dissemination:

- Accessible communication channels: television, radio, newspapers, etc., and a listing indicating the hours of radio/TV broadcasting, the newspapers frequency, and contacts of the employees involved;
- Coverage of the area by broadcast stations (radio/TV) and a rough idea of their audience;
- Alternative options in the case of communication disruption (with radio/TV/publishing house); and
- List of out-of-town media on which the issue/dissemination of mass information depends.

Audiences. Target public groups that must obtain information in emergency, including the groups with special needs, for example, non-English speaking people in the place of accident which number exceeds some threshold (e.g., above five percent of the population), sight or hearing impairments, or tourists being unfamiliar with the area and its hazards, etc. The messages for these groups should be disseminated through special information channels.

II. Concept of Actions

This section provides general information on how the EPI should be performed for the public. It describes the operator's information policy, the approved procedures and the sequence of actions, namely:

- Schedule of activation of the EPI organization;
- List of organizations that deliver operative data on the accident;
- Reporting Procedure for personnel from the EPI organization [whom and where the EPI employees should report to about the work done, e.g., to the Emergency Operative Center (EOC)];
- Priorities for the EPI activity:
 1. Preparation and dissemination of messages;
 2. Response to public inquiries;
 3. Monitoring of the media and rumor control;
 4. Arrangements for the interaction with media.
- Information Policy of the organization:
- Create the JPIC for EPI;
- Focus on specific emergency-related information; and
- Provide positive and reassuring information when it is appropriate.
- Sequence of actions on part of the EPI organization and

the content of messages:

- When declaring the “Increased Readiness” status;
- When declaring the “Emergency” status; and
- After the accident.

- Procedures designed to coordinate and agree the information messages within the EPI organization, including:

- Assignment of the EPI Coordinator and his/her designee;
- Options for EPI management from the alternative command points;
- Means of communication with the EPI employees being in the place of event, as well as with those who are in the EPI central office;
- Means of coordination between the EPI organization and the information services from various departments;
- Procedures to monitor and identify the information, as well as to obtain the permission for its further dissemination.

- Duties allocation during a mass “information attack” on the EPI organization on part of the media, including:

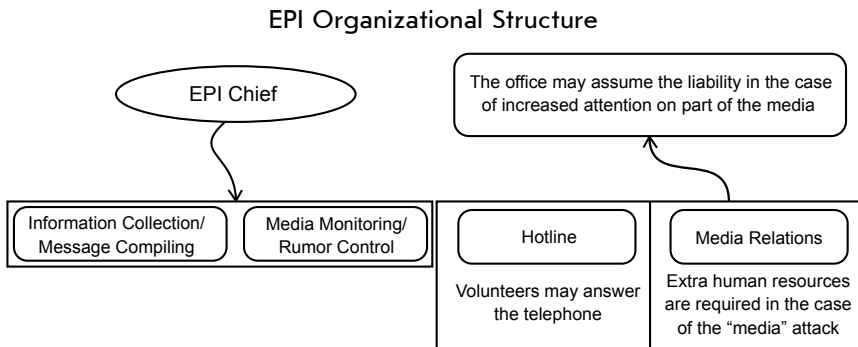
- Transfer of some duties to the office of top management of the organization where there is a press secretary;
- Involvement of a qualified journalist for interaction with the regional/central media;
- Assistance from the information services of other bodies;
- Creation of a single briefing center, if the EOC lacks sufficient space;
- Accreditation of the journalists; and
- Coordination with the law enforcement agencies to

provide the journalists with an access to the place of accident (when it is safe).

- Schedule for information exchange with other emergency responders, including the interaction with horizontal/vertical structures of state management and the JPIC.

III. Structure and Liabilities

This section represents the EPI organizational structure on a diagram. Each diagram box stands for a zone of liability. A single man is not meant to be responsible for every function. It is important to have a chance, if necessary, to forward the required number of people to each zone of liability.



IV. Technical Support and Logistics

This section reviews the items of administrative and technical support, including the regulations of the following:

- What information the EPI organization should obtain from other departments;
- What material the EPI should use for reporting (for instance, press reviews and/or extracts from the press, analysis of public response by the results of a hotline or

public meetings, as well as chronology of the events);

- In what way the EPI “basic staff” may be augmented to cope with the increasing flow of information inquiries from the media and the public;
- What premises/equipment may be of use for the EPI activity and to run briefings, and who is to make decisions in this connection;
- What suppliers of the equipment (e.g., printers) and what services are good to apply to, if needed, along with the provision of their contact telephone numbers.

V. Plan Development/Update

This section points out who is responsible for coordination/update of this attachment, as well as for development of standard instructions and other essential documents aimed at implementing respective procedures.

VI. Authority and References

This section points out the grounds to develop the attachment (the laws, decrees, etc.) as well as the references to other vital documents on the subject.

Content of Information Messages

Adequacy of public response to any emergency depends mainly on how clearly the following questions that worry humans most will be answered:

- “How risky is the situation?”
- “How can a human protect himself, his family and his interests?”

The official messages should, first, be guided by the above information needs.

If a message can be delivered before the accident, it should contain the following information:

1. Hazard factors (e.g., “the iodine attack”);
2. Estimated area and time of impact;
3. Possible protective measures with regard to the property (e.g., garaging a car);
4. Disaster supply kit to survive for 72 hours;
5. Evacuation instructions for children, pregnant women and the elderly;
6. Instructions on protection of domestic animals;
7. Other “do’s and don’t’s” if not feasible to evacuate;
8. How (and how often) the authorities will deliver vital information to the public;
9. Contacts for specific inquiries (for instance, concerning foodstuffs contamination).

The messages delivered after the accident should contain as follows:

1. Current assessment of radiological status;
2. Current actions to mitigate the emergency consequences;
3. Survival instructions (for people living on radio-contaminated lands);
4. How/where to get help (for the sufferers);
5. Information of health risks for those who live in contaminated areas;
6. How/where to get help for domestic animals contaminated;
7. Restricted areas (for those not affected);
8. Contacts for the inquiries on the sufferers;
9. What to do and whom to contact in order to offer help;
10. How and how often the authorities will deliver vital information to the public;

11. Instructions on the return of evacuees to their place of residence.

In emergency, the officials will issue recommendations as to what protective measures the public should take. Neither these officials nor the public may understand the radiation protection principles or terminology. Therefore, the information messages should comprise a plain language explanation of how the protective measures will secure public safety.

For a radiological emergency involving possible public exposure, the recommendations to the public may have the following content:

- Those who have left the place of accident without passing the dosimeter control or getting instructed as to further actions to take, should arrive at (specify the place) to get monitored and obtain appropriate instructions;
- All those who have transported the sufferers must arrive at (specify the place) to pass individual control and to monitor the vehicle;
- If the airborne release is suspected, the public being within one km of the site of the emergency should be advised as to the following:
 - Remain inside during the release;
 - Not to eat any food or drink water that may be contaminated (for instance, the vegetables grown outside or rainwater) until informed otherwise;
 - Make sure that children do not play on the ground;
 - Wash hands before eating until monitoring of food is performed (until the announcement of the results will follow);
 - Avoid dusty areas or the activities that will make dust;
 - Not to fear to be infected from evacuees (they are not dangerous for those nearby);

- Not to go to the place of accident as a volunteer to help. If the assistance is required, respective announcements will be made.

In the case of loss or theft of a hazardous radioactive source, the public should be provided with the following information:

- Time and site of loss of control over the hazardous source;
- State authority liable for emergency response;
- How to request for help, should the hazardous item be found;
- Illustration (scheme) or description of the item, if possible;
- Information that the item is extremely dangerous and should not be touched, if found. It is necessary to abstain from approaching it nearer than 10 meters;
- Information as to where to report to about the item for those who may have seen it;
- Information as to where to apply for medical assistance in the case of contact with the above item or when being nearby.

Apart from it, medical practitioners should be alerted as to the possibility of radiation symptoms development (burns without any apparent reasons) among the patients. Besides, scrap metal dealers and buyers who have had a contact with suspicious items should also be on the alert.

