

EPREV REPORT



Emergency
Preparedness
Review

EPREV

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



2015-07-13 to 2015-07-17

International Atomic Energy Agency

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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) the IAEA has a function, if requested, to assist Member States in preparing emergency arrangements for responding to nuclear accidents and radiological emergencies.

In response to a request from the Government of Jamaica, the IAEA fielded an Emergency Preparedness Review (EPREV) mission to conduct, in accordance with Article III of the IAEA Statute, a peer review of Jamaica'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 limited-scope Emergency Preparedness Review (EPREV) mission to Jamaica from 13 July to 17 July 2015. The mission was undertaken by the International Atomic Energy Agency (IAEA) based on a request from the government of Jamaica. EPREV missions are designed to provide a peer review of emergency preparedness and response (EPR) arrangements in a country based on the IAEA Safety Standards. This specific mission was requested with a limited scope, focusing on the activities related to the conversion of the currently used highly enriched Uranium (HEU) fuel of the Slowpoke II (JM-1) 20kW research reactor, including removal, transport and replacement of the reactor, to low-enriched uranium (LEU) fuel.

The objective of the mission was to review the prevailing conditions and arrangements established for EPR which may be needed in the event of a radiation emergency during the implementation of the fuel conversion project. The EPREV team followed the standard IAEA methodology and tools described in the EPREV Guidelines, taking into account the specific scope and the limited mission duration. The review was based on the study of relevant documentation (e.g., plans, procedures), interviews with the representatives of stakeholder organizations.

The EPREV team concluded that while, in general, the national radiation EPR infrastructure (e.g., laws, plans, procedures, competence and capabilities of agencies) could benefit from further formalization and improvement, and the EPR planning for the specific operation of the fuel removal and transport is adequately addressed. The parties involved in the operation (both ICENS and the contracted counterpart) are fully competent, experienced and capable of handling postulated emergency situations. There are plans and procedures for the operation and for the response to emergency situations. There is equipment and instrumentation available for monitoring and mitigating the emergency consequences, and some training was provided to first responders and medical staff who might be involved in the emergency response.

The team did observe some specific areas for possible improvement in the preparedness for radiation emergency associated with the fuel conversion operation. These observations are formulated as Recommendations (when non-compliance with the requirements of the relevant standards was found) or Suggestions (where improvements are felt possible). Altogether 4 Recommendations and 3 Suggestions are given in the mission report.

The EPREV team noted with appreciation the excellent cooperation of the host organization, the International Centre for Environmental and Nuclear Science (ICENS), which facilitated the successful conduct of the mission. All invited government agencies, including the Office of Disaster Preparedness and Emergency Management (ODPEM), Ministry of Health, Jamaica Fire Brigades, and different health institutions were cooperative and helpful, providing all the information that was necessary for the EPREV team to develop a clear understanding of the situation regarding radiation emergency preparedness for the fuel conversion operation.

The EPREV team has the opinion that addressing these findings in an urgent and efficient manner will greatly improve the country's preparedness for any radiation accident that may occur during the implementation of the ICENS Slowpoke II fuel conversion.

1. INTRODUCTION

1.1. Objective and Scope

The purpose of this EPREV mission was to conduct a review of Jamaica's emergency preparedness and response arrangements and capabilities. The EPREV scope was limited to the activities related to the conversion of the currently used HEU fuel of the Slowpoke II (JM-1) 20kW research reactor at the University of the West Indies (UWI) at Kingston, Jamaica, to LEU of similar power. The review was carried out by comparison of existing arrangements against the IAEA safety standards.

It is expected that the EPREV mission will facilitate improvements in Jamaica's emergency preparedness and response arrangements and other Member States from the knowledge gained and experiences shared between Jamaica and EPREV team and through the review of the effectiveness of the Jamaican arrangements and capabilities and its good practices.

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

- Providing Jamaica with a review of its emergency preparedness and response arrangements relevant for the fuel conversion operation;
- Promoting the sharing of experience and exchange of lessons learned;
- Providing key staff with an opportunity to discuss their practices with reviewers who have experience with different practices in the same field; and
- Providing Jamaica with recommendations and suggestions for improvement relevant for the fuel conversion operation.

1.2. Mission Background and Preparatory Work

Jamaica currently operates a Slowpoke II (JM-1) 20kW research reactor at the University of the West Indies (UWI) at Kingston, Jamaica for research and training purposes. This reactor was manufactured and provided by Atomic Energy of Canada Limited (AECL), and has been operating for 30 years. The highly enriched uranium (HEU) fuel used in the core was provided via an agreement between the IAEA, Canada, Jamaica and the USA, which was signed on 25 January 1984. The 296 fuel pins of the current HEU core are made of a coextruded U-Al alloy (28wt% U) enriched to ~93% (^{235}U mass of ~827 g) and Al cladding, which is also the fuel cage material.

In line with international nuclear non-proliferation efforts, Jamaica is in the process of implementing the conversion of its research reactor from its current HEU core to one that utilizes LEU. This conversion and the removal of the HEU core is currently expected to occur in autumn 2015 (August-September timeframe). The proposed LEU core for the JM-1 reactor will have 198 fuel pins manufactured from Zircaloy-4, like the fuel cage, and filled with sintered UO_2 pellets (enriched to 19.86%), resulting in a total U mass of ~5600 g and ^{235}U mass of ~1100 g.

Conversion: The IAEA received a request from Jamaica on 7 April 2011 seeking the IAEA's assistance to facilitate the conversion of the Jamaica research reactor core from HEU to LEU.

On 28 November 2014, Jamaica asked for additional assistance from the IAEA relating to the completion of the conversion process. A meeting was held on 9-11 March 2015 at the IAEA with representatives from Jamaica, the United States and numerous departments within the IAEA. During this meeting, reviews and missions were identified to support Jamaica's needs relating to the conversion and removal of the HEU core.

Removal: The removal of the HEU core of the reactor is being coordinated through the U.S. Department of Energy (US DOE), National Nuclear Security Administration. A type B LWT cask is going to be used for transport of the spent nuclear fuel. The cask and the transportation are provided by the Secured Transportation Services, LLC-(STS), contracted by DOE - the contractor.

Jamaica requested IAEA assistance for all facets of the conversion and removal (safety, security, transportation, licensing, oversight during the regulatory review of the SAR, etc.), including an EPREV mission for the emergency preparedness and response issues. Coordination between the IAEA and US DOE-NNSA is conducted through NEFW.

The IAEA provided financial support to implement the EPREV mission through the Technical Cooperation regional project No. RLA9076 (Strengthening of National Capabilities for Response to Radiation Emergencies).

1.3. Reference for the Review

IAEA Safety Standards GSR Part 7 (Preparedness and Response for a Nuclear or Radiological Emergency) [1], GSG-2 (Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency) [2], and GS-G-2.1 (Arrangements for Preparedness for a Nuclear or Radiological Emergency) [3] were used as review criteria.

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

2. DETAILED FINDINGS ON GENERAL REQUIREMENTS

2.1. Emergency management system

The legal framework of national emergency management in Jamaica is defined by the National Disaster Action Plan for Jamaica (the Plan, last revised in 1997). The Plan was produced under the provisions of Act 15 of 1993 (“THE DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT ACT”, last revised in 2015, The Act). Although radiation emergency is considered a low probability event in Jamaica, it is mentioned among the possible types of emergencies. The Plan describes the National Emergency Organization (NEO), the national strategy, concept of operations, assignment of responsibilities etc.

In general, and in accordance with the “all-hazard” approach, the Office of Disaster Preparedness and Emergency Management (ODPEM) is responsible for coordinating the efforts of emergency response. ICENS is considered the Lead Technical Agency in all matters related to nuclear and radiological emergencies, although it is not stated anywhere in the legal documents.

The regulatory authority is exercised by the Jamaican Bureau of Standards (BSJ). The regulatory functions of BSJ are being separated from the metrology related functions and this new, effectively independent regulator will be legally established as of 24 July 2015.

2.2. Roles and responsibilities

The Plan clearly and comprehensively defines roles and responsibilities under the all hazards approach for the preparedness, response and recovery, even though radiation emergencies are not considered in details.

Nevertheless, for the specific purpose of the conversion project, the roles of the contractor performing the removal and transport of the used HEU fuel and the ICENS staff are mostly clearly allocated in a separate document. The “Transportation/Security Plan for the Physical Protection of Spent Nuclear Fuel in Transit to DOE UWI ICENS Mona to DOE Savannah River Site, Aiken SC” (the Transportation Plan) covers the roles during the transport; however, it does not include the phase of removal of the core until it is loaded into the transport vehicle. This phase is described in two procedures: “SLOWPOKE – ICENS Core Removal / Transfer Procedure” and “SLOWPOKE – ICENS SIP Test Procedure”.

2.3. Hazard assessment

The national hazard assessment is given as part of the Plan (Chapter 7.0 Hazard/Situation Analysis). The radiation emergencies are not considered.

Hazard assessment for the JM-1 reactor is given by the Procedures for Response to Emergencies at the SLOWPOKE-II Research Reactor (the Procedures).

For the conversion project the hazard assessment was performed as part of the emergency plan for the conversion (Emergency Response Plan for the JM-1 HEU to LEU core conversion, Chapter 3, Facility/Project Hazards - The Conversion Plan). The assessment includes low probability events, non-radiation hazards and security related events. However,

the document fails to address emergencies as a result of errors and mishaps during the manipulation of the core.

A thorough radiation physics assessment was performed (Radiation Physics Assessment for the JM-1 HEU to LEU Conversion). This document presents the calculations of the inventory of the core as a function of the shutdown time, showing that by the time of the transfer to the transport cask the total activity will be less than 6.6 TBq (200 Ci). The total activity is not extremely high, and in case of mishandling or a fall, the core – with the use of proper tools and applying safe handling procedures – can be put back into the pool to be shielded by the water.

Recommendation 1.
Observation: The Emergency Response Plan for the JM-1 HEU to LEU core conversion does not fully address emergencies as a result of errors and mishaps during the manipulation of the core.
Basis for recommendation: GSR-Part 7 paragraph 4.26, states: "The government through the regulatory body shall ensure that operating organizations review appropriately and as necessary revise the emergency arrangements (a) prior to any changes in the facility or activity that affects the existing hazard assessment and (b) when new information that provides insights into the adequacy of the existing arrangements becomes available."
Recommendation: ICENS should review and revise the document appropriately and should update the emergency plan and procedures to cover the removal of the core and loading for transport.

2.4. Protection strategy for an emergency

There is no national protection strategy for radiation emergencies and there are no national generic criteria.

The Procedures include operational intervention levels (OILs) for protective actions only for on-site emergencies.

Recommendation 2.
Observation: There are no operational documents for off-site responding organizations to identify and determine when and for whom the protective actions and other response actions are necessary.
Basis for recommendation: GSR-Part 7 paragraph 4.28, (4), states: " ... pre-established operational criteria (conditions on the site, emergency action levels (EALs), and operational intervention levels (OILs)) for initiating the different parts of an emergency plan and taking protective actions and other response actions shall be derived from the generic criteria. Arrangements shall be established in advance to revise these operational criteria, as appropriate, in a nuclear or radiological emergency, with account taken of the prevailing conditions as these evolve."
Recommendation: ODPPEM, in cooperation with ICENS, should develop and implement an appropriate Protection Strategy for radiation emergencies, including operational intervention levels (OILs) for off-site emergencies.

3. DETAILED FINDINGS ON FUNCTIONAL REQUIREMENTS

3.1. Managing emergency response operations

The Plan describes overall emergency management at the national, regional and parish levels. In accordance with the “all-hazard” approach, the Office of Disaster Preparedness and Emergency Management (ODPEM) is responsible for coordinating the efforts of emergency response. In Part 1 of the Plan the following details, relevant for the emergency management, are given:

- An introduction to the Plan which begins with a general overview of the country, in the context of threats from disasters;
- The concept of operations;
- The national strategy for dealing with disasters;
- The structure of the National Emergency Organization (NEO);
- A matrix indicating the functional responsibilities during disaster response of each agency in the NEO.

The Plan and ODPEM’s ability to implement it has been tested in many occasions during natural and man-made disasters (e.g., hurricanes, fires, landslides etc.

Even though there are no special arrangements for radiation emergencies. ICENS is considered the Lead Technical Agency in all matters related to nuclear and radiological emergencies.

The Conversion Plan gives an overall description of the emergency management response during the core removal. Further clarification of emergency response during the review and revision of the core removal procedures should be given, as specified in Recommendation 1.

The Transportation Plan gives an overall description of the emergency management response during the transport.

In general, it can be said that the local arrangements are sufficient to manage postulated emergencies.

3.2. Identifying, notifying and activating

The Plan clearly describes the notification process and communication channels (Part 4, National Emergency Operations Centre, Standard Operating Procedures, Chapter 6.0, Warning and Alerting Systems). There is a general national number that the public can use to reach emergency services is 110 for paramedics and firefighters, and 119 for police.

The emergency classification system for the JM-1 reactor is detailed in the Procedures. Two classes are possible: Facility Emergency and Alert. The Procedures include on-site conditions and readings for emergency declaration as well as predetermined protective actions based on declared emergency level.

The Procedures also address responsible authorities external to the site who shall be notified in case of an emergency, but the contacts are not correct and not up to date.

For the conversion project, notification and communications are predetermined by the Transportation Plan.

Suggestion 1.
Observation: The Procedures for Response to Emergencies at the SLOWPOKE-II Research Reactor provide contacts of external organizations to be notified, which are not correct and not up to date.
Basis for suggestion: GSR-Part 7 paragraph 5.17, (3), states: " ... to notify the appropriate notification point ..."
Suggestion: ICENS should consider correcting and updating national contacts in the procedures. For the contact with the IAEA, the official emergency contact details should be used.

3.3. Taking mitigatory actions

The emergency arrangements cover technically the credible emergencies that can happen. This includes both the local capabilities and the contractor capabilities. The reviewed documents are still not finalized but the technical information is complete. However, considerations in section 2.2 (Roles and responsibilities) and Recommendation 1 are still applicable.

3.4. Taking urgent protective actions and other response actions

The ultimate decision about evacuation and other public protective actions is to be taken by the Director General of ODPEM. The implementation is the responsibility of ODPEM. ICENS is to provide assistance in the assessment of the radiological situation and about the criteria for the action (in terms of radiation levels).

However, there are no generic criteria, guidance values (OILs) defined yet for the urgent protective actions and the detailed procedures are yet to be developed (see Recommendation 3).

3.5. Providing instructions, warnings and relevant information to the public

The Plan covers public warnings, which are provided through the media. The ICENS site maintains automatic alarm system in case of elevated radiation levels.

3.6. Protecting emergency workers and helpers in an emergency

The Procedures contain instructions for responding to emergencies associated with the use of the research reactor. This document defines the guidance levels for emergency workers (Table F.1). The guidelines are consistent with those given in ref. [1], Table I.1 (Guidance Values for Restricting Exposure of Emergency).

ICENS has a well-established personal dosimetry service; all radiation workers wear TLD dosimeters. In fact, ICENS is the dosimetry centre for a number of countries in the region. They have enough spare dosimeters to provide to those off-site emergency workers who would be potentially involved in any emergency during the conversion project (first responders, fire fighters, police etc.).

ICENS should consider providing (additional) dosimetry service also for the contractor, should they request it. The capacity is there but the arrangements are still to be made.

ICENS also has electronic personal dosimeters, which will be used primarily for the on-site activities of the operation. Nevertheless, these EPDs are available and will be used also during the transportation phase.

Although contamination is not expected during the fuel removal, ICENS ordered a few sets of personal protective equipment (PPE). They will be available, should there be a need for using them.

Suggestion 2.
Observation: Currently there is no dosimetry service provided to the off-site workers (first responders, foreign contractors) who might be involved in the fuel conversion operation.
Basis for suggestion: GSR-Part 7 paragraph 5.55, states: Arrangements shall be made to assess as soon as practicable the individual doses received in a response to a nuclear or radiological emergency by emergency workers and helpers in an emergency and, as appropriate, to restrict further exposures in the response to the emergency (see Appendix I).
Suggestion: ICENS should consider providing dosimetry service to all off-site emergency workers who may potentially be involved in any emergency response operation.

3.7. Medical response

There are no special arrangements for medical response to radiation emergencies in Jamaica. The radiation knowledge of medical personnel is limited, even though radiation matters are part of regular curriculum of the medical course at the university studies in Jamaica.

For the conversion project, ICENS is planning to make a special arrangement with the University Hospital of the West Indies.

The training provided by the US DOE (see section 4.6 for more information) covered medical response as well. There was good representation from Jamaican hospitals at the training, but there were no participants from the University Hospital of the West Indies.

Recommendation 3.
Observation: Representatives from University Hospital of the West Indies did not participate at the training provided for the conversion project.
Basis for recommendation: GSR-Part 7 paragraph 5.60, states: "Arrangements shall be made for medical personnel, both general practitioners and emergency staff, to be made aware of the clinical symptoms of radiation exposure and of the appropriate notification procedures and other response actions that are warranted if a nuclear or radiological emergency has occurred or is suspected."
Recommendation: Ministry of Health should ensure that personnel of the University Hospital of the West Indies responding to radiation emergencies (with focus on initial treatment of overexposed patients) are trained appropriately.

3.8. Communicating with the public throughout an emergency

The Plan covers public information, which is provided through the media. Part 4 of the Plan outlines the communication protocols and other procedures. The National Emergency Operations Centre (NEOC) has a Communications Centre that is responsible to keep contact with the media. Chapter 8.3 of Part 4 is devoted to the description of the communications facilities, procedures etc.

3.9. Taking early protective actions

This requirement is relevant in case of the release of a significant amount of radioactive material, which would necessitate the measures listed in Requirement 14 of [1]. Given the total activity of the reactor core (< 6.6 TBq), its material composition (coextruded U-Al alloy) and the container it is shipped in (certified B-type container) the contamination of populated areas is highly unlikely.

3.10. Managing radioactive waste in an emergency

The document “ICENS Waste Management Policy and Plan” describes the policy and plans for the management of radioactive waste for normal reactor operation. There are no special arrangements for the conversion project or for emergencies.

3.11. Mitigating non-radiological consequences

The issue of non-radiological consequences was discussed with the representatives of ICENS, ODPEM and Ministry of Health. They realized the problem but recognized that there are no plans and procedures available yet. It was proposed by the team to prepare simple, plain-language statements for the reassurance of the public in case of an emergency and for the diffusion of fear and panic originating from circulation of rumors and unfounded information.

Recommendation 4.
Observation: There are no plans and procedures available for countering false information, rumours and other non-radiological consequences of the fuel conversion operation and of any emergency possibly happening during its implementation.
Basis for recommendation: GSR-Part 7 draft paragraph 5.87, states: Arrangements shall be made for mitigating the non-radiological consequences of an emergency and an emergency response and for responding to concerns of the public in a nuclear or radiological emergency. These arrangements shall include providing the public with: (a) information on any associated health hazards and clear instructions on the actions to be taken (see Req. 10 and Req. 13); (b) medical and psychological counselling; and (c) adequate social support, as appropriate.
Recommendation: ICENS, ODPEM and the Ministry of Health should develop a clear strategy and information material to be used for the mitigation of non-radiological consequences of emergencies during the conversion operation, including the psychological aspects on the workers involved in the conversion project.

3.12. Requesting, providing and receiving international assistance

Jamaica is not a signatory to the Conventions on Early Notification of a Nuclear Accident and on Assistance in the Case of a Nuclear Accident or Radiological Emergency. At the IAEA there is neither a National Warning Point (NWP) nor a National Competent Authority (NCA) registered for Jamaica, which could delay asking for and providing assistance, if needed. However, the host (ICENS) is fully aware of the possibility of requesting assistance from the IAEA in case of an emergency.

International assistance, should there be a need for any, can be expedited either directly by US DOE as part of the standing agreements for this conversion operation.

3.13. Terminating an emergency

The Plan gives provisions for transition from emergency to normal situations. This is not specific to radiation emergencies.

Regarding emergencies at the JM-1 reactor and for the conversion project there are no provisions for terminating a radiation emergency.

3.14. Analyzing the emergency and emergency response

ODPEM representative informed the team that it is a standard practice of the organization to do an analysis of every major emergency they get involved in and to draw conclusions and lessons from the events and from the response. They will follow the same routine should there be an emergency occurring during the fuel transportation.

4. DETAILED FINDINGS ON REQUIREMENTS FOR INFRASTRUCTURE

4.1. Authorities for emergency preparedness and response

Authorities for emergency preparedness and response are defined by the Plan and by the Act. Decision making is assigned to Director General of ODPEM.

4.2. Organization and staffing for emergency preparedness and response

The Plan clearly and comprehensively defines staffing of organizations involved in preparedness and response. ODPEM maintains a roster for initial activation of the National Emergency Operations Centre (NEOC). (This roster can be extended to involve ICENS representative, if needed.)

For the time of the conversion project activities, medical staff and other first responders who participated in the special training, previously discussed, will be on-call. The same is planned for firefighters. In addition the NEOC team will be put in standby.

4.3. Coordination of emergency preparedness and response

The coordination is in place and currently the responsibility of ODPEM.

4.4. Plans and procedures for emergency response

Should there be a major emergency during the fuel conversion operation the situation will be managed in accordance with The Plan, which defines the roles and responsibilities of the different licensees, governmental and non-governmental organizations etc.

There is a detailed document containing the procedures to be applied in responding to emergencies associated with the use of the research reactor (The Procedures). This document describes the site, the facility, the possible accidents, their classification and the steps to be followed during these events. The manual gives detailed listing of the guidance levels for emergency workers, protective actions based on accident classification, protective actions based on radiation measurements and criteria for specialized medical assessment or follow-up. It also gives guidance for the different support teams.

While the above document was developed for the normal operation of the research reactor most of the procedures are fully applicable in emergencies occurring during the conversion operation. Nevertheless, an emergency plan was developed (The Conversion Plan) as an attachment to this document for the purpose of the conversion project. The Conversion Plan is complementary to the Procedures; it regulates the project specific parts of the work (e.g., the distribution of responsibilities, defining project specific positions like Conversion Manager, Accident Assessment Manager etc.). The Procedures and the Conversion Plan are fully consistent with each other.

ICENS has all the plans and procedures that are needed for the upcoming fuel conversion. The first responding organizations (ODPEM, Jamaica Fire Brigades) have their own plans and procedures that are applicable for the traditional hazards and emergency situations. However, they may not be sufficient for the specific circumstances of a radiological

emergency. For the improvement of the situation ODPEM was advised to adopt the relevant procedures described in the IAEA document EPR-First Responder (“Manual for First Responders to a Radiological Emergency”, 2006); see also Recommendation 2.

All the reference material provided was not formally approved (no signatures and dates).

Suggestion 3.
Observation: All the reference material provided was not formally approved (no signatures and dates).
Basis for suggestion: GSR-Part 7, paragraph 6.18 (b), states: "emergency plans and procedures are prepared and, as appropriate, approved for any facility or activity, areas and locations that could give rise to an emergency warranting protective actions and other response actions"
Suggestion: ICENS, ODPEM and other organizations should consider taking action to ensure that all operational documents are approved and signed prior to the fuel conversion.

4.5. Logistical support and facilities

Regarding the equipment needed for radiation monitoring the operation will rely on instrumentation available at ICENS, as well as those devices to be brought by the contractor, which should be enough for the purpose of monitoring the activities within ICENS premises. After loading the container on the truck and during transportation and transferring it on the ship monitoring has to be provided, because ODPEM and the police do not have this capability. ICENS is going to provide the service and the contractor will also assist.

Both ODPEM and the other agencies involved in the escorting have the capabilities of efficient communication, as described by The Plan and The Transportation Plan.

ODPEM is prepared to provide the necessary technical assistance (e.g. heavy duty machinery, cranes), if necessary.

4.6. Training, drills and exercises

As part of the preparedness process the National Disaster Executive Committees produce, among others, preparedness plan and ODPEM is charged to implement it, which includes education and trainings. Exercises are regularly conducted, but not for radiation emergencies.

Specifically for the conversion project training was organized by the US DOE for Jamaican response organizations in April and May 2015. There were 47 participants. The training consisted of three modules that were repeated over four days with table top exercises on the fifth day. The modules were:

- Radiological awareness training (4 hours)
- Hospital personnel training (8 hours)
- Compressed modular emergency response radiological transportation training (8 hours)

4.7. Quality management

A copy of the “Quality Assurance Manual for the Conversion of the SLOWPOKE-2 Reactor, ICENS” was provided. It includes the main aspects that have to be considered for the conversion and transport activities.

There are, however, shortcomings in quality managements, especially regarding the formal approval of the documents (see Suggestion 3).

APPENDIX I: MISSION TEAM COMPOSITION

No.	Name and LAST NAME	Position	Organization
1.	Mr. Peter ZOMBORI	EPREV Team Coordinator	Incident and Emergency Centre, IAEA
2.	Mr. Marjan TKAVC	EPREV Team Member	Slovenian Nuclear Safety Administration, Ljubljana, Slovenia
3.	Mr. Gustavo MOLINA	EPREV Team Member	National Nuclear Research Institute, Ocoyoacac, Mexico

APPENDIX II: MISSION SCHEDULE

IAEA EPREV MISSION TO JAMAICA 13-17 JULY 2015 PROGRAMME

Date	Time	
Monday 13 July 2015	09H00-17H00	<p><u>EPREV MISSION OPENING MEETING</u> Venue: ICENS, Gerald Lalor Building, Conference room; Kingston, Jamaica Participants: Representatives of ICENS, Ministry of Health, IAEA EPREV team <u>AGENDA:</u> Chairperson:</p> <ol style="list-style-type: none"> 1. Welcome: 2. Introductions: 3. Presentation on EPREV objectives and process:- IAEA 4. Telephone conference call to the fuel removal project contractor (STS) 5. Discussions on the HEU-LEU fuel conversion project 6. Closure:
Tuesday 14 July 2015	09H00-17H00	<p><u>MEETING WITH NATIONAL COUNTERPARTS</u> Venue: ICENS, Gerald Lalor Building, Conference room; Kingston, Jamaica Participants: IAEA, Representatives of ICENS, Ministry of Health, ODPEM <u>AGENDA:</u></p> <ol style="list-style-type: none"> 1. Discussions on EPR arrangements in Jamaica (operating organization) 2. Discussions on EPR arrangements in Jamaica (first responders) 3. Discussions on EPR arrangements in Jamaica (medical preparedness)
Wednesday 15 July 2015	09H00-17H00	<p><u>MEETING WITH NATIONAL COUNTERPARTS</u> Venue: ICENS, Gerald Lalor Building, Conference room; Kingston, Jamaica Participants: IAEA, Representatives of ICENS, Ministry of Health, University Hospital of the West Indies, Jamaica Fire Brigade) <u>AGENDA:</u></p> <ol style="list-style-type: none"> 4. Discussions on EPR arrangements in Jamaica (fire services) 5. Discussions on EPR arrangements in Jamaica (local and national medical preparedness)
Thursday 16 July 2015	All Day	<p>Venue: ICENS, Gerald Lalor Building, Conference room; Kingston, Jamaica <u>AGENDA:</u></p> <ol style="list-style-type: none"> 6. Finalization of the report 7. Discussion with the Counterpart on the findings and the draft mission report

Date	Time	
Friday 17 July 2015	09H00-10H30 8H00-11hH00	<p><u>MEETING WITH NATIONAL COUNTERPARTS</u> Venue: ICENS, Gerald Lalor Building, Conference room; Kingston, Jamaica Participants: IAEA, Representatives of ICENS, Ministry of Health, University Hospital of the West Indies, Jamaica Fire Brigade) <u>AGENDA:</u></p> <p>8. Presentation of the mission findings (IAEA)</p> <p>9. Discussions and closing of the mission (Host and IAEA)</p>
Saturday 18 July 2015		Team leaves

APPENDIX III: LIST OF MISSION PARTICIPANTS

No.	Name	Position	Organization
1.	Dr. Nicole Lowe-Fahmi	IHR Director	Ministry of Health
2.	Ms. Michelle Richards-Henry	Coordinator IHR Administration and Implementation	Ministry of Health
3.	Mr. Horace Glaze	Senior Director, Preparedness & Emergency Operations Division (SD PEOD)	Office of Disaster Preparedness & Emergency Management (ODPEM)
4.	Dr. Denise Bennett	Emergency Physician	Kingston Public Hospital
5.	Mr. Charles Grant	Director General	International Centre for Environmental and Nuclear Sciences (ICENS)
6.	Mr. Johann Antoine	Research Scientist	International Centre for Environmental and Nuclear Sciences (ICENS)
7.	Mr. Ricardo Hibbert	Training Division	Jamaica Fire Brigade
8.	Mr. Floyd McLean	Fire Prevention Division	Jamaica Fire Brigade
9.	Dr. Melody Ennis	Director, Emergency, Disaster Management and Special Services	Ministry of Health
10.	Dr. Jean Williams-Johnson	Medical Director, Emergency Medicine Division	The University Hospital of the West Indies
11.	Mr. Jeffrey Galan	Program Manager, U.S.-Origin Nuclear Material Removal Program Office of Material Management and Minimization	National Nuclear Security Administration, US-DOE
12.	Mr. Roy Boyd	Vice-President	Secured Transportation Services, GA, USA
13.	Mr. Greg Philips	Security specialist	Secured Transportation Services, GA, USA
14.	Mr. Blake Williams	President	Secured Transportation Services, GA, USA
15.	Mr. Peter Zombori	EPREV Team Coordinator	IEC, IAEA
16.	Mr. Marjan Tkavc	EPREV Team Member	Slovenian Nuclear Safety Administration, Ljubljana, Slovenia
17.	Mr. Gustavo Molina	EPREV Team Member	Mexican National Nuclear Research Institute, Ocoyoacac, Mexico

APPENDIX IV: REFERENCES

- [1] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency, GSR Part 7, IAEA, Vienna (Board of Governors Approved Draft, March 2015)
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, GSG-2, IAEA, Vienna (2011).
- [3] INTERNATIONAL ATOMIC ENERGY AGENCY, Arrangements for Preparedness for a Nuclear or Radiological Emergency, GS-G-2.1, IAEA, Vienna (2007).