



INTERNATIONAL ATOMIC ENERGY AGENCY

REPORT OF THE
FOLLOW-UP ORPAS

OCCUPATIONAL RADIATION PROTECTION APPRAISAL SERVICE

MISSION

To the
UNITED REPUBLIC OF TANZANIA

18th – 23rd November 2018

FOLLOW-UP MISSION ON OCCUPATIONAL RADIATION PROTECTION APPRAISAL SERVICE
Conducted under IAEA Extra-budgetary Project and Technical Co-operation Project on Occupational
Radiation Protection

DEPARTMENT OF NUCLEAR SAFETY AND
SECURITY

DEPARTMENT OF TECHNICAL CO-
OPERATION



**FOLLOW-UP OCCUPATIONAL RADIATION PROTECTION
APPRAISAL SERVICE MISSION**

REPORT TO

THE GOVERNMENT OF UNITED REPUBLIC OF TANZANIA

Mission date: 18th – 23rd November 2018

Facilities and services: Operators and Technical Service Providers

Location: Dar es Salaam and Arusha

Organised by: IAEA

ORPAS Team:

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EXECUTIVE SUMMARY

At the request of the Government of United Republic of Tanzania addressed to the International Atomic Energy Agency (IAEA) to conduct an Occupational Radiation Protection Appraisal Services (ORPAS) mission, the Agency organised the ORPAS in the United Republic of Tanzania during 11-15 August 2014 with a Team of three international experts that include a Team Leader and an Agency Coordinator. The Tanzania Atomic Energy Commission (TAEC) acted as the national contact point for the mission.

The organizations participated in the ORPAS mission were; the TAEC (national regulatory authority), one dosimetry service provider (TAEC), one Secondary Standard Dosimetry Laboratory (SSDL) (TAEC), various end-users including a non-destructive testing company, four hospitals and the maintenance and training services in TAEC. An ORPAS Report for the mission was provided the main findings, recommendations, and good practices identified during the mission. Detailed findings for individual facilities or service providers are provided in the Appendices.

To review progress in implementing improvements resulting from the initial ORPAS mission recommendations or suggestions, and to address areas of significant change in the ORPAS recipient facilities since the last mission, a follow up ORPAS mission was conducted 18th – 23rd November 2018.

This follow-up ORPAS Mission Report provides the observations on the status for the implementation recommendations in the ORPAS Report, significant changes and advices for future improvement.

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1. INTRODUCTION

At the request of the Government of United Republic of Tanzania addressed to the International Atomic Energy Agency (IAEA) to conduct an Occupational Radiation Protection Appraisal Services (ORPAS) mission, the Agency organised the ORPAS in the United Republic of Tanzania during 11-15 August 2014 with a Team of three international experts that include a Team Leader and an Agency Coordinator. The Tanzania Atomic Energy Commission (TAEC) acted as the national contact point for the mission.

The organizations participated in the ORPAS mission were; the TAEC (national regulatory authority), one dosimetry service provider (TAEC), one Secondary Standard Dosimetry Laboratory (SSDL) (TAEC), various end-users including a non-destructive testing company, four hospitals and the maintenance and training services in TAEC. An ORPAS Report for the mission was provided the main findings, recommendations, and good practices identified during the mission. Detailed findings for individual facilities or service providers are provided in the Appendices.

According to the procedure of ORPAS, a follow up mission should be conducted to review the effect of the mission within two or three years after the ORPAS mission.

The follow up ORPAS mission was conducted 18th– 23rd November 2018. The mission covered all the facilities in Dar es Salaam and Arusha in the full ORPAS mission.

The purpose of the follow up ORPAS mission is to review the progress in implementing improvements resulting from the initial ORPAS mission recommendations or suggestions, and to address areas of significant change in the ORPAS recipient facilities since the last mission,

This follow-up ORPAS Mission Report provides the observations on the status for the implementation of the recommendations in the ORPAS Report, significant changes and advices for future improvement.

2. STATUS OF IMPLEMENTATION OF ORPAS RECOMMENDATIONS

2.1 Conduct of the Follow-up ORPAS Mission

Prior to the follow-up mission, the counterpart provided an Advanced Report of the Follow-up ORPAS Mission, which is the self-assessment about the status for the implementation of the recommendations in the ORPAS mission.

The scope of the follow-up mission is primarily based on the participating institutions involved in the ORPAS mission and considering the recent institutional changes, eleven ORPAS receiving facilities/ service providers in seven institutions covering six medical facilities, one industrial facility and four service providers in the country were visited. The Team reviewed the progress in implementing improvements resulting from the ORPAS mission recommendations through communication with the stakeholders, checking the radiation protection programme and its implementation.

The conduction of the follow-up mission was based on the discussions with the staff and the visit of the facilities, implementation status for the recommendations was checked by using the specific report to the counterpart in the ORPAS mission report. The observations were focusing on major changes and new good examples for the radiation protection arrangements.

2.2 Main observations

- 1) Most or the recommendations in the ORPAS Mission Report have been or are being implemented.
- 2) The infrastructure in the technical service providers for dosimetry and calibration in the TAEC has been greatly improved.
- 3) The capability for the radiation protection equipment maintenance service is continually maintained. Trainings for the staff from other Member States are provided.
- 4) Regular training service on Radiation Safety Officers is very effective and a quality management system for the training service is under establishment stage.
- 5) Radiation protection awareness in the facilities of operators has been enhanced. Comprehensive radiation protection programmed have been established and implemented in some of the facilities.

Observations to specific radiation facility or service provider are given in the specific Appendix.

2.3 Recommendations for further improvements

- 1) The ORAPS participating stakeholders are encouraged to implement all of the recommendations in the ORAPS Mission Report.
- 2) It is recommended to ensure the staffing and operational cost for the technical service providers to keep the laboratories at a good operational status.
- 3) It is recommended to establish quality management system in the laboratories of the technical service providers based on the ISO/IEC 17025.
- 4) Implementation of radiation protection programme should be enhanced in the operator facilities. Promotion of safety culture, quality management system, staff training, provision of radiation protection equipment as well as effective enforcement from the regulatory authority are highlighted as the key points for occupational radiation protection in the operator facilities.

Observations to specific radiation facility or service provider are given in the specific Appendix.

3. CONCLUSIONS

It is important to conduct the follow up ORPAS mission to review the implementation status of the recommendations in the ORPAS Mission Report. The implementation status has been assessed through the visit to the eleven ORPAS participating facilities and service providers, major advances have been identified and recommendations for further improvements have been given. The output of the mission is helpful for both of the ORPAS stakeholders in their organizations to improve occupational radiation protection and for the IAEA to improve the ORPAS service in future.

**APPENDIX I: SPECIFIC STATUS OF IMPEMENTATION FOR OCEAN ROAD
CANCER INSTITUTE-RADIOTHERAPY DEPARTMENT**

Facilities and services: Ocean Road Cancer Institute –Radiotherapy Department
Location: Dar Es Salaam
Follow-up Mission date: 19 November 2019
People met: Dr Julius Mwaiselage, Taus Maftah. Mr. Tegemea Kalolo,
 Mr Hemed Myanza, Mr. Egid Mlwilo, Mr Innocent Kija

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	It is recommended to proceed to the radiological evaluation and risk assessment and shielding calculation during the design of the future LINACs prior to the construction of the building. This evaluation should be addressed to the TAEC for approval.	The construction of building to house two LINACs were at clearing phase and communication with regulatory body initiated	Fully implemented
2	The Radiotherapy Department is recommended to implement a routine workplace monitoring programme.	Radiation survey meters are available but no formal workplace monitoring (WPM) programme is in place	Partially implemented
3	It is recommended to review, the organization chart specifying the responsibilities and duties for the staff for radiation safety in both normal operation and emergency situations.	Informed that it is lengthy process to review the organization chart, however there are ongoing processes	Not implemented
4	It is recommended to provide the Radiation Safety Officer with the necessary resources to accomplish its mission;	Informed that resources flow has improved. Despite this progress, challenge on timely returning dosimeters for evaluation was reported to be still existing	Partially implemented
5	It is recommended to establish and to implement an appropriate written programme and measures on radiation protection and safety for both normal	Radiation Protection Programme (RPP) drafts were being prepared	Partially implemented

	operation and emergency situations, together with the allocation of responsibilities for its implementation within an organization, from the top management to workers involved in specific tasks.		
6	It is recommended to maintain a record book for notifying the incidents of occupationally exposed workers.	A file available for recording incident forms together with other medical records	Partially implemented
7	It is recommended to implement the reference levels and the investigation levels for dosimetry results and for accumulated doses over periods. Results exceeding these values should be investigated to determine whether or not doses are optimized.	Radiation protection programme (RPP) document being drafted	Partially implemented
8	It is recommended to establish an appropriate written programme for the training of staff in the different tasks and specific trainings and refresher training on occupational radiation protection for the Medical Physicist and the RSO.	Training programme not formally documented	Not implemented
9	It is recommended to maintain an updated inventory for the radiation sources	Spent brachytherapy sources collected by TAEC for waste management. Inventory not yet updated	Partially implemented

Additional observations:

- None

Recommendations for further improvements

- The centre should implement pending recommendations

**APPENDIX II: SPECIFIC STATUS OF IMPEMENTATION FOR OCEAN ROAD
CANCER INSTITUTE-NUCLEAR MEDICINE DEPARTMENT**

Facilities and services: Ocean Road Cancer Institute –Nuclear Medicine Department
Location: Dar Es Salaam
Follow-up Mission date: 19 November 2018
People met: Dr Julius Mwaiselage, Taus Maftah. Mr. Tegemea Kalolo,
 Mr Hemed Myanza, Mr. Egid Mlwilo, Mr Innocent Kija

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	It is recommended to review the design of the department specifically the ventilation system, the drainage system, the waiting area, the floor and the shower to comply with the IAEA’s requirements.	No immediate plans to construct a dedicated nuclear medicine building	Not implemented
2	It is recommended to review completely the radioiodine hospitalisation to ensure the radiation protection of the staff, the public and the patient according to the regulation in place and to the IAEA’s standard.	Hospitalization transferred to other wards. A process to comply with TAEC Regulations and IAEA standards was ongoing	Partially implemented
3	The design review should be addressed to TAEC approval with a radiological and risk assessment	No immediate plans to construct a dedicated nuclear medicine building	Not implemented
4	It is recommended to review, the organization chart specifying the responsibilities and duties for the staff for radiation safety in both normal operation and emergency situations.	Informed that it is lengthy process to review the organization chart, however there are ongoing processes	Not implemented
5	It is recommended to provide the Radiation Safety Officer with the necessary resources to accomplish its mission;	Informed that resources flow has improved. Despite this progress, challenge on timely returning dosimeters for evaluation was reported to be still existing	Partially implemented
6	It is recommended to implement a routine workplace monitoring programme.	Occasional workplace monitoring data were observed but no formally established programme	Partially implemented

7	It is recommended to establish and to implement an appropriate written programme and measures on radiation protection and safety for both normal operation and emergency situations, together with the allocation of responsibilities for its implementation within an organization, from the top management to workers involved in specific tasks.	Responsibilities are located to key radiotherapy staff. Appropriate programme on radiation protection and safety for both normal operation and emergency situations is still not in place	Partially implemented
8	It is recommended to maintain a record book for notifying the incidents of occupationally exposed workers.	A file available for recording incident forms together with other medical records	Partially implemented
9	It is recommended to implement the reference levels and the investigation levels for dosimetry results and for accumulated doses over periods. Results exceeding these values should be investigated to determine whether or not doses are optimized.	Radiation protection programme (RPP) document being drafted	Partially implemented
10	It is recommended to provide with a sufficient number of PPE to the staff of the department.	Some PPEs have been acquired	Partially implemented
11	It is recommended to establish an appropriate written programme for the training of staff in the different tasks and specific trainings and refresher training on occupational radiation protection for the Medical Physicist and the RSO.	RSOs are trained on ORP at regulatory body while medical physicist participates in training course/meetings organized by IAEA. There was no any evidence on the training of others	Partially implemented
12	It is recommended to adopt a written emergency plan for the department with procedures and instructions supporting overexposed or contaminated workers.	Emergency plan was being drafted	Partially implemented

Additional observations:

- None

Recommendations for further improvements:

- The centre should implementing pending recommendations

APPENDIX III: SPECIFIC STATUS OF IMPEMENTATION FOR TANZANIA STEEL PIPES

Facilities and services: Tanzania Steel Pipes –NDT
Location: Dar Es Salaam
Mission date: 20 November 2018
People met: Mr. Elly Bohela, Mr. Festo Temba, Mr. Jaffary Seif,
 Mr. Florence Mwananzige

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	It is recommended to review the safety features of the facility and to establish stricter countermeasure to prevent the intrusion of the staffs into the NDT area during operation (interlocks, camera, monitors, safety culture and training).	Monitoring equipment, alarm system are available.	Partially implemented
2	This review should be addressed to TAEC approval.	Draft document is available	Partially implemented
3	It is recommended to review, the organization chart specifying the responsibilities and duties for the staff for radiation safety in both normal operation and emergency situations.	Responsibilities and duties of RSO mainly in normal operation are in place. Organization chart has not yet been reviewed	Partially implemented
4	It is recommended to provide the Radiation Safety Officer with the necessary resources to accomplish its mission;	Adequate financial and human resources as well as radiation protection equipment are available	Implemented.
5	It is recommended to implement a routine workplace monitoring programme.	Workplace monitoring is available but is not formally established	Partially implemented
6	It is recommended to establish and to implement an appropriate written programme and measures on radiation protection and safety for both normal operation and emergency situations, together with the allocation of responsibilities for it implementation within an organization, from the top	The work is still under plans	Not implemented

	management to workers involved in specific tasks.		
7	It is recommended to maintain a record book for notifying the incidents of occupationally exposed workers.	A general record book available, but none for notifying occupational radiation protection incidents	Not yet implemented
8	It is recommended to implement the reference levels and the investigation levels for dosimetry results and for accumulated doses over periods. Results exceeding these values should be investigated to determine whether or not doses are optimized.	Informed that the work is at planning stage	Not yet implemented
9	It is recommended to establish a programme for the specific training in radiation protection for the staff including the workers.	The training programme offered by TAEC is available but lacks the internal component	Partially implemented
10	It is recommended to provide EPD for the persons who will enter into the NDT area.	Under plans	Not yet implemented
11	It is recommended to adopt a written emergency plan for the facility with procedures and instructions supporting overexposed workers.	Emergency plan was being drafted	Partially implemented

Additional observations:

- None

Recommendations for further improvements:

- The centre should implement pending recommendations

**APPENDIX IV: SPECIFIC STATUS OF IMPEMENTATION FOR THE JAKAYA
KIKWETE CARDIAC INSTITUTE**

Facilities and services: Muhimbili National Hospital –Cath Lab
Location: Dar Es Salaam
Follow-up Mission date: 19 November 2018
People met: Prof. Mohamad Janabi, Dr. Engerasiya Kifai, Mr. Maulid I France, Mr. Rogers Kibula, Mr. Kulindwa Kasubi

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	It is recommended to review, the organization chart specifying the responsibilities and duties for the staff for radiation safety in both normal operation and emergency situations.	Work planned upon the review of organization chart	Not implemented
2	It is recommended to provide the Radiation Safety Officer with the necessary resources to accomplish its mission;	RSO is provided with resources according to the budget, which is limited	Partially implemented
3	It is recommended to implement a routine workplace monitoring programme.	Radiation survey meter is available and occasional monitoring in place. There is no a formally established WMP	Partially implemented
4	It is recommended to establish and to implement an appropriate written programme and measures on radiation protection and safety for both normal operation and emergency situations, together with the allocation of responsibilities for it implementation within an organization, from the top management to workers involved in specific tasks.	Still under plans	Not implemented
5	It is recommended to implement the reference levels and the investigation levels for dosimetry results and for accumulated doses over periods. Results exceeding these values should	Still under plans	Not implemented

	be investigated to determine whether or not doses are optimized.		
6	It is recommended to establish a programme for the specific training in radiation protection for the staff, especially for the cardiologist.	Specific training of cardiologists is not formally established	Not implemented

Additional observations:

- None

Recommendations for further improvements

- The institute should implement pending recommendations

**APPENDIX V: SPECIFIC STATUS OF IMPEMENTATION FOR MUHIMBILI
NATIONAL HOSPITAL-RADIOLOGY DEPARTMENT...**

Facilities and services: Muhimbili National Hospital – Radiology Department
Location: Dar Es Salaam
Mission date: 19 November 2018
People met: Dr Praxeda Ogweyo Director, Dr. Flora Lwakatare

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	The management structure for radiation protection should be formally established. This will involve creating the position of radiation protection in the organogram of the hospital. Policies and procedures should be documented;	Draft document on policy and procedure has been prepared	Partially implemented
2	The job description of RSO also indicating his responsibilities on radiation protection matters should be documented and available in the department;	Job description of RSO available	Fully implemented
3	Radiation Protection Program should formally be established and implemented;	RPP document available but is not yet formally approved	Partially implemented
4	Radiation protection training programme should be adopted and training should be provided to some staff members who have not yet been trained;	Still working on the matter	Not implemented
5	Personal dosimeters should be provided by TAEC to the occupationally exposed workers and the wearing should be supervised by the RSO;	Workers are covered by individual monitoring service provided by TAEC	Fully implemented
6	Dose records should be maintained by the RSO and the occupational physician;	Dose records are maintained by RSO	Partially implemented
7	Reference levels and the investigation levels for dosimetry results and for accumulated doses over periods. Results exceeding these values should	Still under plans	Not implemented

	be investigated to determine whether or not doses are optimized.		
8	Controlled and supervised areas should be designated with appropriate radiation symbols and appropriate warning notices translated in Swahili and English languages;	Controlled areas are clearly designated with radiation symbols and warning notices in place.	Partially implemented
9	Local rules and supervision procedures should be established and implemented; especially for the control of access to controlled area.	Still working on it	Not implemented
10	Acquisition of additional and adequate protective gears;	Adequate protective gears are in place	Fully implemented
11	Periodic maintenance of PPEs	Some PPEs are in good conditions	Partially implemented
12	Radiation survey instrument should be acquired, calibrated and used in workplace monitoring to be conducted according to an established programme;	Still planning	Not implemented

Additional observations:

- None

Recommendations for further improvements

- The hospital should implement pending recommendations

**APPENDIX VI: SPECIFIC STATUS OF IMPEMENTATION FOR ARUSHA
LUTHERAN MEDICAL CENTRE-RADIOLOGY DEPARTMENT**

Facilities and services: Arusha Lutheran Medical Centre – Radiology Department
Location: Arusha
Follow-up Mission date: 21 November 2018
People met: Dr. Mark Jacobson, Dr. Geoffrey Kibira, Dr. Walter Mkwema,
 Mr. Erick Jackson

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	The job description of RSO also indicating his responsibilities on radiation protection matters should be documented and available in the department.	The job description of RSO is available	Fully implemented
2	Radiation Protection Program should formally be established and implemented.	Still under plans	Not implemented
3	The management structure for radiation protection should be formally established. This will involve creating the position of radiation protection in the organogram of the hospital. Policies and procedures should be documented.	Policies and procedures still under drafting stage	Partially implemented
4	The programme for training on radiation protection should be established and implemented.	Training programme available but not formally established	Partially implemented
5	It might be necessary to translate the warning notices in local (Swahili) language.	Translated warning notices in local language are in place	Fully implemented
6	Radiation survey instrument should be acquired, calibrated and used in a planned and documented workplace monitoring.	Still under plans	Not implemented
7	Dose records should be maintained by the RSO and the occupational physician.	Dose records are only maintained by RSO	Partially implemented
8	Reference levels and the investigation levels for dosimetry results and for	Still under plans	Not implemented

	accumulated doses over periods. Results exceeding these values should be investigated to determine whether or not doses are optimized		
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Additional observations:

- None

Recommendations for further improvements

- The hospital should implement pending recommendations

**APPENDIX VII: SPECIFIC STATUS OF IMPEMENTATION FOR MOUNT MERU
REGIONAL HOSPITAL -RADIOLOGY DEPARTMENT...**

Facilities and services: Mount Meru Regional Hospital – Radiology Department
Location: Arusha
Follow-up Mission date: 21 November 2018
People met: Dr. Shafii Msechu, Ms. Angela A. Kimath, Mr. Benedict G. Valentine, Mr. Mathew Mbise, Ms. Zainab Salum, Ms Munde Mkinga

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	The hospital should apply for authorization to operate x-ray services.	The centre had initiated a process to acquire TAEC license	Partially implemented
2	The management structure for radiation protection should be formally established. This will involve creating the position of radiation protection in the organogram of the hospital. Policies and procedures should be documented.	Still under plans	Not implemented
3	The job description of RSO also indicating his responsibilities on radiation protection matters should be documented and available in the department.	Job description of RSO is available but do not include relevant radiation protection matters	Partially implemented
4	Radiation Protection Program should formally be established and implemented.	Individual monitoring and clear sign for radiation areas are in place	Partially implemented.
5	Radiation protection training programme should be adopted, and training should be provided to some staff members who have not yet been trained.	Workers participate in training organized by TAEC. Formal internal training programme is not in available	Partially implemented.
6	Controlled and supervised areas should be designated with appropriate radiation symbols and appropriate warning notices translated in Swahili and English languages.	Clear signs were observed.	Fully implemented

7	Local rules and supervision procedures should be established and implemented.	Room access restriction and exposure charts are available	Partially implemented.
8	Radiation survey instrument should be acquired, calibrated and used in workplace monitoring.	Still under plans	Not implemented
9	Dose records should be maintained by the RSO and the occupational physician.	Dose records are still maintained only by RSO	Partially implemented
10	Acquisition of additional and adequate protective gears.	Some additional protective gears have been acquired	Partially implemented
11	Periodic maintenance of the PPEs	Some PPEs are well maintained	Partially implemented
12	Reference levels and the investigation levels for dosimetry results and for accumulated doses over periods. Results exceeding these values should be investigated to determine whether or not doses are optimized.	Still under plans	Not implemented

Additional observations:

- None

Recommendations for further improvements:

- The hospital should implement pending recommendations

**APPENDIX VIII: SPECIFIC STATUS OF IMPEMENTATION FOR DOSIMETRY
LABORATORY-TAEC**

Facilities and services: Dosimetry Section – TAEC
Location: Arusha
Follow-up Mission date: 22 November 2018
People met: Ms Sarah Lema, Mr. Lazaro Meza

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	The Quality Management System should be established and based on ISO 17025.	Documents on quality management system are under preparation with the support of the IAEA advisory mission	Partially implemented. It is recommended to make an action plan and provide enough resources for the establishment of the QMS.
2	Procedures for type testing and performance testing should be implemented.	The procedure has been developed.	Partially implemented. Testing should be implemented.
3	Participation in international inter-comparisons particularly for laboratories providing measurement services should be encouraged.	The laboratory participated in the IAEA regional intercomparison exercises	Fully implemented. It is recommended to attend the exercise in future
4	The Service should develop a formal monitoring programme/information to subscriber. The plan should cover all types of monitoring, frequency, quantities, location, equipment, reporting, investigation arrangement, etc.	The programme has been developed	Fully implemented.
5	The Dosimetry Section should review the overexposure investigation, follow up and process in the service.	Draft procedure has been developed	Partially implemented.
6	The Dosimetry Section is encouraged to reach the customer to have an updated list of workers needing an individual monitoring, independently from the inspection of the regulatory body.	The list has been updated	Fully implemented. It is recommended to update the list regularly.

7	The implementation of an automated DMS	An old version of DMS software developed by the IAEA has been obtained from Ghana	Partially implemented
8	Training of the staff in quality assurance and type testing	The staff have been trained in the IAEA regional training course and the national training supported by the IAEA	Fully implemented.

Additional observations:

- a) One Harshaw 6600 Plus Automatic TLD reader has been introduced with the support of EU.
- b) Two thousand and one hundred TLD dosimeters were procured with the support of EU
- c) Five hundred of TLD dosimeters were procured with the support of the IAEA.

Recommendations for further improvements

- a) It is recommended to make an action plan with time frame to establish the quality management system.
- b) Staffing and operational expenditure should be ensured for the operation of the laboratory.
- c) It is recommended to establish an automated DMS.

**APPENDIX IX: SPECIFIC STATUS OF IMPEMENTATION FOR MAINTENANCE
LABORATORY-TAEC**

Facilities and services: Maintenance Section – TAEC
Location: Arusha
Follow up Mission date: 22 November 2018
People met: Mr Yesaya Yohana SUNGITA

No.	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	Quality management system regarding the maintenance service including the document keeping needs to be strengthened	One generic laboratory procedure and six specific procedures have been prepared.	Partially implemented. It is recommended to establish QMS in TAEC which covers the maintenance service
2	Maintenance service should be authorized by the national authority.	The tasks and responsibility are defined in the “Scheme of Services”, however, it cannot be regarded as the authorization for the service from the regulatory body	Partially implemented. It is recommended to get authorization from the regulatory authority for both of the service as well as the activities with radiation (i.e. maintenance x-ray machines)
3	Provision of continuously training for the Staff in the maintenance group to cope with the rapid development of the technology on nuclear instrument	Staff are regularly trained through the IAEA programme.	Fully implemented as a regular activity

Additional observations:

- a) Hosted the IAEA fellowship training on RP equipment maintenance and conducted expert missions to other Member States for the IAEA several times.

Recommendations for further improvements

- a) It is recommended to upgrade the infrastructure of the considering the rapid progress of the nuclear instrumentation technology
- b) It is recommended to ensure the resources for the maintenance of the sophisticated instruments which may have high cost.
- c) Maintenance service as an activity related with radiation should be authorized separately.

**APPENDIX X: SPECIFIC STATUS OF IMPEMENTATION FOR NATIONAL
CALIBRATION LABORATORY (NCL) –TAEC**

Facilities and services: National Calibration Laboratory – TAEC
Location: Arusha
Follow-up Mission date: 22 November 2018
People met: Dr. Wilbroad Muhogora, Eng. John Ben Ngatunga, Ms Sarah Lema

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	The TAEA is encouraged to accelerate the building of new laboratories for the future SSDL covering all calibration needs. The new facility should be approved and licensed by the Regulatory.	A new SSDL with Hopewell designs X80-225-E x-ray system and Hopewell designs G10-2-2600_E gamma irradiation system (20 Ci Cs-137 and 1 Ci Co-60) as well as the measurement equipment has been established with the support of EU.	Fully implemented
2	It is recommended to establish and to implement an appropriate written programmes and measures on radiation protection and safety for both normal operation and emergency situations, including workplace monitoring to comply with national regulations and international standards.	Draft written programme for radiation protection for the laboratory has been developed.	Partially implemented.
3	The Quality Management System should be established and based on ISO 17025.	Documents on quality management system are under preparation with the support of an IAEA advisory mission	Partially implemented. It is recommended to make an action plan and provide enough resources for the establishment of the QMS in the SSDL.
3	Calibrations certificate need to be updated including validation,	The certificate has been updated	Fully implemented.

	traceability and a statement on uncertainties.		
4	Procedures for angular irradiations should be implemented to allow for performance testing for equipment and dosimeters.	Procedures have been prepared.	Partially implemented.
5	Reference X-ray Generator should be repaired, and procedures established for the calibration of radiation protection instruments for energy responses.	The damaged X-ray machine has been replaced by a new one in a newly established SSDL	Fully implemented with different approach
6	Reference Co-60 radioactive source should be changed and procedures established for the calibration of radiation protection instruments for energy responses.	The irradiator has been replaced by a new one in a newly established SSDL.	Fully implemented with different approach. It is recommended to decommission the disused source safely.
7	Reference planar sources should be purchased and procedures established for the calibration of radiation protection instruments for surface contamination.	Calibration of surface contamination still in plans	Not yet implemented
8	Reference sources for beta radiations should be purchased and procedures established for the calibration of personal dosimeters and radiation protection instruments.	Inbuilt reference source for beta irradiations used although there is limited metrological traceability	Partially implemented
9	Participation in national and international inter-comparisons particularly for laboratories providing measurement services should be encouraged.	Inter-laboratory comparisons been done	Fully implemented. It is recommended to do comprehensive inter-comparisons for the new SSDL

Additional observations:

- a) A new SSDL with x-ray machine, gamma irradiator as well as the measurement equipment has been established with the support of EU.
- b) Operation procedures under preparation.

Recommendations for further improvements

- a) It is recommended to ensure the staffing and operational expenditure for the operation of the SSDL.
- b) It is recommended to make an action plan and provide enough resources for the establishment of the QMS in the SSDL.

- c) It is recommended to complete all necessary measurements and procedures to make the SSDL commence its operation in early time.
- d) It is recommended the SSDL should provide training and calibration services for other Member States in the region.
- e) It is recommended to safely decommission the old SSDL equipment.

**APPENDIX XI: SPECIFIC STATUS OF IMPEMENTATION FOR TRAINING SERVICE ON
OCCUPATIONAL RADIATION PROTECTION -TAEC**

Facilities and services: Training Service – TAEC
Location: Arusha
Follow-up Mission date: 22 November 2018
People met: Mr Simon Leonard Mdoe

	Recommendations in the ORPAS Mission	Follow-up Mission Observations	Remarks
1	Training for RSO should be strengthened	Partially implemented. RSO training held twice a year (about 45 participants for one course). It is required the workers have to be trained every two years, but is not strictly implemented	Partially implemented. Customized and tailored training should be provided, focuses will be given on the responsibility of RSO and the development of radiation protection programme.
2	Quality management system (QMS) of the training service should be improved. The lecturers should have qualification certificate delivered from the regulatory body. The training material should be developed	Being implemented. Certain qualifications for the lecturers required. Training syllabus exists. There are training materials from IAEA and EU.	Partially implemented. To cover the training service in the QMS in TAEC
3	Training service should be authorized by the national authority	Not yet implemented. Tasks and responsibilities are defined in the “Scheme of Services”	Partially implemented. It is recommended to get the authorization from the regulatory body

Additional observations:

- a) Training packages on radiation protection from the IAEA and EU adopted. Some of the packages should be updated with the new versions.
- b) RPO training course is organized twice a year by TAEC.
- c) There are about 45 participants for each training course.
- d) Initial training and advanced training are adopted for the RPO training.

Recommendations for further improvements

- e) It is recommended to provide training in the facilities or in the cities of the users of the facilities so that more participants can attend the training
- f) It is recommended to update the training material regularly.
- g) Training for the development of radiation protection programme during the RSO training should be strengthened.
- h) Training on radiation protection for workers should be strengthened.
- i) It is recommended to include more participants for the radiation protection training through checking the factors influencing the participation including the price of the training.

APPENDIX XII: AGENDA OF THE FOLLOW-UP ORPAS MISSION TO TANZANIA

FOLLOW UP ORPAS MISSION PROGRAMME

**Occupational Radiation Protection Appraisal Service Follow up Mission
UNITED REPUBLIC OF TANZANIA
18 – 23 November 2018**

Place	Facilities	Days
Dar Es Salam	Arrival	
Dar Es Salam	Initial team briefing	Sunday 18 th , pm
Dar Es Salam	<ul style="list-style-type: none">• Ocean Road Cancer Institute (public)• Nuhimbili National Hospital (public)• Jakaya kikwete Cardiac Institute (public)	Monday 19 th
Dar Es Salam	<ul style="list-style-type: none">• Tanzanian Steel Pipes (private)	Tuesday 20 th am
Transportation from Dar Es Salam to Arusha		Tuesday 20 th pm
Arusha	<ul style="list-style-type: none">• Arusha Lutheran Medical Centre – Radiology department (private)• Mount Meru Regional Hospital - Radiology Department (public)• Dosimetry Section (TAEC)• Maintenance Section (TAEC)	Wednesday 21 th
Arusha	<ul style="list-style-type: none">• National Calibration Laboratory (SSDL) (TAEC)• Training (TAEC)	Thursday 22 th
Arusha	Report preparation	Friday 23 th am
Arusha	Exit Meeting	Friday 23 th pm
Arusha	Departure	

APPENDIX XIII: LIST OF PARTICIPANTS

No	Name	Designation/organization
1.	Prof Lazaro Busagala	Director General, Tanzania Atomic Energy Commission (TAEC)
2.	Dr Firm P. Banzi	Director, Technology and Technical Services, TAEC
3.	Eng. John Ngatnga	Director, Regulatory Control Unit, TAEC
4.	Dr Wilbroad E.Muhogora	TAEC
5.	Mr Lazaro Meza	TAEC
6.	Ms Sara Lema	TAEC
7.	Mr Simon Mdoe	TAEC
8.	Mr Yesaya Sungita	TAEC
9.	Dr Julius Mwaiselage	Executive Director, Ocean Road Cancer Institute (ORCI)
10	Dr Taus Maftah	ORCI
11	Mr Tegemea Kalolo	ORCI
12	Mr Hemed Myanza	ORCI
13	Mr Egid Mlwilo	ORCI
14	Mr Innocent Kija	ORCI
15	Mr Elly Bohela	Tanzania Steel Pipes (LTD) (TSPL)
16	Mr Festo Temba	TSPL
17	Mr Jaffary Seif	TSPL
18	Mr. Florence Mwananzige	TSPL
19	Prof. Mohamad Janabi	Director General, Jakaya Kikwete Cardiac Centre (JKCI)
20	Dr Engerasiya Kifai	JKCI
21	Mr Maulid Kikondo	JKCI
22	Mr Polycarp France	JKCI
23	Mr Rogers Kibula	JKCI
24	Mr Kulindwa Kasubi	JKCI
25	Dr Praxed Ogweyo	Director, Muhimbili National Hospital (MNH)
26	Dr Flora Lwakatare	MNH
27	Dr Mark Jacobson	Medical Director, Arusha Lutheran Medical Centre (ALMC)
28	Dr. Geoffrey Kibira	ALMC
29	Dr Walter Mkwema	ALMC
30	Mr Erick Jackson	ALMC
31	Dr Shafii Msechu	Medical Officer In-charge, Mount Meru Regional Hospital (MMRH)
32	Ms Angela A. Kimath	MMRH
33	Mr Benedict G. Valentine	MMRH
34	Mr Mathew Mbise	MMRH
35	Ms Zainab Salum	MMRH
36	Ms Munde Mkinga	MMRH