

EPREV REPORT



Emergency
Preparedness
Review

EPREV

PEER APPRAISAL OF THE ARRANGEMENTS IN TAJIKISTAN REGARDING THE PREPAREDNESS FOR RESPONDING TO A RADIATION EMERGENCY



17–28 February 2014
Dushanbe, Tajikistan

International Atomic Energy Agency

FOREWORD

Within the United Nations system, the International Atomic Energy Agency (IAEA) has the statutory functions of establishing standards of safety for the 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 accidents and radiation emergencies.

In response to a request from the Nuclear and Radiation Safety Agency (NRSA) under the Academy of Sciences of Tajikistan, the IAEA fielded an Emergency Preparedness Review (EPREV) mission to Tajikistan to conduct, in accordance with Article III of the IAEA Statute, a peer review of Tajikistan's radiation emergency preparedness and response arrangements vis-à-vis the relevant IAEA standards.

The number of recommendations, suggestions and good practices is in no way a measure of the status of the emergency preparedness and response system. Comparisons of such numbers between EPREV reports from different countries should not be attempted.

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EXECUTIVE SUMMARY

This report provides the results of the Emergency Preparedness Review (EPREV) mission to Tajikistan. The mission was requested by the Nuclear and Radiation Safety Agency (NRSA) of the Academy of Sciences, the national regulatory authority of Tajikistan and was co-hosted by the NRSA and the Committee of Emergency Situations (CoES), which is the national coordinating authority on matters of nuclear and radiological emergency preparedness and response. The mission took place in Dushanbe on 17–28 February 2014.

The purpose of the mission was to review Tajikistan's national capabilities and arrangements regarding its preparedness for responding to nuclear and radiological emergencies (radiation emergencies). It was undertaken by the International Atomic Energy Agency (IAEA) based on the methodology outlined in the IAEA EPREV Guidelines, and was implemented by a team of international experts. The mission was based on peer reviews of Tajikistan's EPR arrangements and assessment of the compliance of these national arrangements with the requirements of the international standards, with special emphasis on the IAEA Safety Series No. GS-R-2 [2].

The work included a review of the available information on national EPR capabilities (e.g. the Self-Assessment Questionnaire, the mission report of the previous EPREV implemented in 2007, relevant documents of the national legislation and reports from other IAEA missions, etc.), as well as discussions and interviews with the representatives of various national agencies and stakeholders involved in the national radiation emergency preparedness and response system.

The work of the EPREV team was fully supported by the staff of the NRSA and by the responsible officials of the CoES. Their devotion, efficient help and cooperation was essential for the successful completion of the mission.

The EPREV team observed a noticeable improvement in the situation regarding the EPR capabilities in Tajikistan since the implementation of the previous EPREV mission in 2007 [3]. The most important development is the launch of a governmental Action Plan for emergency preparedness and radiation protection for 2013–2017 (AP2012) [4], which will strengthen and upgrade national emergency preparedness and response capabilities in the country. This Action Plan is scheduled to be completed by 2017. Government funding has been earmarked for these activities and the progress of its implementation is to be regularly reported to the Government of Tajikistan.

The other positive change in the national EPR system is the fact that in 2011, Tajikistan joined the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency in-line with the recommendations of the 2007 EPREV mission.

In addition, the EPREV team found areas that would require further attention and improvement. In some key areas, the international standards are not met or are only partially met by the national arrangements. The most important deficiency of the national EPR system is the lack of a National Radiation Emergency Plan (NREP). This plan should address all those areas that were found either missing or not well defined (e.g. assignment of roles and responsibilities, assessment of hazards, the emergency classification system, public communication, medical response, agricultural countermeasures, etc.). The team noted that

one of the activities of the Action Plan is the creation of the NREP. Discussions and technical meetings conducted during the mission provided an opportunity for team members to give their input for this important endeavour.

Based on its findings, the EPREV team formulated 18 recommendations (for addressing issues regarding non-compliance with the international standards) and 4 suggestions (where improvements may be reached by implementing the proposed actions). The team found the programme for implementing the governmental Action Plan to be a good practice that can be proposed to other countries.

1. INTRODUCTION

1.1. Objective and Scope

The purpose of this EPREV mission was to conduct a review of Tajikistan's radiation emergency preparedness and response arrangements and capabilities. The EPREV was a full scope review mission, covering all aspects and areas of radiation emergencies. The review was carried out by comparing existing arrangements against the IAEA safety standards.

The knowledge gained and experiences shared between Tajikistan and the EPREV team and the evaluation of the effectiveness of the country's arrangements, capabilities and its good practices will benefit not only Tajikistan's emergency preparedness and response arrangements, but also those of other Member States.

The key objectives of this mission were to enhance nuclear and radiation safety and emergency preparedness and response by:

- Providing Tajikistan and the NRSA with an opportunity for self-assessment of its activities against IAEA safety standards;
- Providing Tajikistan and the NRSA with a review of its emergency preparedness and response arrangements;
- Providing Tajikistan and the NRSA with an objective evaluation of its emergency preparedness and response arrangements with respect to IAEA safety standards and guidelines;
- Contributing to the harmonization of emergency preparedness and response approaches among IAEA Member States;
- Promoting the sharing of experience and exchange of lessons learned;
- Providing reviewers from IAEA Member States, and IAEA staff with opportunities to broaden their experience and knowledge of EPR;
- Providing key NRSA staff, as well as the officials of the Governmental Committee for Emergency Situations who are responsible for radiation emergency preparedness and response, with an opportunity to discuss their practices with reviewers who have experience with different practices in the same field;
- Providing Tajikistan and the NRSA with recommendations and suggestions for improvement; and
- Providing other States with information regarding good practices identified in the course of the review.

1.2. Preparatory Work and Review Team

At the request of the NRSA of Tajikistan in April 2013, preparatory work was initiated for an EPREV. The technical part of mission preparation was assigned to the Incident and Emergency Centre (IEC) of the Department of Nuclear Safety and Security, whereas funding was provided by the regional project RER9118 of the Department of Technical Cooperation (TC). Preparatory work focused on assembling a mission team and on developing, in cooperation with the Tajik Counterpart, the Terms of Reference for the EPREV mission. Mr V. Kutkov (Head of laboratory of the Kurchatov Institute, Russian Federation) was appointed to be the Team Leader, Mr M. Breitinger, Emergency Preparedness Officer of the IEC, was tasked to be the Team Coordinator (later replaced by Mr P. Zombori, Consultant of the IEC).

Ms L. Rozdylouskaya, a Consultant for TC Europe, was also involved in mission preparation.

The schedule and other details of the mission were developed in the summer of 2013 through correspondence and discussions in Vienna with the officials of NRSA (Prof. U. Mirsaidov, Director of NRSA, Mr J. Salomov, Deputy Director of NRSA and Mr I. Mirsaidov, Head of the Department of Information and International relations of the NRSA).

The proposed EPREV team composition and size was discussed and tentatively confirmed. Logistics including meeting and work space, Counterparts and Liaison Officers, proposed site visits, lodging and transportation arrangements were also addressed. All relevant aspects were included in the agreed to Terms of Reference.

The initial November 2013 date for the mission was later postponed. The mission was finally implemented from 17–28 February 2014.

In preparation for the mission, the IAEA review team members conducted a review of the available documents related to EPR arrangements in Tajikistan including, among others, the mission report of the 2007 EPREV and the Self-Assessment Questionnaire provided by the host country in 2009.

1.3. Reference for the Review

IAEA safety standards GS-R-2 [2], GSG-2 [5], and GS-G-2.1 [6] were used as review criteria. The complete list of IAEA publications used as the reference for this mission is given in the reference section.

The terms used in this report are consistent with those found in the IAEA standards referred in the above paragraph.

2. DETAILED FINDINGS

2.1. Basic responsibilities

The existing legislation in Article 11 of Ref. [7] and Article 17 of Ref. [8] empowers the CoES to act as a national coordinating authority and perform the following functions:

- Ensure and exercise control over preparedness of state bodies and organizations to respond to potential emergency situations;
- Perform management of the forces and means involved in the mitigation of consequences of emergency situations;
- Engineer and coordinate the recovery and other actions required in the event of emergency situations; and
- Organize training for management authorities, civil defence divisions and the public on how to act in the event of emergency situations, etc.

The CoES is the executive body of the Uniform State Emergency Prevention and Elimination System of the Republic of Tajikistan (USEPES). It unites governmental bodies, local executive and administrative bodies, enterprises and institutions authorized to take preventative and mitigatory measures in the event of any emergency or accident of natural or man-made character, including radiation emergencies.

On 29 December 2012, the Government of Tajikistan issued Decree No. 770, ‘On the Action plan of Emergency Preparedness and Radiation Protection for the 2013-2017 years’ [4]. According to Article 3 of Decree No. 770, the CoES has been appointed as the coordinating authority responsible for activities to be implemented in Tajikistan during 2013–2017 related to upgrading the national system on preparedness and response to radiation emergencies in-line with international requirements.

Action 28 of AP2012 [4] states that the NREP and the model plans to facilitate preparation of the adequate radiation emergency response plans for the facility and local/regional levels should be prepared by the end of 2014.

In the existing legislation of Tajikistan, the responsibilities for preparedness and response for a radiation emergency are not allocated clearly enough to meet the requirements of GS-R-2 [2]. The legislation does not determine in advance the allocation of responsibilities for the management of interventions in emergency exposure situations between the regulatory body, the national and local response organizations and operators.

Action 2 of AP2012 [4] states that the allocation of responsibilities and functions between the operators and response organizations should have been completed in 2013.

The regulatory body, NRSA, was established in 2003 and, according to Article 6 of [9], it is the only regulatory body for all matters regarding the safety and security of radiation sources.

The NRSA takes a proactive role towards establishing an adequate emergency response system through the regulatory (state registry of sources, licensing and inspection) process. The legislation defines that NRSA is responsible for controlling and coordination of arrangements that ensure radiation safety in the event of radiation emergency [10]. It is also

responsible for the approval of norms and rules for radiation safety and emergency planning as given in Article 6 of Ref. [9].

Reference [11] established the Interagency Council for Radiation Safety with the responsibility of coordinating activities of all state bodies having a regulatory role in the field of atomic energy (including the NRSA).

The functions and responsibilities of operators, as specified in GS-R-2, are clearly assigned in the existing legislation and are understood by the regulatory authority and the operators. But this assignment is not clear for the functions and responsibilities of the response organizations. Also, the integration of the functions of the operators and the response organizations is unclear. Paragraph 7.7 of [12] states that the administrators of the facilities (operators) are responsible for the protection of personnel and emergency workers.

The functions and responsibilities of users (licensees) to ensure protection of workers and the public in the event of radiation emergencies are clearly defined in Article 5 of the Requirements for Ensuring Radiation Safety [13] and by Article 23 of Ref. [9]. In particular, a licensee should:

- Develop a list of potential radiation accidents with a description of their consequences and predicted radiation situations;
- Establish criteria for making operational decisions in the event of a radiation accident;
- Create emergency and rescue teams and non-military formations of Civil Defence, staffed with on-site workers (personnel) of the radiation facility;
- Develop an emergency plan for protecting personnel and the public in the event of a radiation accident, agreed upon with the local authorities and the relevant State authorities;
- Provide for a means of notification; and
- Ensure medical prophylaxis of radiation injuries and medical assistance to victims during a radiation emergency.

According to Ref. [14], a plan for responding to a potential radiation emergency is the prerequisite for issuing an authorization (license) for any practice or source that could give rise to a radiation emergency.

Article 12 of Ref. [7] states that ministries and organizations should have necessary resources and make preparations and arrangements, in the area of protection of the public and territories during emergency situations, that are commensurate with the scope of their activity and their competence.

The authorization and inspection system is in place, and NRSA is working towards establishing the adequate licensing and inspection programme. After the 2007 EPREV mission in Tajikistan [3] the NRSA prepared and approved procedures for some of these functions, and staff are being comprehensively trained to conduct the authorization and inspection process.

In addition to NRSA, the existing legislation [7, 15, 12, 13] empowers the Sanitary Epidemiological Service under the Ministry of Health of Republic of Tajikistan (SES) and CoES to carry out authorization, inspection and enforcement, to ensure that emergency preparedness and response arrangements are taken in compliance with the legislation.

Good practice 1.
<p>Observation: AP2012 has been approved by the Government of Tajikistan. It will support the development of the emergency preparedness and response system in Tajikistan in the case of a radiation emergency.</p>
<p>Basis: GS-R-2 paragraph 3.2 states that, “The arrangements for emergency response actions both within and outside facilities, if applicable, or elsewhere under the control of the operator, are dealt with through the regulatory process. [The State] shall ensure that [the regulatory body and response organizations] have the necessary resources and that they make preparations and arrangements to deal with any consequences of [a radiation emergency] in the public domain, whether the [radiation emergency] occurs within or beyond national [borders]”.</p>
<p>Good Practice: The preparation and approval of the national Action Plan implementing the GS-R-2 requirements and recommendations of the previous EPREV mission is a good practice. This shows a good example of how the recommendations of an EPREV mission (in this case the previous EPREV implemented in 2007) were turned into actions, with the supervision and funding of the government.</p>

Recommendation 1.
<p>Observation: The legislation and current arrangements in place do not clearly define the assignment of functions and responsibilities of the response organizations and also do not clearly define the integration of the functions of the operators and the response organizations for preparedness and response for a radiation emergency in order to meet the requirements of GS-R-2.</p>
<p>Basis for Recommendation:</p> <p>GS-R-2 paragraph 3.3 states that, “It is presumed that the State will have determined in advance the allocation of responsibilities for the management of interventions in emergency exposure situations between the [regulatory body], national and local [response organizations] and [operators].”</p> <p>GS-R-2 paragraph 3.4 states that, “...legislation shall be adopted to allocate clearly the responsibilities for preparedness and response for a radiation emergency and for meeting the requirements established in this Safety Requirements...”</p>
<p>Recommendation: The Government should harmonize the current legislation in order to clearly assign the responsibilities and functions for preparedness and response for a radiation emergency.</p>

2.2. Assessment of threats¹

The EPREV team was informed that Tajikistan has not completed a systematic assessment of hazards, in-line with international requirements [2], which could be the planning basis of the future NERP. Some provisions for categorization of radiation facilities are given in Section 2.1 of the Requirements for ensuring radiation safety (PORB-08) [13]. These provisions give a graded approach for siting radiation facilities (Section 2.2), their design (Section 2.5), operation (Section 2.4) and decommissioning (Section 2.6). The categorization of the radiation facilities in PORB-08 does not provide any basis for a graded approach to emergency preparedness, as it is required in Ref. [2].

NRSA operates the Radiation Source Database (RSDB) of the NRSA which contains information on registered sources. The regulatory base for the RSDB is provided by Regulation No. 602 in Ref. [16]. NRSA provided the EPREV team with an up-to-date inventory of radiation sources that are in use in Tajikistan. The inventory was derived from the RSDB on a platform of RASOD 1.4 software. The RSDB includes 9 sealed sources of category² 1, and 82 sources of category 2 in accordance with Ref. [17]. In total, 1112 radiation sources of categories 1–5 are registered in the RSDB.

Taking into account the up-to-date inventory, the EPREV team concluded that there could be at least six major operators of category III facilities in Tajikistan:

- Ore-dressing and processing enterprise ‘**Anzob**’ (**Ayni, Sughd province**) operates three ²⁵²Cf sources of 0.2 TBq each.
- The **Research Institute on Natural Sciences of Tajik State University** (Dushanbe) operates the irradiation facility, which contains about 80 ⁶⁰Co sources with activities in the range of 0.7–0.1 TBq.
- The **Republican Clinical Centre of Oncology** (Dushanbe) operates one ⁶⁰Co source of 136 TBq and one ⁶⁰Co source of 8 TBq. Additionally, it keeps one ⁶⁰Co source of 9 TBq in storage.
- The **Institute of Technical Physics** (Dushanbe) operates a ¹⁵²Eu source with an activity of about 37 TBq.
- The **Institute of Gastroenterology** (Dushanbe) operates one ¹³⁷Cs source with an activity of 8 MBq.
- The **Radioactive Waste Repository** (town of Fayzabad in R.R.S. at 70 km from Dushanbe) has in storage four ⁹⁰Sr Radionuclide Thermo Electrical Generators with activities of about 1500 TBq, and about 500 dangerous sources together with 120 m³ of liquid radioactive waste.

¹ This heading refers to the original terminology of GS-R-2. In the rest of the report the term ‘hazard’ is used instead of ‘threat’, in accordance with the terminology of the revised IAEA safety standards.

² GS-R-2 refers to the term ‘threat category’, however this term is being phased out as ‘threat’ has a specific meaning with regard to nuclear security. Throughout this document, the term ‘category’ will be used unless GS-R-2 is quoted directly.

Category IV includes radioactive sources that could give rise to a radiation emergency that could warrant urgent protective action in an unforeseeable location, for example during transport of dangerous sources, or activities related to non-authorized use of dangerous sources, such as illicit trafficking and detonation of a radiological dispersal device [2].

Based on past Tajik experience and present necessity of recovering numerous disused radioactive sources, it appears that events with radioactive sources in this category are the most likely emergency scenarios in Tajikistan.

Activities in category V [2] include activities not normally involving sources of ionizing radiation, but that yield products likely to become contaminated to levels necessitating their prompt restriction. Such contamination may result from emergencies at facilities of category I or II in the other States. This has a very low probability of occurrence in the Tajik territory. The closest relevant category I facility is in Pakistan, several thousand kilometres from the Tajik border. The nearest category II facility is in Tashkent (Uzbekistan), more than a hundred kilometres from the Tajik border.

Action 3 and Action 4 of AP2012 [4] state that in 2013–2017 CoES and NRSA should develop a regulatory basis for hazard assessment in-line with international requirements and hazard assessment at the national level.

Recommendation 2.
<p>Observation: Tajikistan has not yet performed the assessment of hazards in-line with the international requirements in Ref [2] and does not use the categorization of hazards for a graded approach to managing emergency preparedness and response.</p>
<p>Basis for Recommendation: GS-R-2 paragraph 3.15 states that the nature and extent of emergency arrangements for preparedness and response shall be commensurate with the potential magnitude and nature of the hazard associated with the facility or activity. The full range of postulated events shall be considered in the hazard assessment. Emergencies involving a combination of a radiation emergency coincident with a conventional emergency, such as an earthquake, shall be considered</p>
<p>Recommendation: The Government of Tajikistan should conduct an assessment of hazards in-line with international requirements and assure that a graded approach is implemented for managing emergency preparedness and response. This hazard analysis should be annexed in the NREP. The hazard assessment should be reviewed and repeated, if and when necessary, with certain regularity to maintain a relevant up-to-date understanding of the potential risk and to make the necessary changes in the emergency plan.</p>

2.3. Establishing Emergency Management and Operations

The command and control system for local and national response to any emergency in Tajikistan is an integral part of the USEPES; which consists of a permanent branch and territorial subsystems. They have state, regional, local and enterprise level components.

Every level of the USEPES has coordinating organs - territorial and branch commissions for managing emergencies. The National Commission for Emergencies [33] is at the top of the USEPES. They are authorized to arrange for necessary transport, rescue, fire-fighting,

medical, technical and other forces, and also to use material reserves and all communication systems in the territories under their jurisdiction. In the event of an emergency, forces and means of regional, local and enterprise level subsystems are subordinated to the governmental bodies of the respective territorial subsystems.

It should be noted that the USEPES was established on the basis of an all hazard concept, the infrastructure is used for any type of emergency, and the management staff will depend on the specific emergency. The CoES is the executive body of the USEPES and is responsible for coordinating response in all radiation emergencies.

It is important that NRSA and CoES make arrangements and verify that all category III facilities (i.e. radioactive waste repository, Tajik State University, the Republican Clinical Centre of Oncology, Ore-dressing and processing enterprise “Anzob”, etc.) have adequate emergency arrangements in their emergency plans. This should include on-site management and coordination with off-site organizations. All category III facilities should inform the dedicated police, firefighters and paramedics, as well as CoES, about the activities they are to perform and the assistance to be expected from off-site organizations in the event of a radiation emergency occurring at the facilities. The activities mentioned should be integrated with the arrangements made at the national and local levels for response to conventional emergencies, and should be incorporated in the NREP.

The NRSA does not yet seem to be involved in exercises or planning activities within the framework of the USEPES. In terms of emergency preparedness and response to radiation emergencies, the NRSA’s role needs to be clearly defined and further developed. A draft of the concept of actions for the detection and initial response in case of illicit trafficking of radioactive materials across the border of Tajikistan has been prepared.

Action 5 of AP2012 [4] states that CoES and NRSA in cooperation with the Ministry of Health, SES, and other stakeholders should formalize coordination mechanisms for response to any radiation emergency at all USEPES levels, and to develop and incorporate into emergency plans standard procedures and guidance for operators and response organizations, based on IAEA standards and recommendations [2, 6].

2.4. Identifying, Notifying and Activating

In 2011, Tajikistan became party to the Convention on Early Notification of a Nuclear Accident, and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency [1], as was recommended by the 2007 EPREV mission [3].

There is a national 24/7 point of contact established in the Center of Management of Emergency Situations and Civil Defence; the Republican Crisis Management Centre (RCMC) of the CoES. One of the functions of the RCMC is to receive and dispatch notifications of any actual or potential emergencies. Domestic notification system in Tajikistan is based on the dispatcher centres which operate the unified emergency telephone number 111.

The EPREV team was informed that arrangements are being made by NRSA and CoES to meet the requirements of [2], stating that on-site managers (radiation protection officers) and off-site first responders should be aware of indicators of potential emergencies and be able to

determine the appropriate level of response. The importance of these issues is distinctly understood by NRSA with the understanding that operators (users) and on-site responders (including radiation protection officers) would need more resources and training to be in better compliance with the above stated provisions.

The EPREV team was informed that NRSA and CoES are completing the establishment of two training centres for ongoing training of first responders and operators for radiation emergencies. The team was also informed that the Tajik police have regular briefings on indicators of radioactive materials (radiation symbols, transport placards, etc.), as was recommended in Ref. [18].

There are scrap metal collection (but not processing) facilities in the territory of Tajikistan that export metal collected abroad through the territory of Uzbekistan. When crossing the border, the owner of the scrap metal should provide a clearance from NRSA (as required by Ref. [19]) confirming that the shipment does not contain radioactive materials. To obtain clearance, the shipment owners must invite a NRSA worker to measure for radioactivity in the cargo.

During the EPREV mission, it was determined that personnel of scrap metal collection facilities, customs officers and local officials, are aware of the necessity to notify the CoES and the NRSA in case of a suspected radiation emergency. The identification of a possible radiation emergency is done by categorizing material as suspicious. Indicators of a potential radiation emergency (like the radiation warning symbol) are not well known and radiation monitoring equipment is not available for the scrap metal dealers.

The Division of International Relations of NRSA is currently acting as the warning point responsible for submitting and receiving emergency information to and from the other Member States and the IAEA. The problem is that it operates only during working hours and is not in a position to promptly initiate a response or verification at all times.

For Tajikistan, the IEC has two contact points registered in the Unified System for Information Exchange in Incidents and Emergencies (USIE) [32].:

1. The Permanent Mission of Tajikistan to the International Atomic Energy Agency; and
2. The National Warning Point, National Competent Authority (Abroad and Domestic), Nuclear and Radiation Safety Agency of Academy of Sciences of Tajikistan.

CoES established the national RCMC in Dushanbe. It is currently under reorganization and relocation to CoES headquarters. The Centre, when properly established, will essentially increase the ability of CoES to provide an effective and coordinated response to a radiation emergency (activation and management).

The EPREV team was informed that NRSA cannot provide for 24/7 operation of the national warning point because of a lack of personnel. The team was also informed that CoES has problems with providing 24/7 communication with the IAEA in English.

Appropriate emergency response actions are to be promptly initiated by CoES upon receipt of a notification warranting an off-site response. The Department of Protection of the Public and Territory of the CoES (DPPT) has personnel who are experienced and trained to initiate the appropriate level of 24/7 coordinated emergency response on and off the site.

There seems to be a common understanding on how to initiate a response but it is not clear if all involved parties are aware of or agree to the initiating procedure that is applied on a case by case basis in the framework of operation of the emergency commissions at all levels of response. The emergency classification system does not clearly indicate the potential hazard and the required level of emergency response. Special regulation (instructions, protocols) on the interaction of the authorities and organizations in the event of finding uncontrolled sources or radioactive contamination has to be established in writing and be endorsed by all involved parties, and must be tested with drills and exercises.

NRSA has launched a national technical cooperation project with the IAEA for equipping Tajikistan’s border check points with stationary portal monitors and mobile radiation detectors. The EPREV team was informed that the Tajik customs officers are trained and aware of the potential problems associated with dangerous sources being illicitly removed or illicitly transported over the border.

The IAEA team was informed that there are serious gaps concerning on-site (operator), and local (e.g. CoES regional units) first responder awareness and identification of radiation symptoms, and other immediate actions.

Actions 6-11 of AP2012 state that CoES and NRSA should establish the basic capabilities and arrangements for identifying, notifying and activating in-line with international requirements in 2013–2017.

Recommendation 3.
Observation: There is no emergency classification system for facilities or practices in place in Tajikistan.
Basis for Recommendation: GS-R-2 paragraph 4.20 states that, “The emergency classification system for facilities or practices in threat category I, II, III or IV shall take into account all postulated nuclear and radiological emergencies. The criteria for classification shall be predefined emergency action levels (EALs) that relate to abnormal conditions for the facility...”
Recommendation: CoES should develop basic regulations on identifying, notifying and activating, with due consideration to establishing an emergency classification system and assigning, at each facility, a person with the authority to classify a radiation emergency and to initiate an appropriate on-site response.

Recommendation 4.
Observation: The national warning point in Tajikistan is not fully operational.
Basis for Recommendation: GS-R-2 paragraph 4.29 states that, “The State shall make known to the IAEA and to other States, directly or through the IAEA, its single warning point of contact responsible for receiving emergency notifications and information from other States and information from the IAEA. This warning point shall be continuously available to receive any notification, request for assistance or request for verification of information from the IAEA and to initiate promptly a response or verification.”
Recommendation 4: The Government of Tajikistan should consider transferring the function of being the single national warning point with the IAEA and other Member States to the currently existing 24/7 dispatch point of the CoES as suggested in Ref. [32]. CoES and NRSA should ensure that the staff of the main and backup contact points can communicate in English.

2.5. Taking Mitigatory Action

In this section, nuclear emergencies are not considered, as there are currently no nuclear facilities within Tajikistan’s territory.

There are, however, at least five facilities in Tajikistan that can be classified as category III facilities. The radioactive waste repository in the town of Fayzabad is in this category. In principle, the operators of category III facilities are responsible for taking mitigatory actions within the facility and they should have adequate procedures established that are checked during licensing and inspections as defined in Law 42 [9]. Article 23 of that law states that in the event of a radiation accident, a licensee should make arrangements to localize the source of the radioactive contamination, prevent releases of radioactive materials, and make arrangements to return the situation to a normal safe state. The EPREV team determined, however, that currently many operators have no capabilities to meet the requirements mentioned above.

The EPREV team understood that expertise and professional radiological assessment in the case of a radiation emergency can be provided by NRSA, the Republican Chemical and Radiometric Laboratory of CoES, and the Physics and Technical Institute of the Academy of Science of the Republic of Tajikistan. The country has other institutions (e.g. Tajik State University) with experts being trained in measuring radiation and contamination levels. But, in general, the manpower available for the provision of adequate experts and equipment is limited. Therefore, the ability to handle an emergency depends on the scale of the emergency.

The EPREV team was informed that CoES has four hazardous materials and items (HAZMAT) teams with 120 staff members who can provide field inspection and evaluation of contaminated areas in an emergency related to activities in category IV, e.g. contamination related to a dirty bomb event. They are located at four administrative regions of Tajikistan.

The EPREV team was informed that, in case of a large scale radiation emergency in category IV, the Commission for Emergency Situations under the aegis of the Government and chaired by the President of the Republic of Tajikistan will be in charge for initiation and termination of mitigatory and other response actions.

Actions 12–15 and action 20 of AP2012 state that CoES and NRSA should establish the basic capabilities and arrangements for taking mitigatory actions in-line with international requirements during the 2013–2017 timeframe.

Recommendation 5.
Observation: First responders and operators of hazardous facilities and practices in Tajikistan have limited capabilities and arrangements for implementing mitigatory actions.
Basis for Recommendation: GS-R-2 paragraph 4.37 states that, “The operator for a practice using a dangerous source ... shall make arrangements to respond promptly to an emergency involving the source in order to mitigate any consequences.”
Recommendation: The NRSA should ensure through effective licensing conditions and processes that operators of facilities in category III have capabilities and arrangements in place for the implementation of mitigatory actions.

2.6. Taking Urgent Protective Action

Tajikistan does not have facilities in category I or II. Therefore, off-site urgent protective actions for Tajik facilities have limited applicability. Nevertheless, the existing legislation in Law No. 6 [15], Law No. 42 [09], Law No. 53 [07] and National Safety Standards No. 6 (NRB-06) [12] addresses this issue and the USEPES structure (with the expected crisis management centre) has provisions for a larger scale emergency.

The EPREV team recognized that, while Tajikistan has a regulatory basis for conventional emergencies in Law No. 53 [7], the regulatory basis for the management of off-site urgent protective actions in case of a radiation emergency related to facilities in category III is not yet fully developed.

NRB-06 establishes national intervention levels for taking urgent protective actions, which are generally consistent with the international standards given in Schedule V of Ref. [20]. They are developed for use in the concept of implementation of single protective measures where criteria are formulated in terms of avertable dose. The current General Safety Guide GSG-2 [5] and the new international Basic Safety Standards [21], introduce the new protection strategy concept for off-site response to a radiation emergency where the generic criteria are formulated in terms of the projected dose, has not yet been implemented.

The on-site emergency management issues (paragraph 4.51 of Ref [2]) are part of the operating procedures (safety requirements and emergency handling), which are some of the pre-requisites of issuing a license in-line with regulations in Refs [22, 23, 24, 14].

Actions 10, 16, 17 and action 18 of AP2012 state that CoES and NRSA should establish the basic capabilities and arrangements for taking urgent protective actions in-line with international requirements during the 2013–2017 timeframe.

Recommendation 6.

Observation: Capabilities and arrangements for taking urgent protective actions in Tajikistan are not fully in-line with the international requirements in GS-R-2.

Basis for Recommendation: GS-R-2 paragraph 4.45 states that, “Optimized [national] intervention levels [for taking urgent protective actions] shall be [established that are in accordance with international standards], modified to take account of local and national conditions.”

GS-R-2 paragraph 4.46 states that, “National guidelines in accordance with international standards shall be adopted for the termination of urgent protective actions.”

Recommendation: The CoES and NRSA should ensure that the concept of protection strategy for off-site response to a radiation emergency is in place and is based on the generic criteria formulated in terms of projected dose.

2.7. Providing Information and Issuing Instructions and Warnings to the Public

As Tajikistan does not have facilities in category I or II, arrangements to provide information and to issue instructions and warnings to the public in the vicinity of these facilities are not applicable. Nevertheless, action 19 of AP2012 states that CoES and NRSA should establish capabilities and arrangements to provide prompt warning and instruction to the public.

2.8. Protecting Emergency Workers

The existing legislation (para.3.2 of NRB-06 [12], Article 25 of Law 42 [9]) establishes that:

- No worker undertaking an intervention should be exposed in excess of the maximum single annual dose limit for occupational exposure (50 mSv) except for the purpose of life saving and/or preventing people from overexposure;
- Activities resulting in doses below 100 mSv should be authorized by NRSA and regional bodies;
- Activities resulting in the receipt of doses up to 200 mSv should be authorized by NRSA and the SES;
- Workers who undertake actions in which the dose may exceed the maximum single annual dose limit should be male-volunteers over 30 years old, who have consented to doing the job in writing, after being informed of the possible exposure doses and associated health risks;
- Workers who have received 100 mSv during a year should not be further exposed occupationally to doses over 20 mSv per year;
- Workers who have received 200 mSv during a year can be permitted to work with sources of ionizing radiation at their request only, and after the positive conclusion of a qualified medical commission;
- All workers in emergency response actions should be subject to the full system of requirements established for occupationally exposed workers (radiation workers).

Paragraph 7.7 of NRB-06 defines that control over the protection of emergency workers in the event of an emergency situation is under the responsibility of the administration of an operator.

The provisions in Decree No. 482 [10] state that NRSA is responsible for providing recommendations on measures to reduce or avert the doses received by emergency workers.

Arrangements are in place for handling emergencies involving sealed sources, in particular orphan sources. The CoES has HAZMAT teams in each of the four administrative regions of Tajikistan. Total staffing of those teams is about 120 people.

NRSA has capacities and qualified personnel to assess and record the external doses received by emergency workers as well as by other personnel who may be involved in response actions. The Occupational Exposure Control Services Section of the NRSA (OECSS) has been providing individual monitoring services for the CoES team as well as for radiation workers at the facilities since March of 2004 [25].

OECSS activity is based on regulations on state control in the field of ensuring radiation safety [4], Law No. 69 on radiation safety [26] and occupational exposure control in compliance with NRB-06 [12]. Occupational exposure service is carried out on a contractual basis with relevant organizations and persons for whom a NRSA license is issued. Thermoluminescent detectors (TLDs) are used for occupational exposure control. Measurements are carried out by a modern American thermoluminescent analyser ‘Harshaw TLD System 4500’ with specialized software for automatic occupational exposure measurement, and the doses are archived.

The basic tasks of OECSS are external individual monitoring and workplace monitoring as well as database management; internal exposure monitoring is planned to take place in the future. A system for internal dosimetry does not exist.

Action 20 of AP2012 requires that CoES and NRSA establish the basic capabilities and arrangements for protecting emergency workers and first responders in-line with international requirements in 2013–2017.

Suggestion 1.
Observation: The capabilities are not in place for controlling and assessing the doses that may be received by emergency workers due to an intake of radionuclides.
Basis for Suggestion: GS-R-2 paragraph 4.60 states that, “National guidance that is in accordance with international standards shall be adopted for managing, controlling and recording the doses received by emergency workers.”
Suggestion: NRSA should consider establishing (in-line with its corresponding obligation within AP2012) capabilities to control and assess the doses that may be received by emergency workers due to an intake of radionuclides.

Recommendation 7.
Observation: The regulatory basis for the protection of emergency workers in Tajikistan is not in-line with international requirements.
Basis for Recommendation: GS-R-2 paragraph 4.62 states that, “Arrangements shall be made for taking all practicable measures to provide protection for emergency workers for the range of anticipated hazardous conditions (see para. 4.61) in which they may have to perform response functions on or off the site.”
Recommendation: The Government of Tajikistan should implement the international requirements into the national practice for protection of emergency workers in-line with international guidelines in Refs [2, 5, 21].

2.9. Assessing the Initial Phase

The operator of a facility is required to do the first inspection of the emergency site, to gather the observables and initial data that characterize the emergency and to provide this information to the DPPT of the CoES, in accordance with the arrangements mentioned in 2.4.

The concept and numerical values from Refs [5,18] have not been established with regard to operational intervention levels (OILs) for radiation emergencies as required in GS-R-2 [2].

The existing regulation in paragraph 6.5 of NRB-06 [12] defines that the OILs for any particular radiation facility have to be established by NRSA in cooperation with SES. Involving regulatory body specialists in the adoption of OILs may facilitate the development and establishment of appropriate OILs, in particular for drafting the NREP.

There is an overlap of responsibilities for establishing OILs in the existing legislation. Article 23, Law 42 [13] lays this responsibility on the licensee³ whereas paragraph 6.5 NRB-06 [12] clearly puts it on NRSA and SES. Ultimately, it is the responsibility of the regulatory body (NRSA) to take steps to define appropriate OILs in emergency plans in keeping with intervention levels for the emergency scenarios addressed in the draft NREP.

Action 12 and Article 21 of AP2012 state that CoES and NRSA should establish basic capabilities and arrangements for assessing the initial phase in-line with international requirements in 2013–2017.

³ A licensee should, “establish criteria for taking operational decisions in the event of radiation accident”.

Recommendation 8.
<p>Observation: The basic capabilities and arrangements for assessing the initial phase are not in-line with international requirements.</p>
<p>Basis for Recommendation:</p> <p>GS-R-2 paragraph 4.69 states that, “Operators of practices or sources in hazard category IV shall make arrangements to characterize the extent and significance of any abnormal exposures or contamination; to initiate immediate mitigatory and protective actions on the site; to identify the members of the public who are potentially exposed; and to communicate the extent of the hazard and the recommended protective actions to the appropriate off-site response organizations.”</p> <p>GS-R-2 paragraph 4.70 states that “The operators of facilities in threat category I, II or III shall make arrangements to assess promptly: abnormal conditions at the facility; exposures and releases of radioactive material; radiological conditions on and off the site; and any actual or potential exposures of the public.”</p>
<p>Recommendation: The Government of Tajikistan should implement the concepts of Operational Action Levels (OALs) and Operational Intervention Levels (OILs).</p>

2.10. Managing the Medical Response

There are no arrangements at the national level for medical practitioners to notify an appropriate body following the presentation of radiation exposure symptoms or other effects indicative of a possible radiological emergency. In addition, there is no systematic or sustained training programme at the national level for medical personnel, for either general practitioners or emergency staff to be made aware of the medical symptoms and initial treatment of radiation injuries.

Action 22 of AP2012 [4] states that NRSA, CoES and the Ministry of Health should make arrangements for medical personnel to be trained and to gain knowledge to be able to adequately implement their responsibilities for responding to radiological incidents or emergencies. This includes the creation of an Educational and Training Centre, the development of the training programmes and training of medical personnel in-line with the international requirements.

International guidelines on medical response in case of a radiation emergency [37] are not in place in Tajikistan. Implementation of Actions 22 and 23 of AP2012 will contribute to filling this gap in the EPR system of Tajikistan.

Recommendation 9.

Observation: No detailed procedure has been established for medical practitioners to make prompt notification of a radiological emergency, and there are no arrangements in place for medical personnel to be made aware of the medical symptoms of radiation exposure and of the appropriate notification procedures and other immediate actions warranted if a radiation emergency is suspected.

Basis for Recommendation:

GS-R-2 paragraph 4.74 states that, “On the presentation of medical symptoms of radiation exposure or other effects indicative of a possible radiological emergency, the medical practitioner or other responsible party who recognizes the indications shall notify the appropriate notification point and shall take response actions as appropriate.”[2]

GS-R-2 paragraph 4.77 states that, “Arrangements shall be made for medical personnel, both general practitioners and emergency staff, to be made aware of the medical symptoms of radiation exposure and of the appropriate notification procedures and other immediate actions warranted if a radiation emergency is suspected.” [2]

Recommendation: CoES, in cooperation with the Ministry of Health, should establish a detailed procedure for medical practitioners about reporting to CoES suspected cases of radiation exposure or other effects indicative of a possible radiological emergency. A re-training programme should also be launched for medical personnel, both general practitioners and emergency staff, to teach them how to recognize the medical symptoms of radiation exposure, to use the appropriate notification procedures, and to implement immediate actions warranted if a radiation emergency is suspected.

Decree No. 192 of the Government of Tajikistan related to establishing non-military civil defence troupes in organizations of Tajikistan [27] mandates the Ministry of Health to develop a national service for sanitary treatment of victims of mass casualty and to create special medical teams with supplies for providing medical care in case of mass casualty events (disasters). In reality, no special services or procedures for medical response to radiological emergencies have been so far established.

Action 23 of AP2012 [4] states that the Ministry of Health should assure national capabilities for initial treatment and, if needed, long-term treatment of people who, as a result of a radiation emergency, have been exposed or contaminated. This includes the selection of approved institutions to be used for diagnosis, initial and medical treatment of radiation injuries, creating guidelines for treatment, and also making arrangements for consultation with international experts on treatment following any exposure that could result in severe tissue damage.

Recommendation 10.

Observation: There are no arrangements at the national level to treat radiation injuries or contaminated persons.

Basis for Recommendation: GS-R-2 paragraph 4.80 states that, “Arrangements shall be made at the national level to treat people who have been exposed or contaminated. These shall include: guidelines for treatment; the designation of medical practitioners trained in the early diagnosis and treatment of radiation injuries; and the selection of approved institutions to be used for the extended medical treatment or follow-up of persons subjected to radiation exposure or contamination. This shall also include arrangements for consultation on treatment following any exposure that could result in severe tissue damage or other severe deterministic health effects with medical practitioners experienced in dealing with such injuries.”

Recommendation: The Government should ensure that sufficient capability to treat people with radiation injuries is in place and that in case of severe radiation injuries, a request for assistance can be promptly channelled to the IAEA in-line with the Assistance Convention. Practical guidelines for medical emergency preparedness and response, describing the tasks and actions of different members of an emergency medical response organization is given in Ref [37].

2.11. Keeping the Public Informed

Article 4 of Law No. 53 [7] defines that state authorities and the administration of relevant organizations should provide the public with timely and truthful information of potential or existing emergency situations, via mass media and other channels, and arrangements should be made by State authorities. According to Law No. 53, the procedure for circulating this information should be established by the Government.

CoES has a 24/7 press centre, which is designated as the only point for public and mass media information regarding any emergency situation occurring in the territory of Tajikistan. The CoES press centre organizes press conferences for the mass media on a regular basis to keep the public informed about the situation in the country. This information is coordinated with the regional CoES divisions but not with NRSA and other organizations.

Tajikistan is a party to the Interregional Agreement on Exchange of Information on Natural and Man-Made Emergencies and Informational Cooperation in Liquidation of the Aftermath and Delivery of Assistance to the Affected Population (September 18, 2003, Yalta) [28]. The arrangements for keeping the public informed in case of a conventional emergency are well-established by CoES [29], but specific arrangements for keeping the public informed in case of a radiation emergency are not yet in place in Tajikistan.

Action 24 of AP2012 states that CoES and NRSA should establish the basic capabilities and arrangements for keeping the public informed in case of a radiation emergency in-line with international requirements during the 2013–2017 timeframe.

Recommendation 11.

Observation: Capabilities and arrangements for keeping the public informed in case of a radiation emergency in Tajikistan are not fully in-line with the international requirements.

Basis for Recommendation: GS-R-2 paragraph 4.83 states that, “Arrangements shall be made for: providing useful, timely, truthful, consistent and appropriate information to the public in the event of a nuclear or radiological emergency; responding to incorrect information and rumours; and responding to requests for information from the public and from the news and information media.”

Recommendation: CoES and NRSA should take steps for harmonizing and coordinating their briefings, press releases, interview texts, etc., before providing information to the public and media in the event of a radiation incident or emergency. This capacity for informing the public should be tested in regular exercises, in-line with the recommendations in Refs [30, 18].

2.12. Taking Agriculture Countermeasures, Countermeasures against Ingestion and Longer Term Protective Actions

NRB-06 [12] defines activity concentrations (generic action levels) above which foodstuffs and drinking water must be restricted for general consumption for a period of one year after an emergency. These are in-line with the existing international requirements in GS-R-2 [2]. The new international criteria that are introduced in the IAEA General Safety Guide No. GSG-2 [5], have not yet been implemented.

According to the scale of the hazard, a part of Tajikistan’s territory may be considered as an area with activities in category V. The responsibilities for decision-making are not defined by legislation and no mechanism for initiating/taking appropriate actions is in place regarding agricultural countermeasures and food consumption in the event of a need for corresponding activities (agricultural and food restrictions to be warranted following a radioactive release).

Action 25 and action 26 of AP2012 [4] require that CoES and the Ministry of Agriculture, in cooperation with NRSA make arrangements for taking effective agricultural countermeasures, including restriction of the consumption of locally produced food and agricultural produce. The arrangements are to include the adoption of advanced action levels for field measurements and food concentration and development/approval/implementation of a special Action Plan. The arrangements should be based on assessments of potential radioactive contamination and national agricultural and livestock practices in Tajikistan. These should cover allocation of the responsibilities for restricting consumption, production, distribution and sale of food and agricultural produce, food processing, water supplies, fisheries, livestock and gardening as appropriate.

Recommendation 12.

Observation:1 There are no national provisions (e.g. legislation and mechanisms for initiating/taking appropriate actions) and clear criteria (OILs, e.g. dose rates due to deposition and radionuclide concentration in food) for agricultural countermeasures and putting restrictions on consumption, distribution and sale of local agricultural produce following a release of radioactive material in-line with international requirements.

Basis for Recommendation:

GS-R-2 paragraph 4.85 states that, “Agricultural countermeasures and longer term protective actions in accordance with international standards shall be taken to avert doses.”

GS-R-2 paragraph 4.89 states that, “For areas with activities in threat category V arrangements shall...include: default OILs for environmental measurements (such as dose rates due to deposition and deposition densities) and food concentrations....”

Recommendation: The Government of Tajikistan should develop a strategy and a plan for the implementation of agricultural countermeasures in-line with international requirements to protect the food production and supply following radioactive contamination. This should include the establishment of OILs for environmental measurements (such as dose rates due to deposition) and food concentrations in accordance with the recommendations of the latest international guidelines. The OILs should be put into emergency plans for food restrictions or agricultural countermeasures. Procedures and arrangements for monitoring ground contamination, sampling and analysis of food and water samples should also be established.

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

NRSA and the CoES media centre are responsible for explaining health risks and the measures that can reduce risks from radiation exposure. NRSA seems to be a key organization for making recommendations on counteracting false information, rumours and unfounded allegations that cause panic or unsubstantiated fear. However, no specialized arrangements (plans, procedures, templates, leaflets, instructions, etc.) exist.

Information relevant to the experts may be irrelevant, or mean something different, to the public. This is especially true in the field of radiation hazards where misunderstandings and wrong concepts are common. For this reason NRSA, in cooperation with CoES, should develop, in advance, plain language information and instructions for the public for a wide range of possible emergency scenarios. The draft NREP should specify how NRSA recommendations and instructions are to be used.

Action 27 of AP2012 states that CoES and NRSA should establish the basic capabilities and arrangements for mitigating the non-radiological consequences of the emergency and the response in-line with international requirements during the 2013–2017 timeframe.

Suggestion 2.
Observation: Arrangements and capabilities are not implemented in Tajikistan for mitigating the non-radiological consequences of the response in-line with international requirements.
Basis for Suggestion: GS-R-2 paragraph 4.94 states that, “The non-radiological consequences of the response shall be considered in order to ensure that the response actions do more good than harm.”
Suggestion: The NRSA, in cooperation with CoES, should consider developing plain language information and instructions for the public for a wide range of possible emergency scenarios well in advance as recommended in Refs [18, 30].

2.14. Conducting Recovery Operations

The EPREV team was not informed of any regulation in Tajikistan that contains provisions for transition and recovery operations, which should be planned in the emergency response plans at all levels.

The EPREV team did not find a concept in place in Tajikistan that addresses the requirements regarding the implementation of recovery operations and transition from an emergency situation to an existing exposure situation. Nevertheless, capabilities for conducting such operations exist. For instance, there are HAZMAT teams in CoES that are responsible for recovery if radioactive material is found in Tajikistan. The NRSA and the Institute of Technical Physics have experienced teams, which could be used for handling orphan sources.

Recommendation 13.
Observation: Tajikistan does not have arrangements in place for transition from emergency exposure situation to existing exposure situation.
Basis for Recommendation: GS-G-2 paragraph 4.99 states that, “Arrangements shall be established for the transition from emergency phase operations to routine long term recovery operations. This process shall include: the definition of the roles and functions of organizations; methods of transferring information; methods of assessing radiological and non-radiological consequences; and methods of modifying the actions taken to mitigate the radiological and non-radiological consequences of the nuclear or radiological emergency.”
Recommendation: The Government of Tajikistan should ensure that a practical concept for the management of post-emergency recovery operations, and transition from an emergency situation to an existing exposure situation, is in place and meets the international requirements in GS-R-2.

2.15. Authority

The existing legislation in Article 11 of Ref. [7], Article 17 [8], Decree No. 770 [4] empowers the CoES to act as a national coordinating authority and perform the following functions:

- Ensure and exercise control over preparedness of state bodies and organizations to respond to potential emergency situations;

- Perform management of the forces and means involved in the mitigation of consequences of emergency situations; engineer and coordinate the recovery and other actions required in the event of emergency situations;
- Organize training for management authorities, civil defence divisions and the public on how to act in the event of emergency situations; etc.

The CoES is the executive body of the USEPES. It unites governmental bodies, local executive and administrative bodies, enterprises and institutions authorized to take preventative and mitigatory measures in the event of any natural or man-made emergency or accident, including radiation emergencies. Although it is not clearly stated, it is understood that roles, functions, authorities and responsibilities of all the operating, local and national organizations that act within the framework of the USEPES will be documented as part of the appropriate national and local radiation emergency response plans. According to Action 28 of AP2012, the National Radiation Emergency Plan and model plans for all levels of emergency planning should be prepared and approved by 2014.

The NRSA was established in 2003 and according to Article 6 of Ref. [9], it is the only regulatory body for all matters regarding the safety and security of radiation sources.

The NRSA takes a proactive role in establishing the adequate emergency response system through the regulatory process. The legislation defines that NRSA has responsibilities for control over and coordination of arrangements for ensuring radiation safety in the event of a radiation emergency [10]. It is also responsible for the approval of norms and rules for radiation safety and emergency planning in Article 6 of Ref. [09].

The functions and responsibilities of users (licensees) for ensuring the protection of workers and the public in the event of radiation emergencies are clearly defined in paragraph 7.7 of Ref. [12], in Article 5 of the Requirements for Ensuring Radiation Safety [13] and by Article 23 of [9].

According to Ref. [14], a plan for responding to a potential radiation emergency or accident is the prerequisite for issuing an authorization (license) for any practice or source that could give rise to a radiation accident or emergency.

The authorization and inspection system is in place, and NRSA is working towards establishing the adequate licensing and inspection programme. In addition to NRSA, existing legislation [7, 15, 13, 12] oblige CoES to carry out authorization, inspection and enforcement, to ensure that emergency preparedness and response arrangements are in compliance with the legislation.

There are, however, certain deficiencies regarding the clear definition of roles, functions, authorities and responsibilities of operating, local and national organizations. This was discussed in 2.1 (see also Recommendation 1).

2.16. Organization

The organizations for responding to radiation emergencies are integrated into the USEPES, which is organized and operated according to Law No. 53 related to the protection of the public and territories [7].

The USEPES integrates all republican state bodies and manages the prevention and mitigation of emergency situations, as well as emergency support organizations and local executive and administrative bodies, taking part in planning, organization and implementation of actions protecting the population and territories against emergency situations.

Roles, functions, authorities and responsibilities of all operating parts, ministries and national organizations acting within the framework of the USEPES have not been documented. In case of an emergency, the responsibilities and functions are defined by the Emergency Commissions established on a case by case basis. The availability of qualified personnel in the event of radiation emergency will depend on the specific emergency and may be limited.

Action 28 of AP2012 [4] states that CoES and NRSA should develop NREP. To be in-line with international requirements this plan will establish the necessary interfaces for the response and will include formal procedures for providing off-site support to the site (fire service, medical, transport) if needed.

Recommendation 14.
<p>Observation: The overall organization of the emergency preparedness and response is not clearly specified in the legislation and the responsible positions within each operating and response organizations are not defined.</p>
<p>Basis for Recommendation:</p> <p>GS-R-2 paragraph 5.6 states that, “The operational relationships and interfaces between all the major response organisations shall be established.”</p> <p>Basis for Recommendation:GS-R-2 paragraph 5.7 states that, “The positions responsible within each operating and response organization for the performance of the response functions...shall be assigned in emergency plans.”</p>
<p>Recommendation: The Government of Tajikistan should ensure that the operational relationships and interfaces between all the major response organizations are established and the key responsible positions within these organizations are assigned in the emergency plans.</p>

2.17. Coordination of emergency response

Every level of the USEPES has coordinating organs - territorial and branch Commissions for Emergency Situations (CES). They exist at the regional, municipal, local and facility levels. These are the bodies that make decisions and coordinate actions in case of an emergency.

The Commissions are authorized to employ all necessary transport, rescue, fire-fighting, medical, technical and other forces and also to use material reserves and all communication systems existing in the territories under their jurisdiction. In the event of an emergency, forces and means of regional, local and enterprise level subsystems are subordinated to the governmental bodies of the respective territorial subsystems.

The system works on a case by case basis to coordinate emergency response in the event of conventional emergencies and is also to be applied to radiation emergencies. However, the

arrangements for the coordination of emergency response for radiation emergencies have not been documented and the operational interfaces between operators and local and other level authorities for this type of emergency are not in place. For example, local authorities may not be aware of the dangerous sources that are under their jurisdiction.

There are two bilateral agreements with neighbouring countries on assistance in responding to a conventional emergency, but no arrangements for coordinating a response to a radiation incident or emergency (e.g. a source detected at a border crossing) are included.

For further analysis of the current status and deficiencies of emergency response management and coordination please refer also to Chapter 2.1 (Basic responsibilities).

2.18. Plans and procedures

The EPREV team was informed that a National Conventional Emergency Response Plan for contingency cases has not been prepared and approved. The NREP does not exist. According to Action 28 of AP2012 the NREP and the model plan shall be prepared and approved by 2014.

At the level of regions, cities and districts, plans for preparedness and response to a radiation emergency are not yet developed. According to the Decree No. 770 the following plans will be prepared and approved:

- A plan for emergency preparedness and response to a radiation emergency at the state level;
- Emergency preparedness plans and response to radiation emergencies territorial subsystems at the regional level;
- Emergency preparedness plans and response to radiation emergencies functional subsystems at the territorial level;
- Emergency preparedness plans and response to radiation emergencies territorial subsystems systems at the local level;
- Emergency response plans for facilities involved in practical activities related to radiation or radiation- nuclear technologies.

The RCMC will be created and strengthened within a specified number of units of the CoES.

The draft of the Concept of Actions, on the detection and initial response in the case of illicit trafficking of radioactive materials across the border of Tajikistan [31] has been prepared. To improve the collaboration between the state institutions, NRSA prepared the drafts of the memorandum of understanding between the Nuclear and Radiation Safety Agency and the Ministry of Health, and the memorandum of understanding between NRSA and the Customs Service.

The existing legislation provides a good foundation for further developing the national infrastructure for preparedness and response to radiation emergencies in order to achieve consistency with the international requirements [2] and requirements in Ref. [6]. The legislation clearly requires that an operator should develop an emergency plan for protecting personnel and the public in the event of a radiation emergency as a prerequisite for getting an

authorization (license) for any facility or source which could experience a radiation accident or emergency [14]. The local authorities and the relevant State authorities as defined in Article 23 of Ref. [9] need to agree on the plan.

According to the functions assigned to the USEPES branches:

- Coordination of on-site response actions is the responsibility of the commission for emergencies of the appropriate enterprise or organization;
- Coordination of local off-site response actions (radiation and conventional) is the responsibility of the commissions for emergencies under the regional and local executive bodies; and
- Coordination of national response actions is the responsibility of the CoES and the Commissions for emergencies under of the national state governing bodies.

The regulation requires having a contingency plan to restrict exposure and ensure the safety of people who may be affected by an emergency. The implementation of this requirement is controlled by NRSA. There are no explicit requirements for operating and response organizations to develop procedures needed to perform their response functions for radiation emergencies.

Action 28 of the AP2012 states that NREP and recommendations on default content of plans for local authorities, response organizations and operators should be developed by the end of 2014.

Action 29 of the AP2012 specifies that procedures for performing emergency response for first responders, operators in category III and response actions on the national level shall have been developed by the end of 2014.

Suggestion 3.

Observation: The drafting has started for national emergency plans to respond to a radiation emergency at national, regional or local level but it is not yet completed.

Basis for Suggestion: GS-R-2 paragraph 5.13 states that, “Plans or other arrangements shall be made for coordinating the national response to the range of potential nuclear and radiological emergencies. These arrangements for a coordinated national response shall specify the organization responsible for the development and maintenance of the arrangements; shall describe the responsibilities of the operators and other response organizations; and shall describe the co-ordination effected between these arrangements and the arrangements for response to a conventional emergency. The arrangements should include provisions that can be used to formulate in detail a response to situations such as: a serious exposure or contamination resulting from contact with a source by a member of the public; the notification of a potential trans boundary release of radioactive material; the discovery of a shipment containing a dangerous source that is not under control; the notification of the potential re-entry of a satellite; public concern or rumours about a hazard; and other unanticipated situations warranting a response.” [2]

Suggestion: The Government should ensure that radiation emergency plans at the national, regional and local levels are finalized and include arrangements for preparedness and response to radiation emergency at all levels, in accordance with Action 28 of the AP2012.

Recommendation 15.

Observation: There is no requirement in place in Tajikistan on the content of on-site emergency plans for the operator of facilities in all hazard categories. There are no explicit requirements for operating and response organizations to develop procedures needed to perform their response functions for radiation emergencies.

Basis for Recommendation 15:

GS-R-2, paragraph. 5.17 states that, “The appropriate responsible authorities shall ensure that:(a) emergency plans [are] prepared and approved for any practice or source which could give rise to a need for emergency intervention....”

GS-R-2 paragraph 5.19 states that, “The operating organization [of a facility or practice in threat category I, II, III or IV] shall prepare an emergency plan that covers all activities under its responsibility, to be adhered to in the event of an emergency. This emergency plan shall be co-ordinated with those of all other bodies having responsibilities in an emergency, including public authorities, and shall be submitted to the regulatory body.”

GS-R-2 Paragraph 5.22 states that “ Procedures, analytical tools and computer programs to be used in performing functions to meet the requirements for emergency response shall be tested under 5.17 states that, “The appropriate responsible authorities shall ensure that:(a) emergency plans [are] prepared and approved for any practice or source which could give rise to a need for emergency intervention....”

GS-R-2, paragraph 5.21 states that, “The operating and response organizations shall develop the necessary procedures, analytical tools and computer programs in order to be able to perform the functions specified to meet the requirements for emergency response established in Section 4.”

Recommendation: The NRSA and CoES should establish regulatory requirements for the contents of emergency plans for facilities and practices in all hazard categories. They should also establish regulatory requirements for the procedures for all facilities and activities involving radioactive sources that could necessitate an emergency intervention.

2.19. Logistical support and facilities

Suitable equipment, instrumentation and tools exist in Tajikistan and are sufficient to cope with the anticipated spectrum of radiation emergencies (categories III and IV), although additional arrangements are needed for establishing interim emergency response capability. Operating and local response organizations do not have adequate logistical support to perform response functions for radiation emergencies.

There are no arrangements to provide first responders (police, ambulance, fire brigades, etc.) with dosimetric devices, as well as with manuals or instructions on how to perform their functions in case of the presence of ionizing radiation on the scene.

The CoES operates the RCMC that now is under reconstruction. The committee has good technical capabilities and staff trained to respond to emergencies involving radioactive sources.

The CoES has the Republican Chemical and Radiometric Laboratory of the CoES (RCRL), designed for testing dosimetric equipment and protection means. In 2013, the laboratory was accredited by the Agency on Standardization and Metrology of Tajikistan.

NRSA has good initial capabilities for performing its functions to ensure radiation safety in the event of a radiation emergency and to advise the relevant bodies on measures for reducing or preventing the overexposure of emergency workers. There is an equipped Secondary Standards Dosimetry Laboratory, established in cooperation with the IAEA, to be launched in the near future, after delivery of a radioactive calibration source. The Occupation Exposure Control Services Section of NRSA provides individual monitoring for the the CoES team as well as for emergency workers at the facilities. Internal contamination monitoring is not covered.

The Radioactive Waste Repository facility near the town of Fayzabad has space available in case radioactive waste is generated during an emergency response.

Action 30 and Action 31 of AP2012 [4] obliges the response organizations to provide the response teams with adequate logistical support and include the corresponding arrangements in their Action Plans.

Within the framework of the IAEA technical cooperation project TAD5004, a central laboratory for the analysis of contaminants in food and agricultural products has been created at the Sanitary Epidemiological Service of the Ministry of Health in Dushanbe, and four satellite laboratories were set up at the border with neighbouring countries. Staff in the laboratories are to be trained in Belarus and Lithuania in the near future.

Tajikistan has some capabilities for environmental measurements, available in NRSA (Public Exposure Control Services Section), CoES (RCRL), the veterinary services of the Ministry of Agriculture, Physics, the Technical Institute of the Academy of Science, Hydrometer Centre and others. Their current operational capabilities are not clearly known and must be explored.

CoES makes provisions to study up on the existing monitoring capacities and remediate the former Soviet Network of Supervision and Laboratory Control (NSLC). In accordance with Action 32 of the AP2012 [4] CoES, the Ministry of Health, Ministry of Agriculture and state hydrometeorology organizations are obliged to update the regulation in the NSLC statute and to ensure the training of the NSLC personnel using the training/technical base of RCRL. The RCRL staff has developed appropriate training programmes at three levels.

Recommendation 16.

Observation: Operating and local response organizations do not have adequate logistical support and resources to perform all response functions for a radiation emergency.

Basis for Recommendation: GS-R-2 paragraph 5.25 states that, “Adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation (such as procedures, checklists, telephone numbers and manuals) shall be provided for performing the functions specified in Section 4.”

Recommendation: The Government of Tajikistan should ensure that operators and response organizations have adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation for response to a radiation emergency.

2.20. Training, drills and exercises

DPPT conducted training and drills for USEPES responders, which were partially carried out for countering radiation hazards in accident or emergency conditions.

Since 2002, the staff of NRSA and CoES and other organizations have been participating in training events through different IAEA and other international organizations' training courses, fellowships and workshops in the field of radiation safety and security.

Staffing and training in radiological emergency preparedness and response at different organizations is of varying standards (e.g. relatively good at CoES and NRSA level, lacking at first responders and operator level).

The specified training of emergency staff of operators and first responders did not take place. Capabilities and programmes for such training were not available. The issue should improve in the near future thanks to the establishment of the National Educational and Training Centre on Radiation Protection, under the auspices of NRSA. The Centre was built in cooperation with the IAEA under the technical cooperation project TAD0003. It will have capabilities to provide training in radiation protection to a variety of radiation professionals including emergency workers and first responders to radiation emergencies.

No special training programmes have been developed by CoES and NRSA and the Ministry of Health, nor do they hold special exercises and training at the facilities in the event of a radiation emergency. It is planned that first responders, specifically groups of ambulance, fire services and police, units that are supposed to be involved in responding to radiation emergencies, will be trained on the technical and educational basis of the Chemical and Radiometric Republican Laboratory of the CoES. The Ministry of Health will establish training centres and will improve the training system for the specialists in the field of radiology, medical radiation hygiene and response. On the basis of the Academy of Sciences and the laboratory of the CoES, the training programmes in the field of emergency preparedness and radiation safety will be developed and approved and this training will be organized.

No training of medical emergency personnel in radiation protection was conducted and neither programmes nor arrangements for the training have been created. Action 22 of

AP2012 [4] obliges the Ministry of Health to create an education and training centre on radiation safety and to conduct training of medical response personnel in-line with international requirements.

CoES and NRSA, with the support from international organizations and the IAEA according to the bilateral agreements with the USA, European Union, Turkish Atomic Energy Commission, regularly conduct drills and exercises for personnel involved in the USEPES. These drills and exercises use accident scenarios with radioactive sources (category IV) but most of the time these are not planned in advance.

Actions 32 and action 33 of AP2012 [4] obliges CoES to include in the Action Plan of the Committee the arrangements for conducting exercises and drills to ensure that all specified functions required for emergency response are tested at suitable intervals.

Recommendation 17.
<p>Observation: Training of emergency workers is not in compliance with international requirements.</p>
<p>Basis for Recommendation:</p> <p>GS-R-2 paragraph 5.31 states that, “The response organizations shall identify the knowledge, skills and abilities necessary to be able to perform the functions specified in Section 4. ...response organizations shall make arrangements for the selection of personnel and for training to ensure that the personnel have the requisite knowledge, skills, abilities, equipment, and procedures and other arrangements to perform their assigned response functions. The arrangements shall include ongoing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities for emergency response undergo the specified training.”</p> <p>GS-R-2 paragraph 5.33 states that, “Exercise programmes shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for facilities in threat category I, II or III and national level programmes for threat category IV or V are tested at suitable intervals. These programmes shall include the participation in some exercises of as many as possible of the organizations....”</p>
<p>Recommendation: The CoES and NRSA should establish and implement a training programme (including syllabus, training, drills and exercises), for all organizations involved in the response to radiation emergencies in-line with international requirements.</p>

2.21. Quality assurance programme

A formal, documented quality assurance programme in the area of radiological EPR in the country does not exist, but there are many different components for it. There are requirements for the operators to update emergency plans and procedures (instructions), and to incorporate lessons learned from operating experience and emergency drills and exercises, but the

mechanism is unclear. There are calibration capabilities for the equipment but the possibility to repair and maintain them does not exist and Action 34 of AP2012 is not fully implemented.

Recommendation 18.
<p>Observation: Only a limited number of response organizations have a quality assurance programme in place.</p>
<p>Basis for Recommendation:</p> <p>GS-R-2 paragraph 5.37 states that, “The operator of a facility, practice or source in threat category I, II, III or IV and the off-site response organizations shall establish a quality assurance programme, in accordance with international standards, to ensure a high degree of availability and reliability of all the supplies, equipment, communication systems and facilities necessary to perform the functions... This programme shall include arrangements for inventories, resupply, tests and calibrations, made to ensure that these items and facilities are continuously available and functional for use in an emergency. Arrangements shall be made to maintain, review and update emergency plans, procedures and other arrangements and to incorporate lessons learned from research, operating experience (such as the response to emergencies) and emergency drills and exercises.”</p> <p>GS-R-2 paragraph 5.39 states that, “ The operator of a facility, practice or source in threat category I, II, III or IV and the off-site response organizations shall make arrangements to review and evaluate responses in emergencies and in drills and exercises, to record the areas in which improvements are necessary and to ensure that the necessary improvements are made.”[2]</p>
<p>Recommendation: NRSA and CoES should ensure that all operators and emergency response organizations will have a QA programme in place for their emergency preparedness and response functions. NRSA and CoES should make sure that emergency capabilities of the operators and emergency response organizations will be periodically inspected.</p>

Suggestion 4.

Observation: The arrangements are not in place to review and evaluate the capability for emergency response actions of operators and off-site response organizations through drills and exercises.

Basis for Suggestion 4:

GS-R-2 paragraph 5.39 states that, “The operator of a facility, practice or source in threat category I, II, III or IV and the off-site response organizations shall make arrangements to review and evaluate responses in emergencies and in drills and exercises, to record the areas in which improvements...”

Suggestion: NRSA and CoES should consider taking measures that operators and emergency response organizations will conduct drills and exercises to review and evaluate their emergency response capabilities. The practical guidance on organization and conduct of an efficient exercise is given in the IAEA manual, mentioned above. [38]

Appendix I: Mission Team Composition

Name	Position and Organization	Address
Mr. Vladimir KUTKOV	Head of laboratory, National Research Centre Kurchatov Institute, Russian Federation	Kurchatov sq, 1, RU 123182, Moscow Russian Federation Email: Kutkov@front.ru
Ms. Larisa ROZDYALOUSKAYA	Consultant, Republic of Belarus	Petra Glebka Str. 18-24 220121 Minsk, Belarus Email: larisar@open.by Tel: +375-173-95-14-64
Mr. Albinas MASTAUSKAS	Director, Radiation Protection Centre, Republic of Lithuania	Kalvariju 153 8221 Vilnius, Lithuania Email: a.mastauskas@rsc.lt Tel: +370-5236-1936
Mr. Peter ZOMBORI	Consultant, Incident and Emergency Centre Department of Nuclear Safety and Security, International Atomic Energy Agency	Wagramerstrasse 5 A-1400 Vienna Austria Email: p.zombori@iaea.org Tel: +43 1 2600-22503

Appendix II: Schedule of the Mission

- 1) 17 February 2014 at 10:00: Meeting at NRSA
- 2) 18 February 2014 at 10:00: Meeting at NRSA together with representatives of Committee of Emergency Situations and Civil Defence.
- 3) 19 February 2014 at 11:00: Meeting at Committee of Emergency Situations and Civil Defence with the Head.
- 4) 20-21 February 2014 at 10:00: NRSA and CoES Technical Meeting with participation of all relevant ministries and authorities. Necessary bilateral discussions can be arranged.
- 5) The following week (24-28 February 2014) meetings at NRSA with invitation of relevant ministries and authorities for discussion of National Plan for Emergency Preparedness and Response Implementation.

Appendix III: List of Attendees to EPREV Mission Meetings

17 February 2014, Nuclear and Radiation Safety Authority (NRSA):

No.	Name	Position and email address
1.	Mr. Ulmas MIRSAIDOV	Director of NRSA [info@NRSA.tj]
2.	Mr. Jabor SALOMOV	Deputy Director, NRSA [j.salomov@NRSA.tj]
3.	Mr. Ilkhom MIRSAIDOV	Head of Department of Information and International relation NRSA, [i.mirsaidov@nrsa.tj]
4.	Mr. Matin AKHMEDOV	Head of Inspection section NRSA, [matin82@rambler.ru]
5.	Mr. Bakhtiyor BAROTOV	Head of Licensing section NRSA, [bakhtik-agency@mail.ru]
6.	Major Rosim AMINOV	Head of radiation and chemical division of CoES, [917581020@mail.ru]

18 February 2014, Nuclear and Radiation Safety Authority (NRSA):

No.	Name	Position and email address
1.	Mr. Matin AKHMEDOV	Head of Inspection section NRSA, [matin82@rambler.ru]
2.	Mr. Bakhtiyor BAROTOV	Head of Licensing section NRSA, [bakhtik-agency@mail.ru]
3.	Major Rosim AMINOV	Head of radiation and chemical division of CoES, [917581020@mail.ru]
4.	Mr. Matin AKHMEDOV	Head of Inspection section NRSA, [matin82@rambler.ru]
5.	Colonel Jamshed KAMOLOV	Head of Department of Population and territory protection of CoES, [jjk@list.ru]
6.	Colonel Tojiddin MAHMADOV	Colonel, Head of Republican chemical-radiometric laboratory of CoES, [toj@bk.ru]

19 February 2014, Committee for Emergency Situations and Civil Defence of Tajikistan (CoES)

No.	Name	Position
1.	General-Colonel Khairiddin ABDURAKHIMOV	Chairman of the Committee for Emergency Situations and Civil Defence (CoES)
2.	Mr. Siltonazar KHOLIKNAZAROV	Adviser of the Chairman of the Committee for Emergency Situations and Civil Defence (CoES)
3.	Mr. Jamshed KURBONBEKOV	Colonel, Deputy Head of the International Cooperation Department of CoES
4.	Colonel Jamshed KAMALOV	Head of Department of Population and territory protection of CoES
5.	Colonel Tojiddin MAHMADOV	Head of Republican chemical-radiometric laboratory of CoES
6.	Mr. Ulmas MIRSAIDOV	Director of NRSA
7.	Mr. Jabor SALOMOV	Deputy Director, NRSA

20-21 February 2014, Technical Meeting in NRSA on the implementation of the Action Plan to strengthen the national emergency preparedness and response system in Tajikistan for the years 2013–2017.

No.	Name	Organization
1.	Manuchehr VOSIEV	Ministry of Industry and New Technologies satartok@bk.ru
2.	Shukrihudo ODINABEKOV	MIA
3.	Major Rosim AMINOV	Head of radiation and chemical division of CoES 917581020@mail.ru
4.	Nusrat KAVRAKOV	State mine and technical supervision
5.	Fazliddin YAKUBOV	State Committee investment and state property bdstj@mail.ru
6.	Bahram DZHURAKULOV	Main Department of firefighting service MIA
7.	Anwar KOMILOV	Dushanbe Department of firefighting service MIA
8.	Colonel Jamshed KAMOLOV	Head of Department of Population and territory protection of CoES jjk@list.ru
9.	Bakhtiyor MUMINOV	Main Department of Geology
10.	Major Dmitry STOTSKY	Deputy Head of Chemical and radiological Laboratory of CoES stozki@list.ru
11.	Colonel Tojiddin MAHMADOV	Head of Chemical and radiological Laboratory of CoES toj@bk.ru
12.	S. Sh. DAVLATMIROV	Main inspector of CCO of Custom Services suhshod@mail.ru
13.	Ismoil SAFAROV	Specialist on chemical, biological and radiation protection of Custom Services isenergy@mail.ru
14.	N. TOSHOV	Head of sanitary and hygienic laboratory of sanitary and epidemiological supervision services atoshov@mail.ru
15.	E.I. SALIHOV	Ministry of Agriculture Solihov.Emomali@mail.ru
16.	Kh. NAZIFOV	Ministry of Justice Khosrav17@mail.ru
17.	B. BAROTOV	NRSA bakhtik-agency@mail.ru
18.	J. SALOMOV	NRSA j.salomov@nrsa.tj

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ACRONYMS

AP2012	Action plan for emergency preparedness and radiation protection for 2013–2017 [4]
CES	Commissions for Emergency Situations
CoES	Committee for Emergency Situations and Civil Defence of Republic of Tajikistan
DPPT	Department of Protection of the Public and Territory of the CoES
EPR	Emergency Preparedness and Response
EPREV	Emergency Preparedness Review
HAZMAT	Hazardous Materials and Items
IAEA	International Atomic Energy Agency
IEC	Incident and Emergency Centre of the IAEA
NREP	National Radiation Emergency Response Plan
NRSA	Nuclear and Radiation Safety Agency under the Academy of Sciences of Republic of Tajikistan
NSLC	Network of Supervision and Laboratory Control
OAL	Operational Action Level
OECSS	Occupational Exposure Control Services Section of the NRSA
OIL	Operational Intervention Level
RCMC	Republican Crisis Management Centre of the CoES
RCRL	Republican Chemical and Radiometric Laboratory of the CoES
RSDB	Radiation Source Database of the NRSA
SES	Sanitary Epidemiological Service under the Ministry of Health of Republic of Tajikistan
TLD	Thermoluminescent detector
USEPES	Uniform State Emergency Prevention and Elimination System of Republic of Tajikistan
USIE	Unified System for Information in Incidents and Emergencies