REPORT

PEER APPRAISAL OF THE ARRANGEMENTS IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA REGARDING THE PREPAREDNESS FOR RESPONDING TO A RADIATION EMERGENCY

22 – 26 June 2009
Skopje, the Former Yugoslav Republic of Macedonia

International Atomic Energy Agency

ACKNOWLEDGEMENT

The mission team is grateful to the authorities of the Former Yugoslav Republic of Macedonia for all the attention and assistance received throughout the visit, and for all the effort devoted to organization of the mission by the host organization, which was the Radiation Safety Directorate (RSD). Team members would like to thank Mr. Rumen Stamenov, Director of the host organization, who ensured staff and logistical support for the mission.

Mrs. Svetlana Nestoroska, Junior Associate of RSD, coordinated all activities regarding preparation and implementation of the mission. The team would like to commend her for her valuable support and contribution, which ensured that the mission was conducted smoothly from start to finish. We would like to extend our appreciation to Mr. Goran Angelovski, Junior Associate of RSD, who actively participated during all visits and discussions the team had with the counterparts, and to Mr. Milan Drakalski, IAEA National Liaison Officer, Ministry of Education and Science. In addition, the mission team wishes to extend its special appreciation for the active involvement of Mr. Pande Lazarevski, Director of the Crisis Management Centre, and Mr. Ekrem Zendeli, Deputy Director of the Protection and Rescue Directorate, both of whom participated in discussions, and ensured availability of their staff. The mission team had a very positive experience with all counterparts met during the visits and discussions. We would like to thank them all.

Although many are mentioned by name in the report, we would also like to give credit to those behind the scenes involved in important tasks regarding the organization of the mission, typing, translation, transportation, etc. The team gained access to all principal organizations, which provided excellent cooperation and valuable input at all levels.

FOREWORD

Within the United Nations system, the International Atomic Energy Agency (IAEA) has the statutory functions of establishing standards of safety for protection of health against exposure to ionizing radiation, and of providing for the application of these standards. In addition, under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention) [1] the IAEA has a function, if requested, to assist Member States in preparing emergency arrangements for responding to nuclear and radiological emergencies.

In response to a request from the authorities of the FYR of Macedonia, the IAEA implemented an Emergency Preparedness Review (EPREV) mission to the Former Yugoslav Republic Of Macedonia to conduct, in accordance with Article III of the IAEA Statute, a peer review of emergency preparedness and response arrangements in the Former Yugoslav Republic Of Macedonia *vis-à-vis* the relevant IAEA standards.

This mission was conducted as a full-scope IAEA Emergency Preparedness Review (EPREV), i.e., a complete and thorough appraisal of the country's emergency preparedness and response capability. The Former Yugoslav Republic of Macedonia is a country with a relatively low risk profile regarding radiation emergencies, i.e. there are no threat category I and II facilities. Therefore, the needed scope of its emergency preparedness can be rather limited. In discussions with counterparts, the team also gathered information about general radiation safety issues related to the preparedness and response to radiation emergencies (i.e., licensing, environmental radiation monitoring, firefighting services, use of radioactive sources in medicine, etc.).

The Former Yugoslav Republic of Macedonia gained its independence in 1991 and became a member of the IAEA in 1994. In recent period the country successfully started building its emergency preparedness and response capabilities. One of the first steps was establishment of the Nuclear Safety Directorate in May 2005. In fact, the Law on Radiation Protection and Safety entered into force in June 2002 and it was until 2006 when the Nuclear Safety Directorate became fully functional. The team observed willingness of the authorities to align the emergency preparedness and response legal framework of the Former Yugoslav Republic of Macedonia with the international standards, as well as accepting multilateral obligations.

TABLE OF CONTENTS

1. INTRODUCTION 1
    1.1. Background 1
    1.2. Scope 1
    1.3 Process 2
    1.4 Inputs and Guidance for the Assessment 3
2. SUMMARY OF FINDINGS 6
    2.1. Introduction 6
    2.2. Interim (Immediate) Actions 7
    2.3. Long-Term Actions 13
    2.4. Assessment Sheets 14
3. DETAILED FINDINGS 16
    3.1. Introduction 16
    3.2 Basic Responsibilities 17
    3.3. Assessment of Threats 21
    3.4. Establishing Emergency Management and Operations: Authority, Organization, and Coordination of Emergency Response 23
    3.5. Identifying, Notifying, and Activating 25
    3.6. Taking Mitigatory Action 28
    3.7. Taking Urgent Protective Action 30
    3.8. Providing Information, Issuing Warnings and Instructions to the Public 31
    3.9. Protecting Emergency Workers 32
    3.10. Assessing the Initial Phase 33
    3.11. Managing Medical Response 34
    3.12. Keeping the Public Informed 35
    3.13. Taking Agricultural Countermeasures against Ingestion and Longer-Term Protective Actions 36
    3.14. Mitigating the Non-Radiological Consequences of Emergency and Response 38
    3.15. Requirements for Infrastructure 39
APPENDIX I: 45
Scheme of Crisis Management System 45
    I.1 Platform prevention and management of environmental hazard and CBRN contamination 45
    I.2 Specialized platforms 47
    I.3 Suggested simplified scheme 48
APPENDIX II: 50
Mission Team Composition 50
APPENDIX III 51
List of Participants at the IAEA EPREV Mission Briefing 51
APPENDIX IV 53
Assessment Sheet for the Former Yugoslav Republic of Macedonia 53
GLOSSARY 62
ACRONYMS 67

1. INTRODUCTION

1.1. Background

Article III.A.6 of the IAEA Statute specifies two main functions the IAEA is authorized to perform in relation to safety:

- to "establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property"; and
- to "provide for the application of these standards" through, *inter alia*, the rendering of safety review services, including an appraisal of compliance.

The obligations, responsibilities and requirements regarding preparedness and response to radiation emergencies are set out in the Safety Standards, in particular the 2002 Requirements "Preparedness and Response for a Nuclear or Radiological Emergency" [2]. The IAEA General Conference, in resolution GC(46)/RES/9, encouraged Member States to "implement the Safety Requirements for Preparedness and Response to a Nuclear or Radiological Emergency."

In 2003, the IAEA published the document "Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency" (EPR-METHOD) [3] with the aim of fulfilling in part the IAEA's function under Article 5 of the Assistance Convention [1] to provide a compendium of best practices for planners aiming to comply with IAEA Requirements [2].

The Macedonian authorities requested the IAEA to organize an EPREV mission, which was conducted as a peer review *vis-à-vis* the relevant international standards.

The overall objectives of this mission were:

- to provide an assessment of capability of the Former Yugoslav Republic of Macedonia to respond to radiation[1] emergencies, including those involving terrorist attacks;
- to assist the country in the development of interim arrangements to respond promptly to a radiation emergency. This assistance will include suggested steps that can be taken immediately to utilize better the existing capabilities.
- to provide a basis upon which the Former Yugoslav Republic of Macedonia can develop a *longer-term programme* to enhance their ability to respond.

1.2. Scope

The review focused on the ability of the country to respond to a radiation emergency and was based on an assessment of existing response provisions and capabilities. The mission did not include a detailed appraisal on the status of the national regulatory infrastructure under development. The review was carried out in accordance with the Guidelines developed for the EPREV services. Specifically, the review considered the country's emergency arrangements at the national level in the following areas:

[1] Radiation emergency is used in this document to indicate a nuclear or radiological emergency

a) Emergency management
b) Emergency preparedness
c) Radiation protection
d) Law enforcement
e) Medical response
f) Public information
g) National capability to support and provide training to local response teams

The mission involved three team members (including the team leader), and the mission's duration was five working days. Emergency preparedness and response arrangements of the Former Yugoslav Republic of Macedonia were reviewed at two levels:

- **Review of the national emergency preparedness and response capabilities**: This activity reviewed the response of national level organizations that initiate or support local response to an emergency. The review was conducted within the framework of the Requirements [2] and Guidelines contained in the EPR-METHOD [3] document for threat categories III, IV and V. This review focused on national level preparedness for threats such as (a) nuclear installations in the nearby countries, (b) emergencies due to the malicious use of radioactive sources (RDD), and other special concerns such as possible orphaned sources (lost or stolen), transport accidents, various scenarios such as overexposures, contamination (both intentional and non-intentional), etc. One goal was to establish clearly the roles and responsibilities of the national organizations and their means for coordination, command, and control. In the area of preparedness, the mission reviewed the relevant training, implementation of drills and exercises, provision of public information, inclusion of quality assurance, as well as the notification system and the command (decision-making) system. This review of national policy also assessed the conditions that ensure fulfilment of state obligations resulting from the relevant international Agreements and Conventions [1].

  Local and facility response review: This part of the mission reviewed the ability of first responders to identify and respond promptly and effectively to radiation emergencies, including the availability of facility and on-site plans in relevant cases, as well as medical preparedness and response.

The two levels of review named above were used to assess the emergency preparedness arrangements in the country for these two different regulatory and operational environments, and generalized findings were subsequently developed.

The collected data and analysis contained in this report relies on interviews with representatives of key response organizations, and on personal impressions obtained during visits to various sites and institutions, as well as on the documents handed over during or before the EPREV mission. The mission concentrated on those areas that the team viewed as crucial to the establishment of a sound interim emergency response capability.

1.3 Process

The general schedule for the mission is shown in Table 1. The mission team visited the named authorities and facilities where interviews were conducted. In addition, the team gathered the information described in the assessment sheet (Appendix IV). The major organizations with which the mission team interacted were:

- the Radiation Safety Directorate (RSD), which is the regulatory body for radiation safety in the Former Yugoslav Republic of Macedonia;
- the Crisis Management Centre (CMC), as the organization which supports decision making in case of major emergencies and operates regional and national notification centers
- the Institute of Public Health (IPH), which is the lead national institute for radiation monitoring, operates an Early Warning System for the case of a nuclear emergency, provides dosimetry services and calibrates radiation monitors;
- the Protection and Rescue Directorate within the Ministry of Defence, as the organization providing response in case of an emergency;
- University Centre of Radiotherapy and Oncology, as the organization involved in radiation practices in medicine, as well as the institution responsible for medical emergency response.

The review consisted of:

- determining whether, and to what extent, the arrangements for preparedness and response for radiation emergencies within the Former Yugoslav Republic of Macedonia were in conformity with the International Requirements [2];
- identifying methods and means of meeting the relevant International Requirements and other good practices. The EPR-METHOD [3] and the expertise of the mission team members provided the basis for these suggestions.

The members of the mission team (see Appendix II) were selected based on their relevant experience in the above-mentioned areas.

This mission was designed as a full-scope EPREV. This mission was not preceded by a Pre-EPREV, the main goal of which is to collect missing information for the Terms of Reference, to clarify the roles and responsibilities of the participating organizations and to check the logistics. The team received some information in writing before the mission which consisted from the Law on Radiation Protection and Safety, some draft regulations and the latest national Convention on Nuclear Safety report. The team could not clarify in advance its expectations about various institutions taking part in the emergency preparedness review. Therefore, the site visits were extremely important to gather direct information from actual and potential stakeholders in the country's emergency planning and response.

1.4 Inputs and Guidance for the Assessment

The EPREV mission was conducted in accordance with the Terms of Reference (ToR) developed and adapted in May 2009.

The team obtained its main information about current status and future plans to establish a sound emergency response infrastructure from the representatives of organisations visited during the mission.

The relevant pieces of legislation, some of which were in draft form (i.e., regulations stipulating: contents of an emergency plan, emergency threat categorization, intervention levels in case of emergency), also provided valuable information to understand the relationship and responsibilities of organizations involved in emergency planning and

response. Another important input for assessing the country's radiological emergency preparedness and response capabilities was information on the Internet sites of the relevant institutions. These sites provided insight into the institutions' organizational structure, history, responsibilities, activities, and references.

Table 1. Mission Schedule

Date	Subject
Day 1 22.06.2009	Introductory Meeting with representatives of the institutions of the Former Yugoslav Republic of Macedonia dealing with emergency matters. (A complete list of participants is contained in Appendix III.), The following institutions were presented: Institute of Public Health, Fire Brigade of the city of Skopje, Ministry of Finance – Customs Directorate, Radiation Safety Directorate, Ministry of Defence – CBRN Unit, Crisis Management Centre, Protection and Rescue Directorate, Company 11. Oktomvri – industrial radiography, Ministry of Interior, Ministry of Health
Day 2 23.06.2009	Visit to the University Centre of Radiotherapy and Oncology (UNCRO) along with the presentations of UNCRO and Institute of Nuclear Medicine Work on the assessment sheet
Day 3 24.06.2009	Visit to the Radiation Safety Directorate and reviewing the assessment sheet Visit to the Crisis Management Centre (Notification Centre and facility shelter were shown)
Day 4 25.06.2009	Visit to the Protection and Rescue Directorate (with the display of equipment in the warehouse) Visit to the Institute of Public Health: – walk down of the laboratory, – display of Early Warning System, – secondary standards dosimetric laboratory
Day 5 26.06.2009	Exit meeting with all participants of the previous meetings. Meeting with the Director of Radiation Safety Directorate and the IAEA National Liaison Officer Finalization of the assessment sheet

2. SUMMARY OF FINDINGS

2.1. Introduction

The mission team formulated its recommendations and suggestions based on its findings. These recommendations should be addressed in order to conform to the relevant Requirements [2]. Therefore, these recommendations are stated as actions that should be implemented, with the corresponding paragraph from the Requirements [2] shown in parenthesis.

The summary actions are divided into two groups:

- **interim** actions that should and can be addressed immediately, using existing capabilities, to improve significantly the country's response capabilities. These actions should be addressed as early as possible, preferably within six months to one year after the National Radiological Emergency Plan has been adopted.
- actions pertaining to national and local response organization and coordination which should be addressed over the **longer term**.

The aim of this chapter is to provide a concise overview of activities which need to be performed to establish and to upgrade radiation emergency response capability in the Former Yugoslav Republic of Macedonia. This section describes the most important steps which need to be addressed in developing a sound emergency response commensurate with the threat assessment. In sections 2.2 and 2.3 the lists of interim and longer term actions are given. Section 2.4 deals with the verification of the "Assessment sheets", which serve as the indicators of the present situation. The more detailed description of the current situation is in Chapter 3, which provides more background, why the recommended interim and longer term actions have been proposed.

The team observed a strong commitment of Radiation Safety Directorate staff to establish a competent and respected regulatory body. Quite a lot of effort has been put in writing regulations and building regulatory infrastructure in the recent period since 2006. Establishing a radiation emergency response capability in line with the international standards goes along with this general direction. The authorities of the Former Yugoslav Republic of Macedonia decided to invite the EPREV mission to assist them in setting the goals in the area of radiation emergency preparedness. The first steps were directed into legislative framework (i.e. drafting regulations), that creates a basis for developing an integrated national emergency preparedness and response system, including the National Radiological Emergency Plan (NREP). The next step should be a thorough assessment of the current general emergency response capabilities and identifying the capable and willing organizations to be included into the EPR system within the framework set by the NREP. The following important steps are in front of the authorities which need to be performed to establish an interim emergency response capability. These are the steps, which represent the so called "big picture":

- The Law on Radiation Protection and Safety is in force and it empowers the Radiation Safety Directorate (RSD) to "prepare national radiological emergency plan" (Art. 4). RSD should take advantage of this legal provision and elaborate the National Radiological Emergency Plan (NREP) as soon as possible.

- A pre-requisite of writing the NREP is the threat assessment, which provides the scope of emergency planning, i.e. the set of scenarios or initiating events which should be addressed in the NREP. The planning basis can consist of documents, which are readily available, i.e. (a) individual institutions emergency procedures, which are required during the licensing process, (b) lists of equipment, which may be used for emergencies, (c) facility characteristics (radioactive waste storage), (d) first responders capabilities, etc. Also regulations (i.e. intervention levels, contents of the emergency plans) can be valuable, but it can not be justified to delay preparation and adoption of NREP due to lack of specific regulations. On the contrary, the NREP has to be developed with the aim to fill in the gap, which can not be prescribed by regulations only, as well as to give more specific directions how to cope with the emergencies.

- One of the important characteristics of NREP is defining roles and responsibilities of all stakeholders in the emergency preparedness and response. A challenge is to find and involve appropriate stakeholders into the NREP. The lead authority shall communicate and agree with the most appropriate institutions what is expected from them and to assist them in the formulation of their responsibilities in the NREP. The concept of operations is also an item that should be developed as an input to the NREP, and all subsequent efforts should clarify the details of this concept. Various examples of the concept of operations are given in [3]. While finalizing the draft NREP, the authors should be aware that the NREP is a consensus document. Therefore, the draft should be circulated to all stakeholders for their feedback and comments. This dialogue will ensure that the various responsibilities and the concept of operations are well understood by all stakeholders and that the stakeholders feel involved in the process and develop a sense of ownership for the document.

- Once the NREP is adopted, it must be tested in an exercise. One would say that the training is needed before testing of the emergency response capability. This is correct, but in developing an initial emergency response capability the training shall be focused to provide participants with the concept of operations, i.e. that they understand their roles and to build on the skills they already possess. A comprehensive training program shall be developed at a later stage, after a few exercises combined with partial exercises (drills) shall be conducted. The absence of a comprehensive training program should by no means delay organization of an exercise for testing the initial emergency response capability. The exercises will provide valuable feedback to assess the appropriateness of resources allocated (including manpower, equipment and communications). The exercise analysis will also assess the concept of operations, procedures, and reveal all other details which emerge during an exercise (i.e., compatibility, bottle-necks, a consistent understanding of messages among various stakeholders, etc.).

2.2. Interim (Immediate) Actions

1. **It is essential to draft the National Radiological Emergency Plan (NREP) as soon as possible.** The NREP is a necessary and very important step toward establishing the interim emergency response capability. The methodology for doing so is thoroughly described in [3]. Also, other IAEA documents are recommended [4, 5, 6, 9 and 11]. It is strongly suggested to involve in writing the NREP those persons who have attended the relevant IAEA courses. In the event of doubt or a lack of guidance, seeking IAEA advice may be the most efficient way to find adequate solutions. In addition, NREP should be consistent with the country's National Emergency Response Plan (NERP), designed for response to all types of emergencies. ([2]:para.1.7, 3.4).

2. The legal framework provides a good starting point for writing the NREP, but it seems that the laws themselves do not automatically give a clear distribution of responsibilities during a radiation emergency. **The roles and responsibilities of the P&R Directorate and the Crisis Management Centre should be thoroughly analyzed and the outcome must produce a viable concept of operations, which will be agreed upon and adopted by all parties.** These responsibilities together with the concept of operations should be clearly described in the NREP. Also the RSD responsibilities must be much more detailed in the NREP than they are in the legislation. The Law on Radiation Protection and Safety foresees the implementation of intervention measures by the RSD. The RSD should assume those activities which it is capable of performing, and the others should be assigned to the other organizations, e.g. to the Institute of Public Health, P&R Directorate, etc. ([2]:para. 3.3).

3. **The RSD shall, within the inspection plan thoroughly address verification of licensee's emergency plans.** Such verification should be described in a procedure, the main steps of which will be based on regulations about the content of an emergency plan. The emergency plans should be commensurate with the potential threat and they should address also such elements as training and exercises ([2]:para. 3.3, 3.8, 3.9).

4. For effective functioning of emergency response capability the technical support organizations are vital to provide implementation of specific activities, such as measurements, data processing, source recovery and transportation, etc. **Thus, the technical support organizations should be included in the NREP.** The Institute of Public Health seems to possess most of the needed capabilities, but the role of the other organizations should not be underestimated, especially the organizations dealing with the medical aspects of emergency preparedness ([2]:para.5.25).

5. **A threat assessment for all reasonably likely radiation emergencies should be performed, taking into account all sources which exist in the country**, as well as other relevant practices and activities (e.g. transport of radioactive sources, potential of finding a source in scrap metal, possible terrorist activities such as use of a radiological dispersal device). The basic policy for threat assessment should follow the latest IAEA guidance using the five threat category definition and implementing terms, definitions and terminology in the guidance ([2]:para.3.15-3.20).

6. It is necessary to perform threat analysis before the start of drafting the NREP. **The cooperation with the operators of the facilities and source users in writing threat analysis can be requested to facilitate this task** ([2]:para.3.14, 3.15).

7. Also the **on-site emergency plans of operators as well as plans of the designated response organizations should take into account their own threat analyses** and these plans should be in line with the international recommendations [2, 3] for the relevant category of threat ([2]:para.3.15).

8. Within the framework of National Platform for Disaster Risk Reduction and its platform "prevention and management of environmental hazard and CBRN contamination" a **more detailed concept of operations should be developed for an adequate radiation emergency response**. This concept should give due priority to the line of command, as well as to the differentiation between the responsibilities for

preparedness and response phase, and to the identification of national and local resources ([2]:para.3.2, 3.11).

9. For all notification centers (regional and national) operated by the CMC **appropriate procedures should be developed to deal with the incoming calls reporting the radiation emergency**. The centers should promptly notify the institutions that have roles in radiation emergency response. For the national notification center, which has its role as the **Contact Point under the IAEA Conventions on Early Notification** and Assistance, also incoming calls from the IAEA should be addressed in the procedure. These procedures should be harmonized with the National Radiological Emergency Plan ([2]:para.4.16, 5.21).

10. **The first responders (i.e., police, first aid, firefighters, emergency workers belonging to the P&R Directorate) should receive basic instructions on how to respond to a radiation emergency.** These instructions should include: recognition of the event (e.g., radiation signs, transport codes); identification of whom to call to report the event; guidance on how to secure the site and protect those on-site; the risks associated with radiation; and guidance on how to avoid potential contamination while rendering first aid to injured persons ([2]:para.4.18, 5.33).

11. **A campaign should be conducted, initiated probably by the RSD, to increase the awareness regarding the indicators of a radiological emergency, the appropriate notifications and other immediate actions needed to mitigate or remediate the radiation hazard.** The target audience should include on-site operators of facilities and practices in threat categories III and IV, local officials, representatives of emergency response organizations, the postal service, customs services, national border control authorities, scrap metal dealers, and the public. The IAEA may support organizing a National Workshop or other activity related to the aforementioned awareness campaign ([2]:para.4.32-4.38).

12. Although the ad hoc threat assessment performed by the team did not reveal any need for special mitigatory actions associated with potential radiation emergencies, the **Former Yugoslav Republic of Macedonia should carefully analyze its current needs for expert support to be provided by the technical support organisations**, e.g. the IPH and the armed forces. The team's impression was that these resources do exist and are of adequate quality. However, this does not mean that nothing else is needed. A thorough assessment of these issues (e.g., timely response, quality of measurements, manpower, communication of results, radiological assessment, dosimetry, protective action advice) is needed to establish the future emergency response capability, taking into account international experience, and verifying the arrangements through exercises. These arrangements, capabilities and planned actions of the technical support organizations should be described in the NREP ([2]:para.4.35).

13. To ensure an effective licensing process, **a brief guideline should be developed by the regulatory body to outline which mitigatory actions the operators of threat category IV practices** should include in their instructions for coping with emergency situations ([2]:para.4.36).

14. The NREP should address also the arrangements to **initiate a prompt search and issue a warning to the public in case of a dangerous source** (lost and found source, i.e. an orphan source) ([2]:para.4.36, 4.38).

15. The generic intervention levels and action levels for foodstuffs are in compliance with international standards, but it is recommended to **develop specific procedures, which would take into account how to apply these levels, since the intervention levels can not be measured directly** ([2]:para.4.71, 4.88, 5.21-22).

16. In case of **facilities with threat category III radioactive sources are utilized in the country, appropriate arrangements (including evacuation) to ensure the safety of all persons on-site should be established** ([2]:para.4.51).

17. The National Radiological Emergency Plan should foresee **notification of the endangered population for installations of threat category III** (e.g., facility emergency) **and during certain radiation emergencies of threat category IV** (e.g., a large transport accident, a fire involving a source, or large scale contamination) by the direct method (word-of-mouth). The NREP should also ensure that, when necessary, this population will be provided with instructions based on the radiological assessor's advice ([2]:para.4.53).

18. In the National Radiological Emergency Plan (or similar document) **additional issues for emergency workers should be adequately covered, including: medical surveillance, training, and appropriate protective equipment** (with alarm dosimeters as the minimum requirement), as well as protective clothing and breathing equipment, if needed ([2]:para.4.58, 4.62-64).

19. For the sake of consistency with international standards, the operational intervention levels (OILs) should be quoted in relevant documents. **The OILs should provide reference values that would warrant the introduction of countermeasures.** The OILs may be useful when explaining to the public the measured values on home territory in the event of a nuclear accident abroad ([2]:para.4.71).

20. **In the relevant documents or procedures introduce the concept of "inner cordoned area (safe distance) radius"**, which is explained in Appendix 5 of the EPR-Method [3], and which gives initial guidelines of how to initially organize the area for managing radiation emergencies ([2]:para.5.21-22).

21. For the first responders who are responsible for first aid, and for other medical staff who may encounter potentially contaminated patients, it is necessary to include in their **training programme instructions regarding treatment of potentially contaminated patients**. These instructions should describe procedures for decontamination of patients, and should raise awareness that customary medical protective clothing (gowns, face masks, latex gloves, shoe covers) provides excellent protection against contamination ([2]:para.4.77, 5.31).

22. **Public information should be addressed in the future National Radiological Emergency Plan.** The designated institutions for releasing the information to the public and their roles and their mutual relations shall be clearly described. The staff responsible for preparation and approval of press releases should be designated in advance. In addition, the information pathways should be described in the NREP or its

procedures, outlining to which media information should be sent, by which means (facsimile, e-mail, telephone), and identifying the responsible person to authorize and send out this information ([2]:para.4.82-83).

23. **Testing public information arrangements during an exercise or a specific drill is highly recommended**, but it is difficult to reveal all shortcomings via exercises alone. Therefore, it is also recommended to assess experiences involving public information from other real emergencies and to apply these lessons learned to radiation emergency response ([2]:para.4.82, 5.33).

24. **Templates of press releases are useful tools.** For the most credible emergency scenarios, the short synopsis of a press release may be prepared in advance (i.e., in the event of a lost source or a large-scale contamination) and integrated with the appropriate procedure ([2]:para.4.82, 5.21-22).

25. **The operational intervention levels for agricultural countermeasures regarding food consumption in the event of an emergency should be adopted and integrated into the radiation emergency documents.** In addition, responsibilities for decision-making regarding agricultural countermeasures and food consumption in the event of an emergency should be clearly addressed in the future NREP, including the roles of all stakeholders which may take part in this process IPH, Ministries of Health and of Agriculture, as well as the Incident Commander ([2]:para.4.85, 4.88).

26. **Sampling procedures for food, crops, and agricultural soil in the event of an emergency** should be included in the future NREP (i.e., where to take soil samples, which crops and where should be sampled, frequency and size of samples, etc.). These procedures should reflect national capabilities to perform radioactivity measurements (e.g., how many samples of each type should be taken, and how many samples should be measured within a given timeframe) ([2]:para.4.89).

27. Since the **non-radiological consequences** of emergencies are not among the most important priorities for establishing an interim response capability, the following issues are considered to be the required long-term activities ([2]:para.4.94):

    a. The team responsible for public information should follow media coverage and the public response. The public information team should develop working practices to ensure that the messages (press releases) sent out after the initial notification contain information to correct false or misinterpreted reports, if such reports appear in the media.
    b. The non-radiological consequences include economic losses, security concerns, the fear of losing loved ones, etc. It is impossible to consider all these issues, but the response may foresee and address some of them, (i.e., insurance in the event of economic losses or advice by a team of psychologists to handle unjustified fears and worries, specific information to target audience about trade, transport and different events, such as cultural, sports, religious, political, etc.).

28. All emergency response organizations should begin **developing procedures for radiological emergency response** based on the NREP. The importance of preparing and adopting the NREP as soon as possible is described in Chapter 2.1, “Introduction” ([2]:para.5.21-22).

29. In addition to the NREP preparation, **a thorough analysis should be performed to determine whether the available resources meet the needs** of emergency response, including scenarios anticipated by the threat assessment ([2]:para.5.25).

30. In addition to the identification of roles and responsibilities for various organizations during an emergency, **facilities or premises to be used by these organizations during emergency response should also be identified** ([2]:para.5.28-29).

31. The RSD in cooperation with CMC are advised to **develop a special procedure about cooperation of authorities and organizations in case of lost and found (orphan) source or radioactive contamination**. Authorities are also advised to establish a special Response Group for responding to radiological emergencies involving uncontrolled sources. The group can be activated in a very short time and the group members should be radiation professionals from different institutions and authorities, responsible for providing prompt expertise and radiation protection services to local officials and first responders ([2]:para.5.21-22).

    The procedure should contain the following elements:

    - clear allocation of tasks and responsibilities to all organizations that can contribute to an effective response after finding an uncontrolled radiation source in the territory of the country, including railway stations, airports, and customs crossing points,
    - method of exchange of information between the organizations involved and local authorities (regional crisis management centers,
    - method for exchange of information among the Customs Directorate, the RSD and the regulatory bodies of neighboring countries,
    - templates of how to address public and media concerns promptly in a coordinated, understandable, and consistent manner (with respect to orphan sources),
    - a financial mechanism that specifies how expenditures for the remediation of orphan source will be compensated,
    - other requirements, based on the IAEA recommendations.

32. Within the NREP, maintaining the competence of first responder organizations should be addressed, including a training program for first responders. The P&R Directorate, CMC together with the RSD should **develop and implement this training program to provide first responders with the knowledge and skills** to address any emergency involving the hazard of ionizing radiation. The components of the IAEA's "Regional Training Course on Practical Response to Radiological Emergencies – Part 1, (First Responders)" are recommended to be incorporated in the national training program ([2]:para.5.31).

33. **The emergency response capability should be tested in an exercise with a suitable scenario**. The exercise should be thoroughly analyzed, and lessons learned should be integrated to improve the emergency response capability ([2]:para.5.33).

34. **Establishing and maintaining the required quality of radiation monitoring instrumentation** should be an ongoing task and IPH should be the organization to take part in this task ([2]:para.5.37).

35. To **ensure the participation of various organizations** (both private and public) in emergency preparedness and response, and to ensure availability and reliability of resources, contractual obligation is a preferred method to achieve this goal ([2]:para.5.30).

36. **Regular calibration of radiation measuring devices** is an important issue and the P&R Directorate, including all the organizations having such equipment shall have it calibrated ([2]:para.5.37).

2.3. Long-Term Actions

1. After the establishment of an interim emergency response capability, which will be described in the NREP, it is necessary to **perform a gap analysis, which will show weak points, i.e. the functional and infrastructural elements which are not adequately covered** or are not covered at all. All institutions, taking part in NREP, should perform a sort of assessment, if they are capable of meeting the requirements, and to produce a list of what is still needed in terms of equipment, training, manpower, or similar. In the long term, the issue of financing such needs should be addressed, especially for the organizations which do not have budget lines for emergency preparedness in their financing plans ([2]:para.3.11-12).

2. It is recommended **to review the threat assessment in regular intervals**, for instance every five years or at least every ten years, since this country has a relatively low risk profile for radiation emergencies. Regular review of the threat assessment is important to maintain an up-to-date perception of potential risks and make necessary adjustments of the emergency plans, if necessary ([2]:para.3.16).

3. **Emergency documentation (plans, arrangements, procedures) should be updated and finalized in an appropriate timeframe** (e.g., within three years) after the interim emergency response capability is established. Special attention should be given to verify, if the proposed concepts of operations are functional, and if responsibilities are well understood by the stakeholders. The outcome should be assessed compared to the Requirements described in [3]. A regular schedule for updating the documentation should be established after the full emergency response capability is developed ([2]:para.5.17).

4. It is recommended to the RSD to **issue the regulations which will specify the requirements for the radiation monitoring system and workers training at scrap metal facilities**, including report of the anomalies to the authorities. In case of non-compliance with these requirements the license for the activity may be suspended or revoked ([2]:para.1.7).

5. **The reliability and possible upgrade of the Early Warning System should regularly be reevaluated.** Make a decision about what the action would be, if elevated radiation levels were detected by this system out of the IPH office hours ([2]:para.5.25).

6. Develop an **outreach campaign to raise awareness among general practitioners** of the medical symptoms of radiation exposure. For details, see the IAEA leaflet on recognition of radiation injuries and also [9] ([2]:para.5.77).

7. In the event of severe radiation injuries, a medical centre to provide initial treatment should be designated and the option of sending such patients for medical treatment abroad should be planned. In cooperation with the Ministry of Health the **appropriate procedure should be developed to ensure that an assistance request will be promptly channeled to the IAEA in the event of severe radiation injuries**, which should be treated by qualified specialists ([2]:para.4.75).

8. **Regional cooperation in emergency response should be enhanced further**, and may be formalized via bilateral agreements between countries, especially with the bordering countries, which do have nuclear installations (e.g., Bulgaria) ([2]:para.5.10).

9. A **Quality Management System should be established for radiation emergency response** (e.g., all emergency response organisations should be awarded quality standard certificates) ([2]:para.5.37).

10. A **long-term radiation emergency exercise program should be adopted** and implemented by the authority, which has overall responsibility for the implementation of NREP ([2]:para.5.33).

11. The issues of training for radiation emergencies should be addressed in a strategic manner. Therefore, a **long-term training program should be adopted** and implemented. To facilitate this effort, the IAEA's long-term (regional) training program may be taken into consideration ([2]:para.5.31).

2.4. Assessment Sheets

As part of the appraisal methodology, the answers to questions from the assessment sheets (Appendix IV) were collected during the visit. Based on the facts, interviews, and documents obtained during the visit, the EPREV team made an independent judgement on the prevailing situation in the Former Yugoslav Republic of Macedonia with regard to all appraisal criteria. The assessment sheet in this document represents the first version; therefore, they can be used as benchmarks against which to measure any possible improvement in the future. In this first version of the assessment sheets, the documents primarily reflect the judgement of the EPREV team, and therefore may be biased. Following the future missions, and as additional progress is achieved by the authorities of the country, the data in this document will more accurately reflect the actual situation and the willingness of the authorities of the Former Yugoslav Republic of Macedonia to improve their system of emergency preparedness and response.

From the assessment sheets, it is clear that certain key areas have not yet been addressed. These areas need immediate attention. The action plan to improve emergency preparedness and response, which is to be adopted by the authorities, will clearly describe how to meet the requirements from the assessment sheets. It is important to highlight that not all requirements from the assessment sheets are equally difficult to implement. Clearly the requirements which can be quickly implemented should receive adequate attention as early priorities.

The assessment sheets represent a quick summary of the emergency preparedness along with status indicators for the point in time when the EPREV took place. This is actually a snapshot of the initial situation. Together with the recommendations given in this report, which should be reworked into an action plan, the assessment sheets can be used as a tool to monitor progress made by implementing the recommendations.

3. DETAILED FINDINGS

3.1. Introduction

The EPREV mission team's detailed evaluation of the emergency preparedness and response system in the Former Yugoslav Republic of Macedonia is based on information provided by Government officials and experts, as well as the representatives whom the mission team interviewed. (Please see Appendix III for the list.). Due to the time constraint of finalizing the mission in five days, it was not possible to verify all the information provided. In some cases, the information was not fully comprehensive. This was, in part, due to the fact that the national radiological emergency arrangements and support documents, including regulations, are currently being developed. Some information provided by the participants reflects their intentions regarding how to tackle various issues, rather than describing the existing situation.

One of the challenges of the EPREV mission was to take a snapshot of the rapidly changing situation in the Former Yugoslav Republic of Macedonia, where the institutions have been established, but yet they need to assume their roles in a coherent radiation emergency response organization (e.g., the institutions are functioning and they are receiving information, support in the equipment and training from various foreign donors, but these activities are not coordinated among the institutions themselves, nor is this assistance a part of a nationwide effort to establish a radiation emergency capability). During the mission, the team gained the impression that its counterparts were strongly motivated and committed to comply with international standards. This attitude is in line with the country's commitment to accelerate the accession process to the EU, which is regarded as the national priority. The EPREV team also recognized that the country has limited resources, which causes staffing problems, although the RSD is relatively well staffed compared to similar authorities of the non-nuclear countries in the region. Some difficulties stem from the fact that RSD became functional in 2006 and it has quite a few demanding tasks on its agenda, i.e. from finalizing the secondary legislation to increasing the staff and also to find appropriate premises for the additional staff, as well as to establish working methods and a quality management system. The RSD staff is relatively young and dedicated and they are willing to take on challenges. Good training and advice in some particular areas are among these challenges. The EPREV team expects that in the emergency preparedness and response area the current report will be used to fill in the gap by giving proper advice at the right time.

Where appropriate, the mission team listed interim recommendations to indicate preliminary actions that should be taken immediately, using existing capabilities, to strengthen emergency preparedness and response in the country. Following these interim recommendations, the team listed long-term recommendations regarding actions the mission team felt should be implemented within one to three years to provide a solid foundation for emergency preparedness and response. The recommendations are preceded by the description of the current situation, which provides insight and further clarification about the recommendations given.

The following sections address the Requirements [2] and the associated Guidelines [3] concerning the basic responsibilities, threat assessments, response functions and infrastructure.

3.2 Basic Responsibilities

Regarding the Requirements set out in [2] for basic responsibilities, the following appraisal criteria was investigated:

- Establishment or identification of an existing governmental body or organization to act as a national coordinating authority (NCA)
- Clear assignment of the functions and responsibilities of users and response organizations that are understood by all response organizations
- Establishment of a regulatory and inspection system that provides reasonable assurance that emergency preparedness and response arrangements are in place for all facilities and practices

3.2.1. Current Situation

Since the radiation emergency preparedness and response system is under development in the Former Yugoslav Republic of Macedonia, the EPREV team tried to outline in this chapter the main characteristics of the current situation.

In the Law on Radiation Protection and Safety the responsibility for preparation of the National Radiological Protection Plan (NREP) is clearly assigned to the RSD in the Art. 4. Besides the RSD the main stakeholders in radiation emergency response, as well as in writing the NREP, are the Protection and Rescue (P&R) Directorate and the Crisis Management Centre.

Regarding the current legal framework, the EPREV team had the opportunity to review the Law on Radiation Protection and Rescue, issued in 2002 and amended in 2007, and the Law on Crisis Management, which has been in force since 2005. The law regulating the responsibilities and activities of P&R Directorate, which was established in 2005, was not reviewed. From the presentation of the P&R Directorate, it was concluded that their competencies encompass planning and estimation of hazards, organization of protection and rescue systems, deploying P&R forces, providing resources for P&R, as well as conducting training and exercises. The Crisis Management Centre operates a network of notification centers and it is responsible by law for preparing assessments of the risks to national security and for proposing measures to resolve crisis situations.

From the interviews the team attempted to learn what the principle of operations in case of an emergency would be. In principle the emergencies are handled at the lowest level, i.e. with municipal resources. If the emergency is scaled up and more resources are needed, then regional and even national resources are activated. The P&R Directorate tries to provide as many resources as needed, while the Crisis Management Centre supports operations with its communications network and its capability to gather, process and disseminate various types of information (meteorological, seismological, hydrological, traffic, etc.). In the case of long-lasting (i.e. several days or weeks) emergency or crisis situation and of national importance, the Crisis Management Centre takes the lead by activating a Steering Group consisting of ministers of Interior, Health, Transport and Communications, Defense, Foreign Affairs and the Head of the Assessment Group. The members of the Steering Group can be replaced with other ministers if the proposed structure is not adequate. The Assessment Group is composed of the Directors from different Directorates and this group is responsible for providing the Steering Group with an accurate and relevant assessment to ensure enough information for their decision-making. In terms of a crisis management system, there are altogether 35

notification centers which are organized in eight different crisis management regions across the republic.

However, it is advised that the roles and responsibilities in case of a radiation emergency of the P&R Directorate and the Crisis Management Centre are thoroughly analyzed and once agreed, the outcome should be clearly described in the NREP.

The Law on Radiation Protection and Safety contains provisions about emergency preparedness, as well as about licensing practices with sources of ionizing radiation, which is considered to be an important measure of preventing eventual radiation emergencies. Regarding emergency preparedness, the Law on Radiation Protection and Safety gives RSD the authority to:

- establish intervention levels (a dedicated draft regulation has been prepared to address this issue)
- implement intervention measures
- prepare the National Radiation Emergency Plan
- require the submission of an emergency plan or adequate procedures as a licensing condition.

One of the sections in the Law on Radiation Protection and Safety deals with the "radiological emergency". This section covers responsibility of the Government of the Former Yugoslav Republic of Macedonia to adopt the NREP upon the proposal of RSD, declaration of the emergency situation by the government, as well as requirements for the revision of the NREP and the obligation of a licensee to notify the RSD about the emergency and about what information to provide the RSD in such a case. The regulations, which were still in a draft form, consider intervention levels along with the emergency worker's dose limits, contents of the emergency plan and threat categorization.

Among other requirements which must be met by the applicant for a radiation practice, also the emergency plan must be handed over to the RSD during the licensing process. After the license is obtained, the regular inspections also cover verification of the licensing documents, which include an emergency plan. The licensing and inspection provide reasonable assurance that the likelihood of emergencies and the magnitude of their consequences will be minimized.

By the Law on Radiation Protection and Safety the RSD's role is also implementing intervention measures, but in fact during emergency response its responsibilities will be mainly based on its capabilities. With its present resources the RSD may assume an advisory role to the incident commander (e.g., interpreting the measuring results, providing assessments and proposals for decision making, assisting in media communication) and may also provide inspection control.

The Institute of Public Health (IPH) is designated by the Law on Radiation Protection and Safety (Art. 7) as the technical support organization. Its main duty is the monitoring of environmental radioactivity and calculation of the population dose received through the ingestion pathway. The other activities as listed in paragraph 2 of Art. 7 are: preparing technical bases for regulations, providing the RSD with the reports on radiation protection related to practices supervised by the RSD, conducting training, measuring dose due to occupational exposure, monitoring of workplaces, conducting medical surveillance of workers and calibrating radiation measuring instruments.

The IPH is ready to take part in the emergency response as it has capabilities which can be readily used, but for the time being no extra financial means are foreseen to cover the costs of this activity. The IPH is financed by the Health Security (Insurance) Fund. The IPH operates Early Warning System, which consists of 12 gamma measuring stations which have wireless (via GSM phone network) connection with the centre, located at the IPH. Besides providing personal dosimetry services for the customers and calibration of radiation instruments, the IPH is renowned as the institution performing gamma spectrometry. The IPH performs also radon measurements and on its list of missing equipment are among others: continuous iodine monitor, liquid scintillation counter, broad band high-purity germanium gamma spectrometer, and portable gamma spectrometer. The IPH also has an alpha spectrometer but to become operational it needs to be equipped with adequate software. With its capabilities (technical and manpower) the IPH can assume the role of the primary Technical Support Organization (TSO) in the event of a radiation emergency.

In the event of more widespread emergencies, the NREP should activate as many institutions as needed to provide adequate response. Following, is a tentative list of ministries and institutions, besides the RSD, which can take part in radiation emergencies:

- The Ministry of Health can provide medical assistance to first responders, and can treat persons injured by radiation. Staff of the University Clinic of Radiotherapy and Oncology, as well as the staff of Institute of Pathophysiology and Nuclear Medicine, who are more knowledgeable about radiation and together with their medical background are the right persons, who can provide support in these activities.

- The Ministry of Agriculture can implement food control in cooperation with the Ministry of Health and the IPH.

- The IPH has its role in providing early warning, if such an event occurs. It can provide radiation monitoring during an emergency, as well, supporting emergency workers with the TLD dosimetry.

- The Crisis Management Centre is indispensable with its network of notification and crisis management centers, as well as their capability of gathering, processing and disseminating data, which is essential for decision making.

- The Ministry of Defense, together with P&R Directorate, can provide special equipment and manpower.

- The Ministry of Foreign Affairs can be involved in facilitating international assistance to other countries, if such assistance is requested by the third party.

The NREP is just one of many different emergency plans, which are or are going to be developed and as such, it has to be in line with the general National Emergency Response Plan, designed for response to all types of emergencies. The Crisis Management Centre presented the National Platform for Disaster Risk Reduction, which consists of 23 different platforms, “prevention and management of environmental hazard and CBRN contamination” being one of them. In Appendix I more thorough information about the platform “prevention and management of environmental hazard and CBRN contamination” is given.

3.2.2. Good Practice

In the area of legislative framework the Former Yugoslav Republic of Macedonia has made a solid foundation with its Law on Radiation Protection and Safety, which gives responsibility for writing the NREP to the RSD. It is also encouraging that in the draft secondary legislation quite some provisions will address emergency preparedness issues. However, this legislation is still in the draft form and it needs to be thoroughly reviewed before it is issued.

3.2.3. Recommendations

Interim

1. It is essential to have drafted the National Radiological Emergency Plan (NREP) as soon as possible. The NREP is a necessary and very important step toward establishing the interim emergency response capability. The methodology for doing so is thoroughly described in [3]. Also, other IAEA documents are recommended [4, 5, 6, 9 and 11]. It is strongly suggested to involve in writing the NREP those persons who have attended the relevant IAEA courses. In the event of doubt or a lack of guidance, seeking IAEA advice may be the most efficient way to find adequate solutions. In addition, NREP should be consistent with the country's National Emergency Response Plan (NERP), designed for response to all types of emergencies.

2. The legal framework provides a good starting point for writing the NREP, but it seems that the laws themselves do not automatically give a clear distribution of responsibilities during a radiation emergency. The roles and responsibilities of the P&R Directorate and the Crisis Management Centre should be thoroughly analyzed and the outcome must produce a viable concept of operations, which will be agreed upon and adopted by all parties. These responsibilities together with the concept of operations should be clearly described in the NREP. Also the RSD responsibilities must be much more detailed in the NREP than they are in the legislation. The Law on Radiation Protection and Safety foresees the implementation of intervention measures by the RSD. Actually the RSD should assume those activities, which it is capable of performing, and the others should be assigned to the other organizations, e.g. to the Institute of Public Health, P&R Directorate, etc.

3. The RSD shall within the inspection plan thoroughly address verification of licensee's emergency plans. Such verification should be described in a procedure, the main steps of which will be based on regulations about the content of an emergency plan. The emergency plans should be commensurate with the potential threat and they should address such elements as training and exercises.

4. For effective functioning of emergency response capability the technical support organizations are vital to provide implementation of specific activities, such as measurements, data processing, source recovery and transportation, etc. Thus, the technical support organizations should be included in the NREP. The Institute of Public Health seems to possess most of the needed capabilities, but the role of the other organizations should not be underestimated, especially the organizations dealing with the medical aspects of emergency preparedness.

Long Term

5. After the establishment of an interim emergency response capability, which will be described in the NREP, it is necessary to perform a gap analysis, which would show weak points, i.e. the functional and infrastructural elements which are not adequately covered or are not covered at all. All institutions, taking part in NREP, should perform a sort of assessment, if they are capable to meet the requirements, and to produce a list of what is still needed in terms of equipment, training, manpower, or similar. In the long term, the issue of financing such needs should be addressed, especially for the organizations which do not have budget lines for emergency preparedness in their financing plans.

3.3. Assessment of Threats

Regarding the requirements identified in [2] for threat assessment, the following appraisal criterion was investigated:

- Perform threat assessments for the facilities and activities in the state, and categorize them in accordance with the five threat categories in Table I of GS-R-2 [2].

3.3.1. Current Situation

A radiological emergency threat assessment is to be prescribed in the draft Regulation on the Categorization of Radiation Threats, but the actual radiological emergency threat assessment for the Former Yugoslav Republic of Macedonia has not yet been performed. The EPREV team undertook an initial estimate of this threat assessment. This estimate is based on the following information, which was collected during the mission:

- As a minimum requirement the country must have appropriate radiation emergency preparedness to cope with category IV and V threats. In a search for threat category III sources or facilities, the most active source was identified to be in the University Clinic of Radiotherapy and Oncology, a Co-60 source of about 70 TBq activity. There were other sources (Ir-192) of about 0.4 TBq (when fresh, reloaded every three months) used for brachytherapy. The other sources were of almost negligible activity (far less than 40 GBq). Linear accelerators are also in use, which can cause overexposure to patients and only in extreme cases also to workers (medical and maintenance staff), but they are not harmful when disconnected from power. There is also a storage of disused sources in a so called “bunker”, but the activity of sources (i.e. Cs-137, Ra-226, Sr-90) are again less than 40 GBq, according to the inventory list.

- For nuclear medicine (Institute of Pathophysiology and Nuclear Medicine) the technetium (Tc-99) generator for diagnostics are supplied regularly. The activity of such a generator when fresh is about 16 GBq. It is flown to the airport and then transported to the nuclear medicine department and it represents a relatively modest threat even if the transport route is taken into account.

- There are some radioactive sources in the industry. However, these sources are mainly used as gauges for measuring thickness or density and, in some cases, as level gauges in various silos or containers. The reported number of these sources is 19 and three licenses for radiation practices were issued for those sources.

- The current number of gamma emitting radioactive sources used for radiography in shipbuilding, piping inspection or civil engineering is about six, operated by three different companies. The RSD reported that they are regularly informed about any transport of these sources and about the location where the activities are performed, if the welding inspection is done outside company premises.

- No details of the transport of radioactive sources were obtained but it was assumed that it was relatively modest. The transport of radioactive sources can be analyzed by using data about transport licenses issued per year. These licenses also contain data about the sources, thus the level of threat can be estimated.

- The location and the building for radioactive waste storage were selected and the decision was made by the authorities. The building itself is a bunker type facility erected by the military and it is located in a remote area in a military protected zone. Probably the building will have to be adapted to meet the requirements set by the RSD in the process of licensing, which, in fact, has not started yet.

- The lightning rods on building roofs across the country can have significant activity. The authorities are aware of this problem and they have already started dismantling some of those rods. All lightning rods will probably be dismantled in the near future in the framework of an internationally sponsored project. There are about a hundred lightning rods to be dismantled, since their use is no longer justified, and the installation of new ones is prohibited.

- The use of radioactive sources in research activities (including X-ray analytical techniques) is almost negligible.

In conclusion, the mission could identify only a limited number of threat category III radioactive sources in the Former Yugoslav Republic of Macedonia. Based on the information above, the mission concluded that the country has to establish radiation emergency response capabilities matching category III, IV and IV threats.

A threat analysis is a prerequisite for drafting the NREP, which should adequately address the threats analyzed in the mentioned document.

3.3.2. Good Practice

The introduction of threat categorization into the draft Regulation on the Categorization of Radiation is welcomed as direct use of the IAEA standards and regulatory guides. Such practice should not be considered mandatory; similar results can be achieved using alternative methods. However, in some cases, when new regulations are in preparation, and when it is relatively easy to pass a regulation, this practice can be proven and justified as a quick and direct way to meet the international requirements.

3.3.3. Recommendations

Interim

1. A threat assessment for all reasonably likely radiation emergencies should be performed, taking into account all sources which exist in the country, as well as other

relevant practices and activities (e.g. transport of radioactive sources, potential of finding a source in scrap metal, possible terrorist activities such as use of a radiological dispersal device). The basic policy for threat assessment should follow the latest IAEA guidance using the five threat category definition and implementing terms, definitions and terminology in the guidance.

2. It is necessary to perform threat analysis before the start of drafting the NREP. The cooperation with the operators of the facilities and source users in writing threat analysis can be requested to facilitate this task.

3. Also the on-site emergency plans of operators as well as plans of the designated response organizations should take into account their own threat analyses and these plans should be in line with the international recommendations [2, 3] for the relevant category of threat.

Long Term

4. It is recommended to review the threat assessment in regular intervals, for instance every five years or at least every ten years, since this country has a relatively low risk profile for radiation emergencies. Regular review of the threat assessment is important to maintain an up-to-date perception of potential risks and make necessary adjustments of the emergency plans, if necessary.

3.4. Establishing Emergency Management and Operations: Authority, Organization, and Coordination of Emergency Response

Regarding the Requirements set out in [2] for establishing emergency management and operations, the following appraisal criterion was investigated:

- Make arrangements to coordinate the emergency response of all off-site and on-site response organizations, to include a command and control system for local and national response to any radiation emergency.

3.4.1. Current Situation

The preferred concept for management of operations is the so-called “all hazards” approach, which means that management of operations and basic infrastructural building blocks are the same for all types of emergencies. In the Former Yugoslav Republic of Macedonia, this approach has been incorporated into the crisis management system. From December 2007 to April 2008 the National Platform for Disaster Risk Reduction was developed, which sets the stage for a network of state institutions, academic community, non-governmental organizations, Red Cross and the business community. The National Platform is based on 23 different (specialized) platforms, each designed for a different type of emergency. These platforms cover a wide variety of different hazards and disasters. The list of these different platforms is given in Appendix I. Here we will focus mainly on the platform “prevention and management of environmental hazard and CBRN contamination”, which falls within the scope of the EPREV mission. It is encouraging that platforms entail so many different stakeholders, but it is also necessary to clearly outline a line of command in case of different scenarios for radiation emergencies. In fact, the “all hazards” approach promotes the use of existing resources to cope with the emergencies, but all the existing resources must fit into the concept of operations and each organization must know its role and what is expected from it.

Furthermore, taking part in the National Platform is also an obligation, which requires an adequate level of preparedness from the participating organization.

In the platform "prevention and management of environmental hazard and CBRN contamination" the main players are in the circle, where are the RSD, CMC and P&R Directorate, as depicted in Figs. 2 and 3 of Appendix I. In Fig. 1 the CMC organizational scheme is presented, together with the Steering Committee and the Assessment Group, which were described in Section 3.2. Therefore, for a robust system which would provide response to all types of radiation emergencies, the management system must also be in place, clearly differentiating between the preparedness and the response tasks, as well as indicating who is responsible for their implementation. In relation to the emergency response phase, the authority for decision making must be given to a single pre-designated person, who should be known to the management of all organizations taking part in the emergency response. The function of "incident commander" (i.e. the decision-maker) must be handed over in a manner, agreed and planned on in advance in case the emergency escalates from the local to the national level.

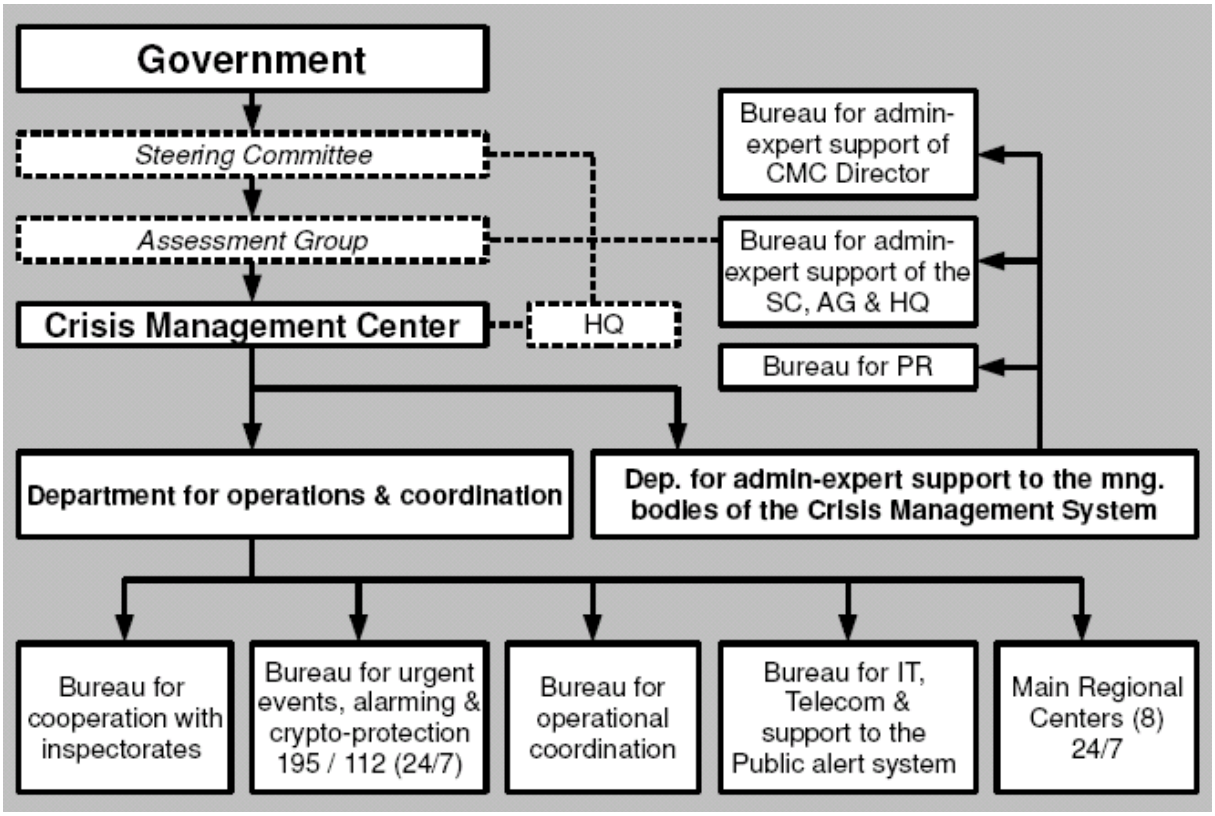

Fig. 1: The scheme representing the structure of the Crisis Management Centre (CMC), augmented by the structures outside the CMC, i.e. the Steering Committee and the Assessment Group

The coordination between on-site and off-site organizations seems not to be an important issue in the country, since there are not many organizations with on-site emergency plans, but a command and control system for local and national response to any radiation emergency needs to be adequately reflected in the concept of platforms.

3.4.2. Good Practice

The wide spectrum of stakeholders activated in the concept of the National Platform for Disaster Risk Reduction is an important step in the right direction to make use of all resources in the country. The National Platform is also applying the "all hazards" approach in the Former Yugoslav Republic of Macedonia, i.e. using the elements of same emergency response system to manage different disasters. This concept has proven to be efficient during many emergencies worldwide. The specifics of each emergency is presented by 23 different specialized platforms, the platform "prevention and management of environmental hazard and CBRN contamination" being one of them.

The CMC and P&R Directorate are the key organizations involved in radiation emergency management and they seem aware of their responsibilities, and are committed to perform their duties.

3.4.3. Recommendations

Interim

1. Within the framework of National Platform for Disaster Risk Reduction and its platform "prevention and management of environmental hazard and CBRN contamination", a more detailed concept of operations should be developed for an adequate radiation emergency response. This concept should give due priority to the line of command, as well as to the differentiation between the responsibilities for preparedness and response phase, and to the identification of national and local resources.

Long Term

2. Emergency documentation (plans, arrangements, procedures) should be updated and finalized in an appropriate timeframe (e.g. within three years) after the interim emergency response capability is established. Special attention should be given to verify, if the proposed concepts of operations are functional, and if responsibilities are well understood by the stakeholders. The outcome should be assessed compared to the Requirements described in [3]. A regular schedule for updating the documentation should be established after the full emergency response capability is developed.

3.5. Identifying, Notifying, and Activating

Regarding the Requirements set out in [2] for identifying, notifying, and activating the emergency response system, the following appraisal criteria were investigated:

- Establish a Contact Point that operates 24 hours per day, 7 days per week.
- Ensure awareness of radiological hazards for on-site facility managers (e.g., for scrap metal processing facilities) and the national border control authorities.
- Ensure first responders are aware of the symptoms, the appropriate notification, and other immediate actions warranted if an emergency is suspected.
- Establish a system to promptly initiate an off-site response in the event of an emergency.
- Ensure response organizations have sufficient personnel.

- Inform the IAEA and other states of a single point of contact in the Former Yugoslav Republic of Macedonia, responsible for receiving emergency notifications and information both from other states and the IAEA.

3.5.1. Current Situation

The CMC operates a network of 35 regional notification centers which are manned around-the-clock, i.e. 24 hours per day, 7 days per week. There is also a national notification center which can serve as a Contact Point under the IAEA Conventions on Early Notification and Assistance, but this arrangement has not yet been implemented. Currently the regional notification centers can be accessed by dialing the number 195. The firefighters and the paramedics (first aid) have different numbers. There are plans to introduce a single number for all emergencies common in the EU countries, i.e. number 112, and the CMC will be the institution responsible for this project. The feasibility study is being carried out to implement number 112 by 2010.

The Early Warning System is in operation and run by the Institute of Public Health. This system consists of 12 gamma measuring stations, which have wireless (via GSM phone network) connection with the central computer, located at the IPH. Measuring range of the stations is from 50 nSv to 10 Sv, the measuring interval can be 5 minutes and the system can supply average, maximal and minimal values. The system is regularly maintained by the IPH staff. The reliability of the GSM network can be compromised in case of an emergency when the lines are busy. The maintenance and repair of remote measuring stations could be an issue because the maintenance people are actually the IPH staff has to travel out from Skopje, which is located in the north of the country. It is also not clear what would be the response, if elevated measurement values (exceeding the alarm threshold) were sent by the Early Warning System out of the IPH office hours.

The potential first responders (e.g., police, first aid, firefighters or members of Civil Protection) should know how to react in the event of a radiation emergency. From the presentations given to the EPREV team during the kick-off meeting it was obvious that the Ministry of Interior (MoI), the Ministry of Health (MoH), P&R Directorate and the firefighters are well aware of their roles they have to assume in case of a radiation emergency. More efforts should be made to improve training the first responders so that they will be aware of the symptoms, the appropriate notification methods, and other immediate actions warranted.

The Former Yugoslav Republic of Macedonia is a Party to the IAEA Conventions on Early Notification and Assistance. Future bilateral agreements with neighboring countries will probably cover cooperation in the area of civil protection or crisis management, rather than being limited solely to the specific area of early notification and radiation or nuclear information exchange. If future bilateral agreements are concluded with neighboring states on cooperation in the area of civil protection, it is recommended that these agreements should also cover prompt information exchange for data related to nuclear or radiation emergencies.

The Former Yugoslav Republic of Macedonia has recently made efforts to establish control over scrap metal at border crossings, as well as at processing facilities and the established system seems to work properly. There are authorized technical services which provide radiation measurements to determine if the scrap metal shipments intended for import or export are free from contamination. The only metal processing facility in the country is located in Skopje and it is equipped with a panel detector to measure incoming scrap metal.

Also, final products are checked by gamma spectrometry analyses, to confirm that no radioactive material escaped the entrance control. Hand-held radiation detectors were provided to all border crossings, while the major ten border crossings are equipped with fixed panel detectors. The authorized technical service or customs or border police officers received the instructions, what action to take in case the measured dose rate is above the natural background. The necessary procedure for customs officers was approved by the Customs Administration Director, and many of the customs and border police officers have been trained to respond to these situations.

Representatives from all countries of the former Yugoslavia meet regularly, and have established contacts to follow all rejected shipments of scrap metal back to the country of origin if radioactive material is found. It is important to be aware and to appropriately consider the cases when the shipment goes back to a country without adequate control. This could cause the radioactive source to become "re-orphanized." In other words, the source can be lost again, instead of being recovered and securely stored.

According to the information received, there are no facilities in the Former Yugoslav Republic of Macedonia, which would warrant off-site emergency plans; therefore, direct activation of off-site response through the facility emergency plan is not anticipated. It is assumed that the facility plans include notification to the authorities, who trigger the response based on the information received.

3.5.2. Good Practices

The national notification centre was established within the CMC, which is equipped with up to date communications and information processing tools and can provide all services needed as the contact point operating 24 hours per day, 7 days per week. The introduction of telephone number 112 complies with international standards, and ensures a coordinated response from the onset of any emergency, including a radiological or nuclear emergency.

Introduction of scrap metal control at border crossings and the measurements of all shipments of scrap metal (both imported and exported) by the authorized technical services represent an important defense in depth, which prevents occurrence of unwanted ("lost") sources anywhere in the country, as well as the spread of any contamination.

The national Early Warning System consists of 12 measuring stations and it is fully operational. Such a system provides an independent notification in case of a nuclear accident abroad.

3.5.3. Recommendations

Interim

1. For all notification centers (regional and national) operated by the CMC, appropriate procedures should be developed to deal with the incoming calls reporting on the radiation emergency. The centers should promptly notify the institutions playing roles in radiation emergency response. For the national notification center, which has its role as the Contact Point under the IAEA Conventions on Early Notification and Assistance, also incoming calls from the IAEA should be addressed in the procedure. These procedures should be harmonized with the National Radiological Emergency Plan.

2. The first responders (i.e., police, first aid, firefighters, emergency workers belonging to the P&R Directorate) should receive basic instructions on how to respond to a radiation emergency. These instructions should include: recognition of the event (e.g., radiation signs, transport codes); identification of whom to call to report the event; guidance on how to secure the site and protect those on-site; the risks associated with radiation; and guidance on how to avoid potential contamination while rendering first aid to injured persons.

3. A campaign should be conducted, most likely to be initiated by the RSD, to increase the awareness regarding the indicators of a radiological emergency, the appropriate notifications and other immediate actions needed to mitigate or remediate the radiation hazard. The target audience should include on-site operators of facilities and practices in threat categories III and IV, local officials, representatives of emergency response organizations, the postal service, customs services, national border control authorities, scrap metal dealers, and the public. The IAEA may support organizing a National Workshop or other activity related to the aforementioned awareness campaign.

Long Term

4. It is recommended to the RSD to issue the regulations which will specify the requirements for the radiation monitoring system and workers training at scrap metal facilities, including reporting the anomalies to the authorities. In case of non-compliance with these requirements, the license for the activity may be suspended or revoked.

5. The reliability and possible upgrade of the Early Warning System should regularly be reevaluated. Make a decision about the actions that would be taken, if elevated radiation levels were detected by this system out of the IPH office hours.

3.6. Taking Mitigatory Action

Regarding the Requirements set out in [2] for taking mitigatory action, the following appraisal criteria was investigated:

- Make arrangements to provide expertise and services in radiation protection promptly to local officials, and to first responders involved in actual or potential emergencies involving Threat Category IV.
- Give basic instruction to the operators who could be involved in Threat Category IV.
- Make arrangements to initiate a prompt search and issue a warning to the public if the loss of a dangerous source occurs.
- Make arrangements for mitigatory action to prevent an escalation of the threat, to return the facility to a safe and stable state, to reduce the potential for releases of radioactive material or exposures, and to mitigate the consequences of any actual releases or exposures.

3.6.1. Current Situation

The facilities with the sources which may be classified as threat category III sources are exclusively medical institutions, e.g. the University Clinic of Radiotherapy and Oncology.

The scenarios for these facilities are mostly static, i.e. a malfunction of the equipment can cause overexposure of the patient or high dose-rate fields around the device. The EPREV team did not identify any facility at which a potential emergency scenario would comprise a transient situation (i.e., an emergency whose classification can change over time as the situation changes, since the status of an emergency can be a complex, time-dependent process). In principle, the operators are responsible for taking mitigatory actions within the facility. All probable radiation emergency scenarios in the country would require radiation measurements to assess the situation prior to recovery of the source and decontamination of an area, if needed. The only exceptions would be a spill of radioactive liquid, and a source caught by fire or an explosion involving a radioactive source. Since radioactive sources in the Former Yugoslav Republic of Macedonia are of relatively low activity, it is likely that dilution (in water, soil, or air) would minimize the potential risks.

The team believes there is sufficient expertise for professional radiological assessment during a radiation emergency in the IPH and probably within the armed forces (CBRN unit). The IPH conducts environmental radiation monitoring regularly, it can provide TLD dosimetry and it has the experience with radiation measurements as the calibration laboratory for radiation instruments. The armed forces have capabilities for decontamination, mainly of vehicles, people and arms, but they are less experienced for decontamination of workplaces. Also the range and accuracy of their radiation measuring instruments is more suitable for military use, than for the civilian purposes.

In the event of a more complex emergency, the initial assessment can be made within the existing national emergency response system, and the IAEA Convention on Assistance may be invoked. However, the NREP should address the capabilities for initial assessment of the situation and for mitigatory actions to prevent any unnecessary threat to the emergency workers and the population.

In case of a dangerous source (lost and found source, i.e. an orphan source), the responsibility for taking response actions seems to be assigned to the RSD; the NREP can consider the arrangements to initiate a prompt search and issue a warning to the public.

With regard to a threat category IV event, the relevant information and instructions on emergency situations are addressed by the licensing process, when the applicant is requested to demonstrate its capability to cope with an accident and other emergency situations.

3.6.2. Good Practice

The IPH has appropriate measuring equipment for initial emergency response, and with some extra practice (training, exercises) it is capable of performing on-the-scene radiation measurements of radiation. The IPH has experience with radiation monitoring, TLD dosimetry and calibration of instruments, because all these activities are performed regularly within the scope of its work.

3.6.3. Recommendations

Interim

1. Although the ad hoc threat assessment performed by the team did not reveal any need for special mitigatory actions associated with potential radiation emergencies, the responsible authorities should carefully analyze the current need for expert support to

be provided by the technical support organisations, e.g. the IPH and the armed forces. The team's impression was that these resources do exist and are of adequate quality. However, this does not mean that nothing else is needed. A thorough assessment of these issues (e.g., timely response, quality of measurements, manpower, communication of results, radiological assessment, dosimetry, protective action advice) is needed to establish the future emergency response capability, taking into account international experience, and verifying the arrangements through exercises. These arrangements, capabilities and planned actions of the technical support organizations should be described in the NREP.

2. To ensure an effective licensing process, a brief guideline should be developed by the regulatory body to outline which mitigatory actions the operators of threat category IV practices should include in their instructions for coping with emergency situations.

3. The NREP should address the arrangements to initiate a prompt search and issue a warning to the public in case of a dangerous source (lost and found source, i.e. an orphan source).

3.7. Taking Urgent Protective Action

Regarding the Requirements set out in [2] for taking urgent protective action, the following appraisal criteria was investigated:

- Adopt national intervention levels for taking urgent protective action in accordance with international standards.
- Make effective arrangements for undertaking and implementing decisions on urgent protective action to be taken off-site.
- Make arrangements to ensure the safety of all persons on-site in the event of a nuclear or radiological emergency.

3.7.1. Current Situation

The Former Yugoslav Republic of Macedonia does not have facilities in threat categories I, II and the existence of facilities of threat category III is still to be confirmed by the threat assessment. There are neither facilities nor practices that would warrant urgent protective action off-site. The only case by which urgent protective action may be triggered is activation of a "dirty bomb" or a radiological dispersal device.

Currently, the arrangements to ensure the safety of all persons on-site (e.g., in the University Clinic of Radiotherapy and Oncology) in the event of a radiation emergency do not anticipate significant evacuation, except for the visitors and non-essential staff who should leave the premises. The risk to the population living in the vicinity of the hospital associated with such an event is negligible.

In the draft "Regulation on Limits of Radiation Exposure and Conditions for Exposure in Special Circumstances and in Emergency", the generic intervention levels for urgent protective actions are prescribed in Art. 34. In the tables 9 and 10 of this draft the action levels for foodstuffs and for the evacuation under any circumstances are given respectively. These values are in line with the IAEA documents [2, 3].

3.7.3. Recommendations

Interim

1. The generic intervention levels and action levels for foodstuffs are in compliance with international standards, but it is recommended to develop specific procedures, which would take into account how to apply these levels, since the intervention levels can not be measured directly.

2. In case of facilities with threat category III radioactive sources are utilized in the country, appropriate arrangements (including evacuation) to ensure the safety of all persons on-site should be established.

3.8. Providing Information, Issuing Warnings and Instructions to the Public

Regarding the Requirements set out in [2] for providing information, warnings and instructions to the public, the following appraisal criterion was investigated:

- Make arrangements to provide prompt warnings and instructions to permanent, transient, and special population groups or those responsible for them, and to special facilities in the emergency zones when an emergency is declared.

3.8.1. Current Situation

This Requirement contains specific guidance on providing instructions to the population within the emergency planning zones around facilities having off-site emergency plans. Since there are no such facilities in the country, this requirement is not applicable.

In case of a threat category III event, the emergency planning is mostly limited to the on-site area. Since the threat assessment for those facilities in the Former Yugoslav Republic of Macedonia has not been finalized, there is no specific information, if there is any population off-site, who may need prompt information about measures to be taken if facility emergency is declared.

When issuing information to the population endangered under a threat category IV event, it is expected that the number of people needing instructions would be relatively low (i.e., not more than 100 people), and that these people can be informed directly (i.e., by emergency workers going door to door, or by using loudspeakers). In case of a threat category IV event the target population to receive warnings is not known in advance since events of threat category IV can happen anywhere in the country.

3.8.3. Recommendation

Interim

1. The National Radiological Emergency Plan should foresee notification of the endangered population for installations of threat category III (e.g., facility emergency) and during certain radiation emergencies of threat category IV (e.g., a large transport accident, a fire involving a source, or large scale contamination) by the direct method

(word-of-mouth). The NREP should also ensure that when necessary, this population will be provided with instructions based on the radiological assessor's advice.

3.9. Protecting Emergency Workers

Regarding the Requirements set out in [2] for providing protection to emergency workers, the following appraisal criterion was investigated:

- Make arrangements for taking all practicable measures to provide protection for emergency workers and response personnel.

3.9.1. Current Situation

The RSD is aware of the issue of protecting emergency workers. This issue is also covered in the draft "Regulation on Limits of Radiation Exposure and Conditions for Exposure in Special Circumstances and in Emergency". Table 8a of this referred document provides guidance for the emergency workers' turn-back dose levels for different circumstances. These values are in compliance with the IAEA document [3]. After the regulation is adopted, these turn-back dose levels will have to be addressed by the authorities as well as the employers of potential emergency workers in their procedures (e.g., MoI, hospitals, medical centers, police, and fire brigades).

In general, the incident commander is responsible for giving on-the-scene instructions to emergency workers. However, this person cannot act alone (not being fully competent in radiation protection issues), and may require expert advice by the radiation protection staff about the application of the emergency workers' turn-back limits.

Usually the firefighters have suitable protective equipment, because autonomous respirators and protective clothing can also be used during radiation emergencies. However, they, as well as the other first responders, should have radiation alarm dosimeters, which are needed to enter the cordoned-off area. These radiation alarm dosimeters should be preset to the values approved by radiation protection officer(s) for a specific job or task.

3.9.2. Good practice

The turn-back dose levels for emergency workers are contained in the draft "Regulation on Limits of Radiation Exposure and Conditions for Exposure in Special Circumstances and in Emergency". It is very positive to address this issue in the regulations, but the implementation of these requirements also needs adequate procedures, as well as necessary protective equipment and training.

3.9.3. Recommendation

Interim

1. In the National Radiological Emergency Plan (or similar document) additional issues for emergency workers should be adequately covered, including: medical surveillance, training, and appropriate protective equipment (with alarm dosimeters as the minimum requirement), as well as protective clothing and breathing equipment, if needed.

3.10. Assessing the Initial Phase

Regarding the Requirements set out in [2] for assessing the initial phase, the following appraisal criterion was investigated:

- Establish default operational intervention levels (OILs) for radiological emergencies.

3.10.1. Current Situation

The default operational intervention levels (OILs) have been devised to make an estimate, based on measurements, if the generic intervention levels are exceeded during a nuclear accident [4]. Since the nearest nuclear power plant is Kozloduy in Bulgaria, which is approximately 250 km from the border of the country, it is very unlikely that the OILs for urgent protective actions would be exceeded and that countermeasures would need to be introduced. The only exception may be agricultural countermeasures, which are considered in Chapter 3.13.

For the sake of consistency with international standards, the OILs can be introduced into the relevant documents. These OILs can also be used as reference values in the event of a nuclear accident abroad, when assessing any measured levels either domestic or received through the international channels, how far the domestic or foreign authorities are from the introduction of countermeasures, i.e. as a measure of severity of the situation.

Before the initial radiation measurements and the assessment of the situation takes place for radiation emergencies, it is required that the so called “unsafe area” is cordoned-off, within this, the ingress and egress of responders need to be controlled. Appendix 5 of the EPR-Method [3] provides suggestions for the approximate radius of the inner cordoned area radius. It is meant that responders remove non-essential personnel and members of the public, which may incidentally be inside the inner cordoned area. If contamination is suspected such people should be monitored and decontaminated as necessary. Responders should use respiratory protection if airborne contamination is suspected. The general public should be kept beyond approximately twice the radius of the inner cordoned area in order not to interfere with the responders.

3.10.3. Recommendations

Interim

1. For the sake of consistency with international standards, the operational intervention levels (OILs) should be quoted in relevant documents. The OILs should provide reference values that would warrant the introduction of countermeasures. The OILs may be useful when explaining to the public the measured values on home territory in the event of a nuclear accident abroad.

2. In the relevant documents or procedures, introduce the concept of “inner cordoned area (safe distance) radius”, which is explained in Appendix 5 of the EPR-Method [3], giving guidelines on how to initially organize the area for managing radiation emergencies.

3.11. Managing Medical Response

Regarding the Requirements set out in [2] for managing medical response, the following appraisal criteria was investigated:

- Ensure awareness by general practitioners and emergency staff of the medical symptoms of radiation exposure, and of the appropriate notification procedures if a nuclear or radiological emergency is suspected.
- Make arrangements, at the national level, to provide initial treatment for people who have been exposed or contaminated.

3.11.1. Current Situation

The aspects of medical response were discussed during the initial meeting and during the visit to the University Centre of Radiotherapy and Oncology, as well as during the meeting with the RSD.

Awareness by general practitioners of the medical symptoms of radiation exposure has not been systematically addressed in the Former Yugoslav Republic of Macedonia. This awareness is important in cases when people visit a general practitioner, unaware that they were in a situation where radiation sources were involved, and consequently became unwittingly exposed to radiation. These cases are mostly related to events in which lost sources of high activity are found in scrap metal, or when one simply finds and picks up such a source, because it is a shiny piece of metal, etc. Primarily, such sources originate from medicine or industrial radiography.

Another issue of a general nature is accepting potentially contaminated patients into general hospitals after a mass casualty event (e.g., the activation of a “dirty bomb” or a radiological dispersal device). The hospital staff should be aware that customary medical protective clothing (gowns, face masks, latex gloves, shoe covers) provides excellent protection against the contamination of the medical staff dealing with such patients.

Regarding the hospital treatment of radiation-injured patients, the counterparts mentioned that the following institutions are capable of initial treatment of exposed and/or contaminated people: the Unit of Occupational Medicine within the IPH, the Institute of Pathophysiology and Nuclear Medicine and the University Centre of Radiotherapy and Oncology. In the EPREV team’s opinion, the treatment of radiation-injured persons is highly specialized, and adequate expertise has been accumulated only in the world’s leading centers for treatment of radiation injuries. Moreover, it is very unlikely to encounter many cases of radiation injuries caused by the same event. Therefore, it seems to be a better solution to rely on assistance from abroad (i.e., sending patients to specialized institutions abroad), rather than developing the country’s own full size capability. Nevertheless, it is necessary to determine the referral hospital for the initial treatment of radiation-injured patients, which keeps track of training for the medical staff for such purposes, as well as making known to other emergency responders to which hospital such patients should be sent.

3.11.3. Recommendations

Interim

1. For the first responders who are responsible for first aid, and for other medical staff who may encounter potentially contaminated patients, it is necessary to include instructions in their training programme regarding treatment of potentially contaminated patients. These instructions should describe procedures for decontamination of patients, and should raise awareness that customary medical protective clothing (gowns, face masks, latex gloves, shoe covers) provides excellent protection against contamination.

Long Term

2. Develop an outreach campaign to raise awareness among general practitioners of the medical symptoms of radiation exposure. For details, see the IAEA leaflet on recognition of radiation injuries and also [9].

3. In the event of severe radiation injuries, a medical centre to provide initial treatment should be designated and the option of sending such patients for medical treatment abroad should be planned. In cooperation with the Ministry of Health the appropriate procedure should be developed to ensure that an assistance request will be promptly channeled to the IAEA in the event of severe radiation injuries, which should be treated by qualified specialists.

3.12. Keeping the Public Informed

Regarding the Requirements set out in [2] for keeping the public informed, the following appraisal criterion was investigated:

- Make arrangements for providing useful, timely, truthful, and consistent information to the public; responding to incorrect information and rumors; responding to requests for information from the public and mass media.

3.12.1. Current Situation

The RSD is responsible for providing information to the public about the protection against ionizing radiation. Depending on the particular scenario following the emergency situation, the necessary information is to be spread through the media, news, web sites etc., but written instructions or procedures do not exist.

The CMC has a special service for communication with the media and news during a crisis situation. The information should always be released from the central press room within the CMC or the Government. The RSD representative shall take part in preparing statements and press releases for the public. Providing useful, timely, truthful, and consistent information to the public requires not only persons qualified to provide such information, but also requires continuous work with the media to build mutual trust and partnership between journalists and spokespersons.

The CMC prepares a television program which is broadcast on national television, aimed at presenting to the general public different aspects of crisis management. This is one way of providing different types of information, including on radiation emergencies, to the public.

Public information is an important issue, and its effects and consequences should not be underestimated. For the most credible scenarios, a short synopsis for a press release may be prepared in advance (i.e. in the event of a lost source or large-scale contamination). Even for less credible events such as satellite re-entry, preparations may be undertaken, involving not only general information to the public, but also information for the so-called "potentially affected population." In the unlikely event of satellite re-entry, the impact area may be the whole country.

3.12.2. Good Practice

The CMC's practice to regularly prepare programmes for national television about different aspects of crisis management can cover many different themes. It is suggested that radiation emergency preparedness can be one of these themes. This practice needs not only to present the facts about the radiation emergencies, but also to show how such events can be prevented and how the affected population should react in case of a radiation emergency.

3.12.3. Recommendations

Interim

1. Public information should be addressed in the future National Radiological Emergency Plan. The designated institutions for releasing information to the public, their roles and their mutual relations shall be clearly described. The staff responsible for preparation and approval of press releases should be designated in advance. In addition, the information pathways should be described in the NREP or its procedures, outlining to which media information should be sent, by which means (facsimile, e-mail, telephone), and identifying the responsible person to authorize and send out this information.

2. Testing public information arrangements during an exercise or a specific drill is highly recommended, but it is difficult to reveal all shortcomings via exercises alone. Therefore, it is also recommended to assess experiences involving public information from other real emergencies, and to apply these lessons learned to radiation emergency response.

3. Templates of press releases are useful tools. For the most credible emergency scenarios, the short synopsis of a press release may be prepared in advance (i.e. in the event of a lost source or a large-scale contamination) and integrated with the appropriate procedure.

3.13. Taking Agricultural Countermeasures against Ingestion and Longer-Term Protective Actions

Regarding the Requirements set out in [2] for agricultural countermeasures against ingestion and longer-term protective actions, the following appraisal criteria were investigated:

- Adopt national intervention and action levels for agricultural countermeasures.
- Make arrangements, concentrating on the use of existing capabilities, for undertaking effective agricultural countermeasures.

3.13.1. Current Situation

The action levels for food contamination during an emergency are contained in Table 9 of the draft "Regulation on Limits of Radiation Exposure and Conditions for Exposure in Special Circumstances and in Emergency", which are aimed at food consumption, i.e. if the food can be consumed or if it should be discarded. Since the Former Yugoslav Republic of Macedonia is a well known producer of fruits and vegetables, it would be necessary to assess also from the soil samples, if the agricultural products can be grown for domestic production on a contaminated soil, if such an event occurs. The OILs as given in the EPR-Method [3] can provide guidelines in this direction.

In the event of an emergency, the decision-making mechanism regarding agricultural countermeasures and food consumption will be based on the action levels as outlined in the draft regulations. This is one of the elements for decision-making, but the others are much more complex, demanding and require the sampling pattern of agricultural products as well as sampling of soil and determination of sampling methods. The measuring capabilities do exist in the country. The IPH is the designated laboratory for the measurement of food and environmental samples and performs these activities regularly within the framework of its budget; however it has no sampling strategy for the case of a widespread contamination from a nuclear accident abroad. The measuring capacity may be a bottle-neck in such a case, and some optimization would be needed to get a picture of the situation in the country.

Next, the responsibility for decision-making should be assigned to the appropriate authorities. The stakeholders in this decision-making process would be the IPH as the technical support organization (provider of measurements); the Ministry of Health and Ministry of Agriculture as responsible institutions to provide practical recommendations; and the Incident Commander, who would make the actual decisions based on all information at his/her disposal.

3.13.2. Good Practice

The IPH with its Unit for Radioecology is the lead technical institution in radiation environmental monitoring in the Former Yugoslav Republic of Macedonia. It has experienced staff with adequate training and experience and regularly participates in IAEA inter-comparison measurements. The Unit for Radioecology has 7 employees (4 with university degrees, 3 technicians). The IPH can organize the work of the Unit into two shifts with two working teams, which would make 16 hours/day. They can provide measuring capacity of about 300 samples per day. The samples can be milk products, meat products, water, grass, soil, air, atmospheric fallout and agricultural products.

3.13.3. Recommendations

Interim

1. The operational intervention levels for agricultural countermeasures regarding food consumption in the event of an emergency should be adopted and integrated into the radiation emergency documents. In addition, responsibilities for decision-making

regarding agricultural countermeasures and food consumption in the event of an emergency should be clearly addressed in the future NREP, including the roles of all stakeholders that may take part in this process - IPH, Ministries of Health and of Agriculture, as well as the Incident Commander.

2. Sampling procedures for food, crops, and agricultural soil in the event of an emergency should be included in the future NREP (i.e., where to take soil samples, which crops and where should be sampled, frequency and size of samples, etc.). These procedures should reflect national capabilities to perform radioactivity measurements (e.g., how many samples of each type should be taken, and how many samples should be measured within a given timeframe).

3.14. Mitigating the Non-Radiological Consequences of Emergency and Response

Regarding the Requirements set out in [2] for mitigating the non-radiological consequences of emergency and response, the following appraisal criterion was investigated:

- Make arrangements for responding to public concerns in an actual or potential nuclear or radiological emergency.

3.14.1. Current Situation

The major concern in this area is the possibility of circulating false information, rumors, and non-credible allegations that may cause panic or unsubstantiated fear. The best method for managing this risk is proper communication. The importance of useful, timely, truthful, and consistent information was addressed in Chapter 3.12. If applied properly, these practices can substantially minimize public concern and fear. Practically speaking, this means that public response to emergency information should be monitored. A lack of adequate information may easily generate false information, rumors, etc.

In the Former Yugoslav Republic of Macedonia, the mitigation of non-radiological consequences has not yet been considered. In addition to the need for proper information, other issues include economic losses (loss of income, loss of property), security concerns (in the event of evacuation), the fear of losing loved ones, etc. Not timely or not appropriate response of responsible authorities can cause concern in other non affected areas, which may influence trade (people do not want to buy goods from the affected region), transport (people do not want to travel there), all sorts of relations (cultural, scientific, political, social). These issues may become quite complex during large-scale emergencies. Since such radiation emergencies are not very likely in the country, these issues are placed lower on the priority list.

3.14.3. Recommendations

Long Term

28. Since the non-radiological consequences of emergencies are not among the most important priorities for establishing an interim response capability, the following issues are considered to be the required long-term activities:

- The team responsible for public information should follow media coverage and the public response. The public information team should develop working practices to ensure that the messages (press releases) sent out after the initial notification contain information to correct false or misinterpreted reports, if such reports appear in the media.
- The non-radiological consequences include economic losses, security concerns, the fear of losing loved ones, etc. It is impossible to consider all these issues, but the response may foresee and address some of them, (i.e., insurance in the event of economic losses or advice by a team of psychologists to handle unjustified fears and worries, specific information to target audiences about trade, transport and different events, such as cultural, sports, religious, political, etc.).

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3.15. Requirements for Infrastructure

Regarding the Requirements set out in [2] for infrastructure, the following appraisal criteria were investigated:

- Develop emergency plans that are consistent with the threats and coordinated with all response organizations.
- Develop the procedures needed to perform response functions.
- Concentrating on existing capabilities, provide adequate tools, instruments, supplies, equipment, communication systems, facilities, and documentation needed during an emergency.
- Identify facilities at which the following will be performed: (a) coordination of on-site response actions; (b) coordination of local off-site response actions (both radiological and conventional); (c) coordination of national response actions; (d) coordination of public information; and (e) coordination of off-site monitoring and assessment.
- Concentrating on existing capabilities, make arrangements for the selection of personnel and training.
- Conduct exercises and drills to ensure that all specified functions required for emergency response, all organizational interfaces for the facilities in Threat Categories I, II and III, and the national level programs for Threat Category IV and V are tested at suitable intervals.
- Make arrangements to ensure the availability and reliability of all supplies, equipment, communication systems, and facilities needed during an emergency.

3.15.1 Current Situation

Regarding the first criterion (the requirement for plans), the draft National Radiological Emergency Plan (NREP) should be prepared by the RSD and adopted by the Government as stipulated by the legislation. The EPREV team wishes to emphasize that it is an essential requirement to have the NREP in place in order to establish an interim radiation emergency response capability. The methodology for writing the NREP is thoroughly described in [3]. Many inputs are required before the NREP is finalized. One important input is the threat assessment, which defines the scope of the NREP. In addition, documents regarding the planning basis and concept of operation are needed in order to write the NREP.

Regarding the second criterion (the requirement for operating procedures on the facility level, as well as for response organizations), complex emergency procedures for licensees are not anticipated to be needed in the Former Yugoslav Republic of Macedonia. The licensee's emergency plans or instructions in an emergency are subject to licensing and inspection, which is performed by the RSD. However, all organizations taking part in the emergency response should have procedures developed and harmonized with their tasks, as required by the NREP. The procedures for responders should not focus on execution of regular work (e.g., the EPREV team is sure that IPH has adequate procedures for measuring radiation, the medical response team does its normal activities at the University Clinic of Radiotherapy and Oncology or some other medical institution, etc.). Instead, the procedures should focus on emergency-specific issues such as management and communication interfaces (to whom and when the information should be sent, by which communication means, who is in charge to order implementation of the task), the need for special equipment (protective clothing, etc.), training requirements, and other emergency-related requirements. These are quite demanding tasks, since development of many procedures may require a lot of time, if written from scratch. The EPR-Method [3] and the IAEA or the European Commission assistance, as well as bilateral cooperation, can be used to facilitate writing the procedures. A good advice or a good template procedure may substantially help in resolving these issues.

Regarding the third criterion (the requirement for necessary equipment, instrumentation, monitoring etc.), the situation is the following:

- The IPH implements the regular national radiation environmental monitoring program in the country. The Unit of Radioecology of IPH performs preparation of samples of milk products, meat products, water, grass, soil, air, atmospheric deposits and agricultural products. The IPH's estimated measuring capacity is about 300 samples per day. There are three high volume air samplers (600 m^3/hr) located in Skopje, Bitola and Gjevgelija. The high resolution gamma spectrometry system is in operation, as well as low background alpha/beta measuring system and radon measuring equipment. The IPH also has a unit for TLD dosimetry (there are about 100 spare TLDs, which can be used in case of emergency) and performs measurements of radiation dose-rate. Many different radiation measuring equipment can be found within the calibration laboratory of IPH, e.g. dose-rate meter with telescopic detector, Ludlum dose-rate meter, source identifier with NaI crystal, etc.

- Currently there are 5 gamma spectrometers in the Former Yugoslav Republic of Macedonia. Two are located in IPH, one in the Skopje steel works, one in the veterinary hospital and one in the military hospital.

- The national Early Warning System consists of 12 gamma measuring stations evenly distributed across the country. The system is run by IPH and it is operational, thus providing on-line information if elevated levels of radiation are detected. The data transmission is based on the GSM phone network, which may fail due to overloading in case of some national emergency. Also the response in case of out of office hours is not clearly defined and it needs to be considered to develop a practical solution.

- The P&R Directorate within the Ministry of Defence has the following equipment on its stock (donated by the US MoD in the framework of combating nuclear proliferation): alarm dosimeter (Polimaster) -5 pcs, dose-rate meter (Thermo) – 5 pcs, handheld gamma spectrometer (XRF Corp.) - 1 piece, Ludlum 2241 digital survey meter – 1 piece, neutron

detector (Ludlum) – 1 piece, as well as protective clothing (coveralls, latex gloves, boot covers, caps) and some miscellaneous items (batteries, chargers).

- It may be worth mentioning that many of the radiation monitors owned by the authorities were donated by the USA. Besides the instruments donated to IPH and P&R Directorate, the other recipients of these instruments were the RSD, Customs Directorate, Firefighting Brigade of the city of Skopje and perhaps many others. The US Embassy in Skopje also organized some training on how to use the donated instruments.

The team's general impression is that suitable equipment, instrumentation and skills exist in the Former Yugoslav Republic of Macedonia to cope with the anticipated spectrum of radiation emergencies and to establish an interim emergency response capability. Nevertheless, during the preparation of the NREP, a thorough analysis should be performed to confirm whether these items are sufficient and adequate (e.g., some items are perishable, such as protective clothing, electronic personal dosimeters, and communications equipment). The EPREV team suggests that it is better to rely on instrumentation in regular use, rather than instrumentation stored in a warehouse.

Regarding the fourth criterion (the identification of facilities and organizations where various emergency response functions will be performed), the situation is as follows:

(a) Coordination of on-site response actions is the responsibility of the operator, user, or licensee, e.g. the University Clinic of Radiotherapy and Oncology,
(b) Coordination of local response actions can be done, in the first phase, by the local first responder who has the highest rank. Later, it should be delegated to the national level, since it is anticipated that most responses will be coordinated directly at the national level). Practically in most of the cases the local response would be to cordon-off the area, perform the life-saving actions, and to seek expert's advice, which could be either the RSD or maybe the IPH staff.
(c) Coordination of national response actions is for the time being not very clear. The institutions involved in the coordination of national response actions would be the CMC and the P&R Directorate with the close assistance of the RSD. However, in case of the national level the Steering Group and the Advisory Group have their respective roles. Nevertheless this issue is an important one and there should be no doubt about who the incident commander is at any point in time.
(d) Coordination of public information is the responsibility of the government, and it will be assisted by the CMC facilities and expertise, while the RSD would be providing the factual information. It is expected that this issues in case of radiation emergencies will be considered, when the NREP is written.
(e) Coordination of off-site monitoring and assessment may be the responsibility of the main coordinator or RSD, which can delegate it to IPH. In any case the practical implementer can be IPH, which could also involve other institutions that are capable of performing radiation measurements.

Regarding the fifth criterion (making arrangements based on existing capabilities for personnel selection and training), the EPREV team had the impression that arrangements for staffing and specific training for radiation emergency response are still in the preparatory phase. It must be acknowledged that the emergency response staff has very good general knowledge, and regularly updates this knowledge through IAEA training courses and other means. The staff is highly skilled in their daily work. However, a specific training syllabus for radiation emergency response including, among other details, the communication and

coordination between various stakeholders, has not yet been developed. One reason might be that the NREP has not yet been written. The P&R Directorate is establishing its training center. The premises do exist, but the training syllabus, the lecturers and the teaching aids are still pending. It has to be noted that there is practically no trained manpower at P&R Directorate to do operational tasks.

Regarding the sixth criterion (conducting exercises), the team takes into account that the Former Yugoslav Republic of Macedonia is mostly a threat category IV and V country. The EPREV team did not receive any information about conducting radiation emergency exercises to test the response capability. Neither the schedule of the planned emergency exercises, or the drills exist. Drills and exercises are important elements of emergency preparedness and are actually an indicator of how well the whole emergency response system is conceived and implemented. Thus, the draft NREP should adequately address the exercise scope and planning.

The seventh criterion (ensuring the availability and reliability of all supplies, equipment, communication systems and facilities, etc.) concerns maintenance of the emergency response system. Currently, the arrangements (both procedures and contracts) for supply of services or equipment do not exist. During preparation of the NREP, arrangements and contracts should be concluded to ensure the availability and reliability of equipment and services. The Quality Management System may ensure higher reliability, but this system will only be integrated with radiation emergency preparedness and response after the interim capability is established. However, the IPH, the Institute for Nuclear Medicine, the University Clinic of Radiotherapy and Oncology, P&R Directorate, Fire Brigade of the City of Skopje and the armed forces do have supplies, equipment, communication systems and facilities, which could be used during the radiation emergency. Their resources should be included in the lists which are a constitutional part of NREP.

3.15.2. Good Practice

In principle, the country has enough resources to establish an interim emergency response capability without the need to make essential investments. The existing Law on Radiation Protection and Safety and the draft regulations, after they will be adopted, provide a sound legal basis to build upon. The NREP is needed to determine relations and responsibilities of different stakeholders, to give guidance and instructions and to fill in the gaps which are not covered by regulations. The NREP itself, after it is adopted will be legally equivalent to the secondary legislation.

3.15.3. Recommendations

Interim

1. All emergency response organizations should begin developing procedures for radiological emergency response based on the NREP. The importance of preparing and adopting the NREP as soon as possible is described in Chapter 2.1, “Introduction”.

2. In addition to the NREP preparation, a thorough analysis should be performed to determine whether the available resources meet the needs of emergency response, including scenarios anticipated by the threat assessment.

3. In addition to the identification of roles and responsibilities for various organizations during an emergency, facilities and premises to be used by these organizations during emergency response, should also be identified.

4. The RSD in cooperation with CMC are advised to develop a special procedure about cooperation of authorities and organizations in case of lost and found (orphan) source or radioactive contamination. Authorities are also advised to establish a special Response Group for responding to radiological emergencies involving uncontrolled sources. The group can be activated in a very short time and the group members should be radiation professionals from different institutions and authorities, responsible for providing prompt expertise and radiation protection services to local officials and first responders.

   The procedure should contain the following elements:

   - clear allocation of tasks and responsibilities to all organizations that can contribute to an effective response after finding an uncontrolled radiation source in the territory of the Former Yugoslav Republic of Macedonia, including railway stations, airports, and customs crossing points,

   - method of exchange of information between the organizations involved and local authorities (regional crisis management centers),

   - method for exchange of information among the Customs Directorate, the RSD and the regulatory bodies of neighboring countries,

   - templates of how to address public and media concerns promptly in a coordinated, understandable, and consistent manner (with respect to orphan sources),

   - a financial mechanism that specifies how expenditures for the remediation of orphan source will be compensated,

   - other requirements, based on the IAEA recommendations.

5. Within the NREP, maintaining the competence of first responder organizations should be addressed, including a training program for first responders. The P&R Directorate, CMC together with the RSD should develop and implement this training program to provide first responders with the knowledge and skills to address any emergency involving the hazard of ionizing radiation. The components of the IAEA's "Regional Training Course on Practical Response to Radiological Emergencies – Part 1, (First Responders)" are recommended to be incorporated in the national training program.

6. The emergency response capability should be tested in an exercise with a suitable scenario. The exercise should be thoroughly analyzed, and lessons learned should be integrated to improve the emergency response capability.

7. Establishing and maintaining the required quality of radiation monitoring instrumentation should be an ongoing task and IPH should be the organization to take part in this task.

8. To ensure the participation of various organizations (both private and public) in emergency preparedness and response, and to ensure availability and reliability of resources, contractual obligation is the preferred method to achieve this goal.

9. Regular calibration of radiation measuring devices is an important issue and the P&R Directorate, including all the organizations having such equipment shall have it calibrated.

Long Term

10. Regional cooperation in emergency response should be enhanced further, and may be formalized via bilateral agreements between countries, especially with the bordering countries, which do have nuclear installations (e.g., Bulgaria).

11. A Quality Management System should be established for radiation emergency response (e.g,, all emergency response organisations should be awarded quality standard certificates).

12. A long-term radiation emergency exercise program should be adopted and implemented by the authority, which has overall responsibility for the implementation of NREP.

13. The issues of training for radiation emergencies should be addressed in a strategic manner. Therefore, a long-term training program should be adopted and implemented. To facilitate this effort, the IAEA's long-term (regional) training program may be taken into consideration.

APPENDIX I:
Scheme of Crisis Management System

I.1 Platform prevention and management of environmental hazard and CBRN contamination

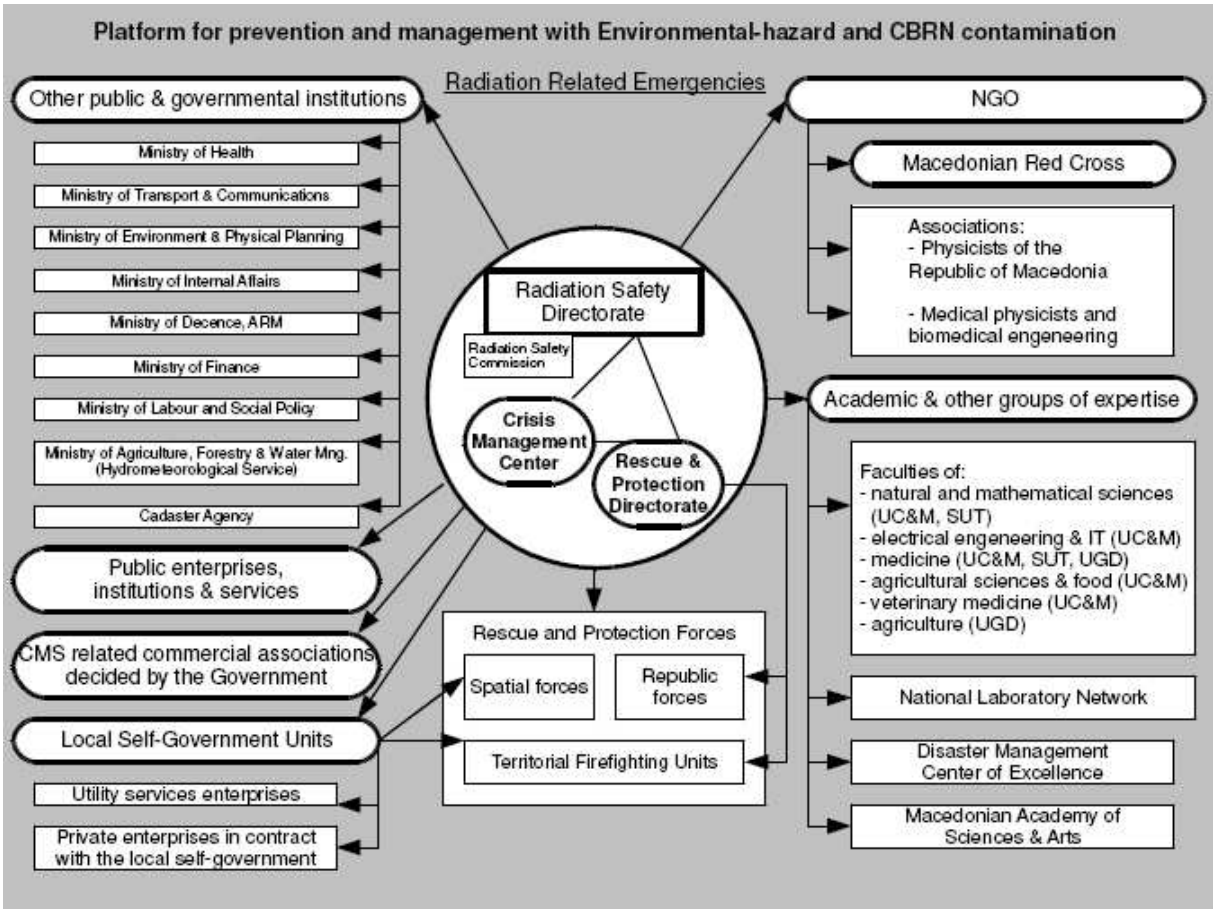


Fig. 2: Scheme of platform for "prevention and management of environmental hazard and CBRN contamination"

The platform "prevention and management of environmental hazard and CBRN contamination" is depicted in Fig.2. The key organizations in this platform are the RSD, CMC and P&R Directorate. The other main players (stakeholders), which will be implementing decisions or supplying some inputs for the decision making, are governmental institutions, public institutions, commercial associations, local self-government and P&R forces, non-governmental organizations and academic groups. Fig.3 shows just a part of the platform, which also represents local level and not just the national one.

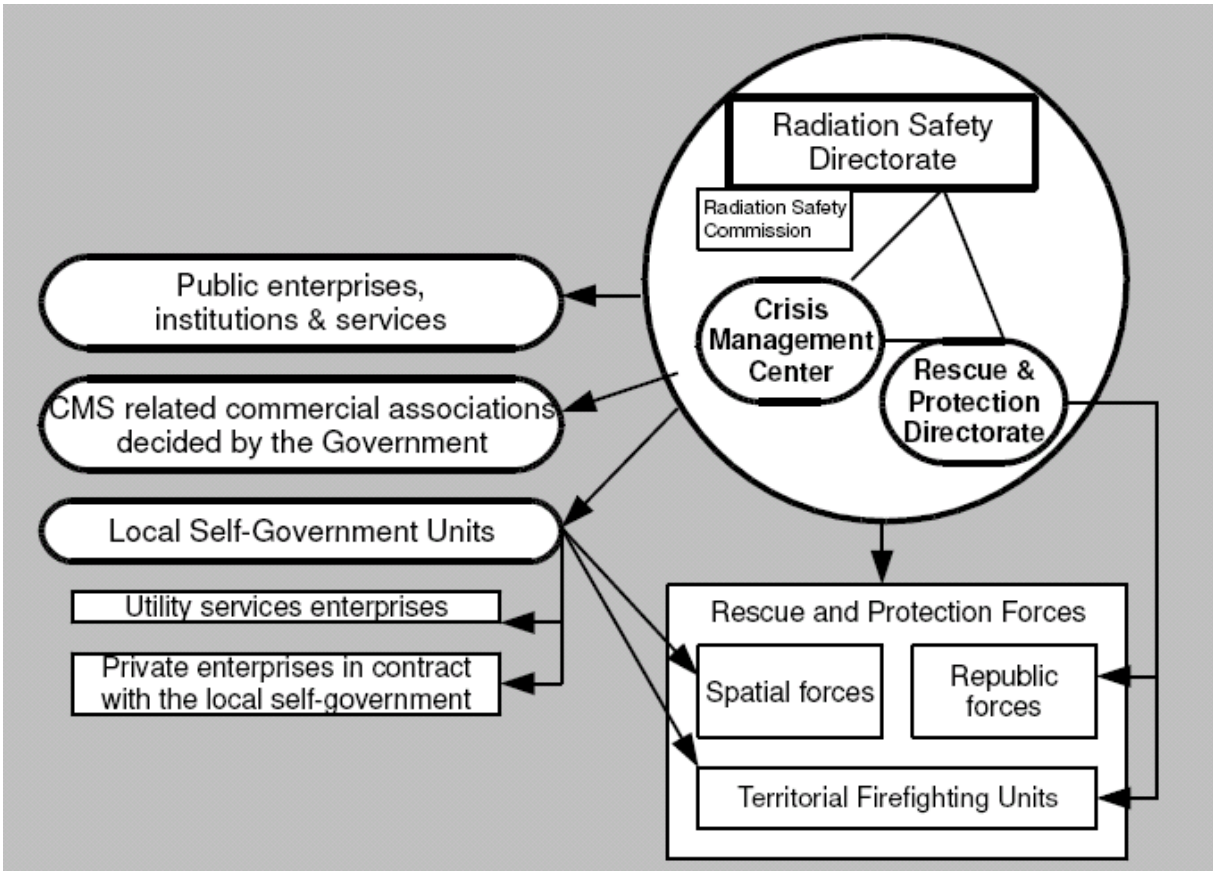


Fig. 3: The part of platform "prevention and management of environmental hazard and CBRN contamination" which deals with public institutions, commercial associations, local self-government and P&R forces

The team suggests that these scheme(s) should be further elaborated. In fact, these scheme(s) include a wide spectrum of national organizations and resources, which may or may not take part in a specific emergency. Thus, it is needed to develop some specific procedures, which would address emergency scenarios as foreseen in the threat assessment.

It is also important that a priority is given to those organizations which are most likely to be involved in a radiological emergency and to indicate that the other institutions are going to take part only in very specific cases or, for instance, if the emergency becomes so wide spread that it needs all national resources to be activated.

It is suggested, that international organizations may be included in the scheme. The IAEA is probably the most likely reliable source to send a notification about a nuclear emergency from abroad (which is also a legal obligation in line with the Convention on Early Notification in Case of a Nuclear Accident [1]). The IAEA can play an assistance role with its Response Assistance Network (RANET).There are other organizations such as the World Health Organization (WHO) and the World Meteorological Organization (WMO). Bilateral and regional cooperation in disaster management should not be underestimated, as during a radiation emergency some special services may be needed.

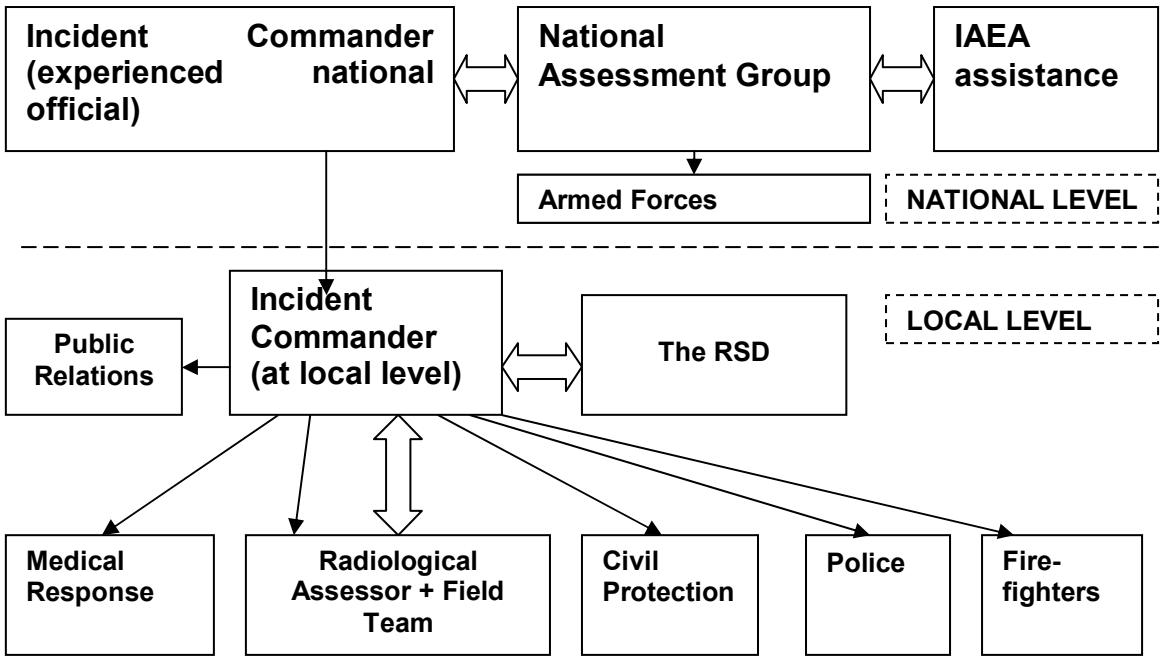
I.2 Specialized platforms

So called specialized platforms are comprised in the National Platform for Disaster Risk Reduction. There are 23 such specialized platforms:

1. prevention and management with epidemics;
2. medical treatment of mass injuries caused by disasters;
3. mental hygiene and psychological treatment;
4. food and water safety;
5. prevention and management of environmental-hazard and CBRN contamination;
6. protection of endemic species and natural rarities;
7. prevention and management with epizootic;
8. prevention and management with epyphitotics;
9. prevention and management of forest fires;
10. coordination in cases of extremely high temperatures and draughts;
11. coordination in cases of strong winds and hail storms;
12. management with floods and landslides;
13. prevention and management with risks in the domain of critical infrastructure – dams;
14. management of earthquakes;
15. coordination in cases of freezing temperatures, ice, snow storms;
16. prevention and management with risks in the domain of critical water supply infrastructure;
17. prevention and management with risks in the domain of critical infrastructure,
18. prevention and rescue in the domain of public and private buildings;
19. traffic infrastructure security and consequence management of major traffic accidents;
20. prevention and consequence management in the domain of critical infrastructure – telecom and IT networks;
21. prevention and consequence management in the domain of critical infrastructure – power plants;
22. coordination in cases of mine accidents;
23. protection of cultural heritage.

I.3 Suggested simplified scheme

The EPREV team suggests the following simple scheme (Fig. 4), which presents coordination and exchange of information and may be used while responding to the most likely radiation emergencies in the Former Yugoslav Republic of Macedonia. Nevertheless this scheme must be harmonized with the existing concept of the National Platform for Disaster Risk Reduction, including its specialized platforms.



Note: Single-direction arrows denote the direction of subordination. Two-direction arrows denote the exchange of information in both directions.

Fig. 4: Suggested simplified scheme for radiation emergency response

Important note: This scheme has been depicted taking into account the team's understanding of the arrangements for response to a radiation emergency in the country. It is not based on an existing national emergency plan, since these documents did not exist in the time of the mission. This scheme is also provided without prejudice to any actual scheme the authorities may adopt or consider in the future.

In the scheme in Fig. 4 are the key players during a radiation emergency who would be involved in case of local level responding. Only in extreme cases of widespread emergency should the national level be activated. In this case, the key players should also include:

- the Incident Commander, who may be supported by a national advisory team including high ranking officials responsible for a specific area of public administration (e.g., health, criminal investigations, social affairs, meteorology, the environment). Only in extreme situations should the highest national level be activated.
- the National Assessment Group, which provides advice to the Steering Group and should have the person in charge as a national commander, as well as support from their respective institutions. This body includes representatives of the ministries responsible

for the interior, transportation, agriculture, foreign affairs, environment, defence, etc., as well as other institutions such as Red Cross, the meteorological office, and so on.

APPENDIX II:
Mission Team Composition

Peter Zombori	Team Leader, IAEA
Igor Grlicarev	Slovenian Nuclear Safety Administration, Slovenia
Larisa Rozdyalouskaya	IAEA Consultant, Belarus

APPENDIX III
List of Participants at the IAEA EPREV Mission Briefing

Date: Monday, 22 June 2009
Place: Skopje

No.	Name	Position, Activity
1.	Grozdanka Naumovska	Head of the Unit for Humanitarian Measures, Protection and Rescue Directorate
2.	Goran Zaturoski	Coordination and Communication Unit, Ministry of finance – Customs Administration
3.	Ilija Georgiev	Ministry of Agriculture, Forestry and Water Management
4.	Dragi Tarcugovski	Operations and Coordination Sector, Crisis Management Centre
5.	Nikola Gjorgon	Operations and Coordination Sector, Crisis Management Centre
6.	Zoran Sandev	CBRN Coy, Ministry of Defence – General Staff
7.	Ljupka Petrovska Trifunovska	Unit for Transport of Dangerous Goods, Ministry of Transport and Communications
8.	Nadica Dimitrovska	Head of the Unit on Radiation Physics and Radiation Protection, University Radiotherapy and Oncology Clinic
9.	Marina Zdravevska Kocovska	Responsible person for incidents, Pathophysiology and Nuclear Medicine Institute
10.	Kresimir Krusik	Head of the Sector for Quality Control Management, 11. Oktomvri (industrial radiography)
11.	Dusan Nedelkovski	Head of the Radioecology Unit, Institute for Public Health (former Republic Institute on Public Health Protection)
12.	Valentina Ivanova	Police Sector, Ministry of Interior
13.	Silvana Delevska	Sector for Managing Health Crisis Situations, Ministry of Health
14.	Pavle Malkov	Inspection Section, Ministry of Environment and Physical Planning
15.	Svetlana Nestoroska	Unit on Licensing, Monitoring and Emergency, Radiation Safety Directorate
16.	Goran Angelovski	Unit on Licensing, Monitoring and Emergency, Radiation Safety Directorate
17.	Zvonko Tomeski	Fire Brigade of the city of Skopje
18.	Peter Zombori	EPREV Team Leader, IAEA
19.	Larisa Rozdyalouskaya	Team Member, IAEA Consultant
20.	Igor Grlicarev	Team Member, Slovenian Nuclear Safety Administration

APPENDIX IV
Assessment Sheet for the Former Yugoslav Republic of Macedonia

The following table provides the key to the performance indicators (PI) that may be used in the assessment check list.

Table 1. Performance indicators for the assessment sheet

PI Grade	Definition
3	**Appraisal criterion is fully met.**
2	**Appraisal criterion is partially met – and an action plan is implemented to fully meet the criterion within a defined time scale.**
1	**Appraisal criterion is not met – and actions are under way to make improvements, but these will not achieve full compliance with the criterion.**
0	**Appraisal criterion is not met - and no significant efforts are being made to improve the situation.**

The task numbers in the table below describe the macro-processes to achieve an interim basic response capability.

Table 2. Assessment check list

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
1	**Responsibilities, threat assessment, and coordination**					

[2] Documents: TECDOC, Safety Standards, etc.
[3] Workshops and training.
[4] Expert mission, scientific visit, equipment, etc.

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
	Identify a national coordinating authority				**2**	**The Law on Radiation Protection and Safety (as amended in 2007) empowers the RSD to perform the major regulatory responsibilities (licensing, inspection, establishing intervention levels) and also to address issues in preparedness and response to the radiological emergencies (preparing NREP, intervening in emergency, training, etc.)** **The Law on Crisis Management (2005) establishes Crisis Management System, and sets the Crisis Management Centre, which operates the national network of notification centres.** **There is the Memorandum of Understanding between the Radiation Safety Directorate and the Crisis Management Centre, signed on 31 July 2008.** **The Radiation Safety Directorate (RSD) is designated by law on Radiation Protection and Safety (Art.3) for preparing the National EPR Plan – i.e. it should assume a role of the coordinating body in assigning the responsibilities of the stakeholders in this project. The RSD is directly under the Government; their director has direct access to the Government and can propose the session agenda.**
	Clearly assign functions and responsibilities	●			**1**	**Clear assignment of the functions and responsibilities of organizations performing response in case of radiation emergency is expected to be made in the NREP, which is going to be a process developed by the RSD.**
	Establish a regulatory and inspection system	●			**2**	**A regulatory and inspection system is in place, but with the adoption of new regulations it would became more efficient.** **The RSD issues a license for a practice with ionizing radiation source only if the legal person attaches a Radiation Protection Programme which includes the Emergency Response Plan, as well as the Quality Assurance and Quality Control Programme, to the application**

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
	Perform a national threat assessment		●	●	**2**	**The draft Regulation on categorization of radiological and/or nuclear threat has been prepared in line with the GS-R-2 requirements, and the national threat assessment is still pending. The National Registry of ionizing radiation sources will be one of the inputs for this assessment. According to the provisional assessment there are facilities/activities in threat categories III, IV and V in the country.**
	Make arrangements to coordinate the emergency response of all off-site response organizations with the on-site response, to include a command and control system for the local and national response to any nuclear or radiological emergency	●		●	**1**	**These arrangements will be defined for appropriate institutions with an on-site emergency plan when the NREP is developed. During the licensing process the RSD may review the facility emergency plan, if this aspect (coordination of on-site and off-site response) has been adequately addressed.**
2	**Identification, notification, activation**					
	24/7 notification points established				**3**	**Around-the-clock notification centre for receiving messages of actual or potential emergencies was established within the Crisis Management Centre (Article 40 of the Law on Crisis Management).** **The current emergency call number 195 is to be changed for the unique emergency call number for all EU countries – 112.**

Task No.	Brief description	Possible IAEA Input				Self-assessed status
		Doc[2]	WS[3]	Other[4]	PI	Comments
	Inform scrap metal processing and border crossings	●	●		**2**	**The licensed technical services provide control over scrap metal shipments intended for import or export.** **The only metal processing facility in the country (in Skopje) is equipped with a panel detector to control incoming scrap metal. The final products are also monitored (gamma spectrometry analysis).** **All border crossings are provided with hand-held radiation detectors while the major ten border crossings are equipped with panel detectors.** **The customs or border police officers are instructed about the actions to be taken in case the detected dose rate is above the natural background. The necessary procedure for customs officers is prescribed by the special Guide No. 02-21605/1 of 07-08-2008 approved by the Customs Administration Director, and many of the customs and border police officers have been trained in line with this procedure.**
	First responders' awareness	●	●		**1**	**No special arrangements are in place, although many customs and police officers and fire-fighters have attended some training events dealing with radiological emergency situations organized by the USA Embassy in the country and the IAEA. An adequate training programme for first responders needs to be established.**
	Classification system for category I and II					**Not applicable.**
	Appropriate response for emergency class category I, II or III					**Not applicable, except for threat category III, but this will have to be confirmed and determined after the threat assessment is performed**
	Sufficient personnel available to perform initial response actions		●		**1**	**The response organizations seem to lack adequately trained personnel. Training and emergency plans should be put in place.**

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
	IAEA informed of the state's Contact Point	●			**2**	**The RSD is currently acting as a Contact Point for receiving emergency notifications and information from other States and information from the IAEA. The contact details of the Directorate are provided to the IAEA and are available on the ENAC web site.** **It is not clear if the RSD is capable of triggering the national emergency response, the CMC notification center should be considered as an alternative round-the-clock contact point.**
3	**Taking initial actions**					
	On-call advice and team to assist first responders		●		**2**	**The IPH will be contacted to provide appropriate assistance to local authorities. In the National Radiological Emergency Response plan it should be determined how IPH is activated.**
	Instruction to operators of threat category IV practices (14)	●			**2**	**The RSD provides expertise and services in radiation protection in case of emergencies involving practices in threat category IV. The additional help and expertise can be acquired from the authorized technical services. Technical services will be provided by the Institute for Public Health.**
	Search and public warning if a dangerous source is lost or stolen (15)		●		**1**	**No written procedure in place. The RSD inspectors will carry out an investigation in case of any abnormal event involving a dangerous source. The representatives from the Ministry of Interior and Crisis Management Centre, as well as other organizations can be involved, if needed.** **A procedure for searching for a lost source needs to be documented.**
	Mitigatory action in threat category I, II or III (16)					**Not known, if applicable - Impact assessment will be performed in case of facilities of threat category III to determine what mitigatory actions may be needed.**
	Intervention levels for urgent protective action (17)	●			**2**	**The intervention levels for urgent protective actions are written in the draft "Regulation on the Limits of Exposure and the Conditions for Exposure in Special Circumstances and in Emergencies", they are consistent with those, defined in Annex II and Annex III of the GS-R-2.**
	Effective implementation of urgent protective action for category I or II (18)					**Not applicable. There are no threat category I and II facilities in country.**

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
	Safety of those on-site at category I, II or III (19)		●		**1**	**According to the draft regulations the appropriate arrangements shall be part of the facility on-site emergency plan: notifying people on the site of emergency and the actions to be taken upon this notification. However, these regulations have not yet been put into practice.**
	Protection for emergency workers and response personnel		●		**1**	**The guidance about emergency workers turn-back doses is given in the draft "Regulation on the Limits of Exposure and the Conditions for Exposure in Special Circumstances and in Emergencies". The guidance is in line with the EPR-Method recommendations.** **The individuals and workers, who can take part in the intervention are volunteers, and they should be trained in the field of radiation protection and are informed about the risks they are facing.** **Following the emergency exposure, the emergency workers are required to undergo a medical examination.**
	OILs for radiological emergencies		●		**1**	**To be included in the draft NREP.**
	Assessment of on-site (EALs) and off-site emergency conditions (OILs) for category I or II		●			**Not applicable.**
4	**Public warnings and information**					
	Prompt warning/instruction to the public for category I or II					**Not applicable.**
	Useful and consistent information to the public and media	●	●		**2**	**The RSD is responsible for providing information to the public about the protection from ionizing radiation.** **The Crisis Management Centre has a special service for communication with the media and news during a crisis situation.** **The roles of the institutions and the process of news preparation should be described in the NREP.**
	Responding to public concern		●	●	**0**	**Has not been addressed yet and it should be included in the NREP.**
5	**Medical**					

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
	Medical practitioner awareness	●			**1**	**The Unit of Occupational Medicine for Workers Dealing with Ionizing Radiation Sources within the IPH, the Institute for Nuclear Medicine and the University Clinic of Radiotherapy and Oncology have trained personnel, who could recognize the medical symptoms of a radiation exposure, although no arrangements have been made to ensure that general practitioners and emergency medical staff are aware of these symptoms and of the appropriate notification procedures. Awareness campaign (training) for general practitioners should be performed.**
	National capability for initial treatment of radiation injuries			●	**1**	**The initial treatment to exposed and/or contaminated people seems to be partially provided by the above mentioned medical institutions, although sufficient information is not available. The preparedness of these institutions for initial treatment of patients should be checked. Also the option of international assistance for further treatment of patients should be investigated.**
	Consultation with experienced practitioners	●			**1**	**To be performed and included in the outreach campaign for awareness of general practitioners.**
6	**Agriculture**					
	Intervention/action levels for agricultural countermeasures	●			**1**	**The draft Regulation on the limits of exposure and the conditions for exposure in special circumstances and in emergencies establish generic action levels for foodstuffs, in accordance with Annex III of the GS-R-2.**
	Taking agricultural countermeasures for category V	●	●		**0**	**To be included in the future NREP.**
7	**Infrastructure**					
	Emergency plans for 1) on- and off-site response at category I, II and III; and 2) the national response for all categories	●	●	●	**2**	**The national radiological emergency response plan needs to be written. The process of drafting of NREP has been initiated in the RSD.**

Task No.	Brief description	Possible IAEA Input			Self-assessed status	
		Doc[2]	WS[3]	Other[4]	PI	Comments
	Response procedures for: 1) On- and off-site response at category I, II and III 2) National response 3) First responders' response to radiological emergencies		●	●	**1**	**1) Not applicable;** **2) RSD, CMC and P&R Directorate;** **3) IPH, Institute for Nuclear Medicine, the University Clinic of Radiotherapy and Oncology and P&R Directorate.**
	Supplies, equipment, and documentation	●	●	●	**2**	**The equipment is satisfactory to establish an interim emergency response capability but documentation (lists of equipment, instructions) needs to be written.**
	Emergency facilities for category I and II					**Not applicable.**
	Training of responders		●	●	**1**	**Ad hoc training is provided by the IAEA and other international programs.** **This item should be addressed more systematically, and focused on actual response system and equipment. Non-existence of the NREP is a serious obstacle to developing a training programme.**
	Conduct: 1) National table-top level exercises 2) Exercise for threat category I, II or III 3) Drill for first responders		●	●	**1**	**To be implemented in accordance with the exercise plan after it is developed. This exercise plan shall be in line with NREP, when it will be adopted.**
	Inventories, resupply, tests, and calibrations of supplies and equipment, and updates to plans and procedures		●	●	**0**	**Procedures for processes, quality management system, regular checks and calibration of instruments are still to be written.**

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GLOSSARY

arrangements (for emergency response): The integrated set of infrastructure elements necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include authorities and responsibilities, organization, coordination, personnel, plans, procedures, facilities, equipment, or training.

dangerous source: A source that could, if not under control, give rise to exposure sufficient to cause severe deterministic health effects. This categorization is used for determining the need for emergency response arrangements and is not to be confused with categorizations of sources for other purposes.

deterministic effect: A health effect of radiation for which generally a threshold level of dose exists, above which the severity of the effect is greater for a higher dose. Such an effect is described as a 'severe deterministic effect' if it is fatal or life threatening, or results in a permanent injury that reduces quality of life.

emergency: A non-routine situation or event that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment. This includes nuclear or radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals, storms, or earthquakes. It includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard.

emergency action level (EAL): A specific, predetermined, observable criterion used to detect, recognize and determine the emergency class.

emergency class: A set of conditions that warrant a similar immediate emergency response. The term used for communicating to the response organizations and the public the level of response needed. The events that belong to a given emergency class are defined by criteria specific to the installation, source or practice which, if exceeded, indicate classification at the prescribed level. For each emergency class, the initial actions of the response organizations are predefined.

emergency classification: The process whereby an authorized official classifies an emergency in order to declare the applicable level of emergency class. Upon declaration of the emergency class, the response organizations initiate the predefined response actions for that emergency class.

emergency plan: A description of the objectives, policy, and concept of operations for the response to an emergency and the structure, authorities and responsibilities for a systematic, coordinated, and effective response. The emergency plan serves as the basis for the development of other plans, procedures, and checklists**.**

(emergency) preparedness: The capability to take action that will effectively mitigate the consequences of an emergency for human health, safety, quality of life, property, and the environment.

emergency procedures: A set of instructions describing in detail actions to be taken by response personnel in an emergency.

(emergency) response: The performance of actions to mitigate the consequences of an emergency on human health and safety, quality of life, property, and the environment. It may also provide a basis for the resumption of normal social and economic activity.

emergency services: The local off-site response organizations that are generally available and that perform emergency response functions. These may include police, fire and rescue brigades, ambulance services, and control teams for hazardous materials.

emergency worker: A worker who may be exposed in excess of occupational dose limits while performing actions to mitigate the consequences of an emergency for human health and safety, quality of life, property, and the environment.

emergency zones: The precautionary action zone and/or the urgent protective action planning zone.

exposure: The act or condition of being subject to irradiation. Exposure can be either external exposure (irradiation by sources outside the body) or internal exposure (due to a source within the body).

first responders: The first members of an emergency service to respond at the scene of an emergency.

generic intervention level: The level of avertable dose at which a specific protective action is taken in an emergency or situation of chronic exposure.

generic action level: The concentration (Bq/g) of specific isotopes in food or water at which consumption should be restricted if replacement food or water is available.

initial phase: The period of time from the detection of conditions warranting the implementation of response actions that must be taken promptly in order to be effective until those actions have been completed. These actions included taking mitigatory actions by the operator and urgent protective actions on and off the site.

intervention: Any action intended to reduce or avert exposure or the likelihood of exposure to sources which are not part of a controlled practice or which are out of control as a consequence of an accident.

intervention level: The level of avertable dose at which a specific protective action is taken in an emergency or situation of chronic exposure.

longer-term protective action: A protective action which is not an urgent protective action. Such protective actions are likely to be prolonged over weeks, months, or years. These include measures such as relocation, agricultural countermeasures, and remedial actions.

non-radiological consequences: Effects on humans or the environment that are not deterministic or stochastic effects. These include effects on health or the quality of life resulting from psychological, social, or economic consequences of the emergency or the response to the emergency.

notification:

1. A report submitted to a national or international authority providing details of an emergency or potential emergency, for example as required by the Convention on Early Notification Convention of a Nuclear Accident
2. A set of actions taken upon detection of emergency conditions, with the purpose of alerting all organizations with responsibility for taking emergency response actions in the event of such conditions

notification point: A designated organization with which arrangements have been made to receive notification (meaning 2 in this glossary) and to initiate promptly the predetermined actions to activate a part of the emergency response.

nuclear or radiological emergency: An emergency in which there is, or is perceived to be a hazard due to:

- The energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction; or
- Radiation exposure.

off-site: Outside the site area.

on-site: Within the site area.

operational intervention level (OIL): A calculated level, measured by instruments or determined by laboratory analysis, that corresponds to an intervention level or action level. OILs are typically expressed in terms of dose rates or activity of radioactive material released, time-integrated air concentrations, ground or surface concentrations, or activity concentrations of radionuclides in environmental, food, or water samples. An OIL is a type of action level that is used immediately and directly (without further assessment) to determine the appropriate protective actions on the basis of an environmental measurement.

operator (or operating organization): Any organization or person applying for authorization or authorized and/or responsible for nuclear, radiation, radioactive waste, or transport safety when undertaking activities or in relation to any nuclear facilities or sources of ionizing radiation. This includes private individuals, governmental bodies, consignors or carriers, licensees, hospitals, and self-employed persons. This also includes those who are either directly in control of a facility or an activity during use (such as radiographers or carriers) or, in the case of a source not under control (such as a lost or illicitly removed source or a re-entering satellite), those who were responsible for the source before control over it was lost.

practice: Any human activity that introduces additional sources of exposure or exposure pathways or extends exposure to additional people, or modifies the network of exposure pathways from existing sources, so as to increase the exposure or the likelihood of exposure of people or the number of people exposed.

precautionary action zone: An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to reduce the risk of server deterministic health effects off the site. Protective actions within this area are to be taken before or shortly after a release of radioactive material or exposure on the basis of the prevailing conditions at the facility (EALs).

protective action: An intervention intended to avoid or reduce doses to members of the public in emergencies or situations of chronic exposure.

radiation emergency: A nuclear or radiological emergency.

radiological emergency: An emergency involving an actual or perceived risk from activities that could give rise to a nuclear or radiological emergency at an unforeseeable location. These include non-authorized activities, such as activities relating to dangerous sources obtained illicitly. They also include transport and authorized activities involving dangerous mobile sources such as industrial radiography sources, radio thermal generators, or nuclear powered satellites.

radiological dispersal device (RDD): A device constructed by terrorists to spread radioactive materials using conventional explosives or other means.

regulatory body: An authority or a system of authorities designated by the government of a state as having legal authority for conducting the regulatory process, including issuing

authorizations, and thereby regulating nuclear, radiation, radioactive waste and transport safety.

response organization: An organization designated or otherwise recognized by a state as being responsible for managing or implementing any aspect of a response.

significant transboundary release: A release of radioactive material to the environment that may result in doses or levels of contamination beyond national borders from the release which exceed international intervention levels or action levels for protective actions, including food restrictions and restrictions on commerce.

site area: A geographical area that contains an authorized facility, activity or source, within which the management of the authorized facility or activity may directly initiate emergency actions. This is typically the area within the security perimeter fence or other designated property marker. It may also be the controlled area around a radiography source or a cordoned off area established by first responders around a suspected hazard.

source: Anything that may cause radiation exposure (such as by emitting ionizing radiation or by releasing radioactive substances or materials) and can be treated as a single entity for protection and safety purposes. For example, materials emitting radon are sources in the environment, a sterilization gamma irradiation unit is a source for the practice of radiation preservation of food, an X-ray unit may be a source for the practice of radio diagnosis. A nuclear power plant is part of the practice of generating electricity by nuclear fission, and may be regarded as a source (e.g., with respect to discharges to the environment) or as a collection of sources (e.g., for occupational radiation protection purposes). A complex or multiple installations situated at one location or site may, as appropriate, be considered a single source for the purposes of application of international safety standards.

stochastic effect (of radiation): A radiation induced health effect, the probability of occurrence of which is greater for a higher radiation dose and the severity of which (if it occurs) is independent of dose. Stochastic effects may be somatic effects or hereditary effects, and generally occur without a threshold level of dose. Examples include thyroid cancer and leukemia.

threat assessment: The process of analyzing systematically the hazards associated with facilities, activities, or sources within or beyond the borders of a state in order to identify:

1. Those events and the associated areas for which protective actions and emergency countermeasures may be required within the state, and
2. The actions that would be effective in mitigating the consequences of such events.

transnational emergency: A nuclear or radiological emergency of actual, potential or perceived radiological significance for more than one state. This includes:

1. A significant transboundary release of radioactive material. (However, a transnational emergency dose not necessarily imply a significant transboundary release or radioactive material.)
2. A general emergency at a facility or other event that could result in a significant transboundary release (atmospheric or aquatic) of radioactive material
3. A discovery of the loss or illicit removal of a dangerous source that has been transported across or is suspected of having been transported across a national border
4. An emergency resulting in significant disruption to international trade or travel
5. An emergency warranting the taking of protective actions for foreign nationals or embassies in the state in which it occurs

6. An emergency resulting in or potentially resulting in severe deterministic health effects and involving a fault and/or problem (such as in equipment or software) that could have implications for safety internationally
7. An emergency resulting in or potentially resulting in great concern among the population of more than one state owing to the actual or perceived radiological hazard

urgent protective action: A protective action that, in the event of an emergency, must be taken promptly (normally within hours) in order to be effective, and the effectiveness of which will be markedly reduced if it is delayed. The most commonly considered urgent protective actions in a nuclear or radiological emergency are evacuation, decontamination of individuals, sheltering, respiratory protection, iodine prophylaxis, and restriction of the consumption of potentially contaminated foodstuffs.

urgent protective action planning zone: An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to avert doses off the site in accordance with international standards. Protective actions within this area are to be taken on the basis of environmental monitoring or, as appropriate, prevailing conditions at the facility.

ACRONYMS

CBRN	Chemical Biological Radiological Nuclear
EAL	emergency action level
EPA	Environmental Protection Agency
EP	emergency planning
EPREV	emergency preparedness review
FYR	Former Yugoslav Republic
GC	IAEA General Conference
IAEA	International Atomic Energy Agency
IPH	Institute of Public Health (former Republic Institute of Public Health Protection)
MoD	Ministry of Defence
MoH	Ministry of Health
MoI	Ministry of Interior
NREP	National Radiological Emergency (Response) Plan
OIL	operational intervention level
PI	performance indicator
P&R	protection and rescue
RANET	Response Assistance NETwork
RDD	radiological dispersal device
RSD	Radiation Safety Directorate
TLD	thermoluminescent dosimeter/dosimetry
UN	United Nations
WHO	World Health Organization