
RADIATION PROTECTION AND RADIOACTIVE WASTE

Annual Activity Report 2013

UNIT: Radiation Protection and Safety

TEAM

Name	Category	R&D (%)
Isabel Paiva	Auxiliary Researcher	100%
Luis Portugal	Graduated Technician	100%
Pedro Pereira	Graduated Technician	100%
José Venâncio	Technician	100%
Alfredo Baptista	Grantee	60%

OBJECTIVES

Main working areas of the Group are research and development, training and education, expertise and legal support to regulators and competent authorities, representation in national and international organizations and services to the Community.

- To pursue and increase the participation in national and international R&D funded by EURATOM/FP-Fission, EURAMET, FCT and QREN/IAPMEI;
- To pursue the involvement of GRRR in the EU Technological Platforms (IGD-TP, NERIS-TP) as a way to further increase the participation of the Group in the new research Agendas (Lisbon Strategy and Horizon 2020);
- To increase the collaboration with other Universities and training centres (at national and international level and within the collaboration with the IAEA and with the PALOP's);
- To collaborate in the fulfilment of university post-graduate degrees (Ph.D. and Master's) and to increase dissemination and visibility of GRRR' research and technical activities through participation in workshops and conferences, papers published and fulfilment services request;
- To ensure support to the national regulators and competent authorities (DGS, APA, MNE, MES and MEE, ANPC, CNTMP, CNER, REPER Brussels, Permanent Mission in the IAEA/Vienna) in matters of national strategies concerning GRRR areas of expertise;
- To ensure participation in international bodies (EURATOM Treaty , Art. 37°, IAEA Committees, EU Committees, Joint Convention of the IAEA, OSPAR Convention) as national experts in the areas of GRRR activities;
- To pursue development of services: Radioactive waste management; Licensing of radioactive sources; Transport of radioactive materials; Intervention in case of radiological emergencies; Detection of radioactive materials in scrap metal; Radiological monitoring of radioactive liquid discharges from medical establishments in Lisbon Borough sewer system; Radiological surveillance during the visit of nuclear vessels in Portuguese harbours; Radiological verification of medical, industrial, research and teaching facilities;
- To pursue the management of the following facilities: Radioactive Waste Laboratory; Active Samples Gamma-Spectrometry Laboratory; Radioactive Liquid Waste Discharge Treatment Station of CTN (ECoDELiR); CTN gamma monitoring network – GAMMANET; Radioactive Waste Interim Storage Facility (PAIRR).

MAIN ACHIEVEMENTS

Research and Development

PREPARE – The project aims to close gaps that have been identified in nuclear and radiological preparedness following the first evaluation of the Fukushima disaster.

IND04 MetroMETAL – Data collected from a questionnaire was processed and separate reports summarizing the systems and methods currently used for monitoring scrap loads, cast steel, slags and fume dusts were prepared with the support of the two Portuguese steel making companies. A Monte Carlo model of the spectrometric device for measuring the activity of cast steel and slag samples has been studied by the Portuguese team.

IND04 MetroNORM – The project addresses the development of measurement systems, methods and techniques including in-situ systems which support design of traceable measurement procedures for industrial NORM and TENORM raw material, products, by-products, residues and waste, development.

ARIAS – Development of training and education programs in radiological protection, radwaste, etc., written material/presentations and implementation of the training courses, analysis of the inputs in terms of adequacy to the proposed objectives of ARIAS project.

ROBOTSAMPLER – Development of an autonomous terrestrial robotic system for radiological and heavy metal monitoring in estuarine environments. Development of technical specifications for sample collection and measurement by gamma spectrometry and instrumental neutron activation analysis.

TECHNICAL ACTIVITIES

- Radioactive waste management - **154** requests;
- Licensing of radioactive sources - **545** sealed sources licencing were issued: national territory introduction licences (**96**), transfer licences (**100**), transport licences (**112**) and ownership licences (**237**);
- Radioactive liquid discharges from CTN - **105** samples were analysed and measured before being discharged;
- Nuclear vessels radiological monitoring - **3** nuclear vessels stayed at Portinho da Costa harbour and estuary of Rio Tejo;
- Detection of radioactive materials in scrap metal at smelting factories - **23** events related have been reported;
- Gamma spectrometry analysis - **357** gamma spectrometry analysis were performed on samples from medical, industrial and environmental origin;
- Radiological protection and safety verifications - **6** verifications and monitoring actions concerning radiological protection and safety of medical and industrial facilities.

RELEVANT PAPERS

- Duarte, P., Silva, I., Mateus, A. Araújo, M.F. Reis, M., Trindade, R., Paiva, I., Radiological and geochemical characteristics of an ultramafic massif (NE Portugal) and their significance in the assessment of the site aptness to host a near surface repository for low and intermediate level radwaste”, Environmental Earth Sciences, Vol. 68, Issue 2, Pages 547-557, DOI:10.1007/s12665-012-1758-0, Jan (2013).
- Paiva, R. Trindade, M. Gonçalves and A. Mateus, “Development of a specific methodology to assess suitable sites to receive a repository for L/ILW in the Portuguese territory”, Proceedings of the ASME 2013 15th International Conference on Environmental Remediation and Radioactive Waste Management, September 8-12, Brussels (2013).
- P. Vaz, I. Paiva and L. Portugal, “Status of the safety and security of radioactive sources in Portugal”, Proceedings of the International Conference on the Safety and Security of Radioactive Sources: Maintaining Continuous Global Control of Sources throughout their Life Cycle, Abu Dhabi, 27-31 October (2013).
- Paiva, M. Reis, L. Portugal and C. Oliveira, “Establishing and E&T platform on NORM related industries”, Proceedings of the Nuclear Education and Training International Conference, NESTet 2013, 17-21 November, Madrid (2013).
- Palmu, M, Cantone, M.-C., Paiva, I., and Vivalda, C., “The CMET working group actions within IGD-TP. Feasibility of voluntary accreditation in geological disposal using ECVET approach”, Proceedings of the Nuclear Education and Training International Conference, NESTet 2013, 17-21 November, Madrid (2013).

FUNDS

Project/Service	Reference	Timeframe	2013
IND04 MetroMETAL	EURAMET EMRP	Started December 2012. First report has been delivered February 2013	
IND04 MetroNORM	EURAMET EMRP	Approved in 2012. First Meeting due March/April 2013	
PREPARE	EURATOM /FP7-Fission	Kick-off meeting February 2013	
ARIAS	FCT 2012	Approved 2012. Started January 2013	
ROBOTSAMPLER	QREN/IAPM EI	Approved 2012. Started January 2013	
Sealed Sources Licensing	(4142 – OF13)	2013	
Radiological Control	(4134 – OF13)	2013	
Radioactive Waste	(4066 – OF13)	2013	

PROTOCOLS

- The Monitoring Programmes of the radioactive liquid discharges from public and private nuclear medicine facilities into the public sewage of Lisbon as well as the monitoring of the four ETAR'S (Lisbon City waste water treatment facilities), in collaboration with Lisbon Council Borough.
- Collaboration with AT- Taxes and Customs Authority in the framework of the MEGAPORTS Initiative of the Second Line of Defence of the USA. Support to the decision and intervention in the radiological monitoring activities of containers in the Port of Lisbon.
- Collaboration with ENAPOR – Cape Verde Port Authority. Technical support and training in radiation protection issues associated with X-ray scanners for containers and Radiation Portal Monitors.

TEAM RESEARCHERS

NAME: Maria Isabel Flausino De Paiva

CATEGORY: Auxiliary Research

IST-ID: 14513

ACTIVITIES

Nº	Activity Description
1	PETRUS III: Implementing Sustainable E&T Programmes in the Field of Radioactive Waste Disposal. EURATOM/FP7/Fission: Coordination and Support Action (CSA-CA). Principal Contractor: INPL. IST-ID Coordinator: I. Paiva (IST/CTN)
2	CMET: Competence Maintenance, Education and Training, IGD-TP/SRA, Secretariat Project SecIGD2. Principal Contractor: POSIVA. IST/CTN Coordinator: I.Paiva (IST/CTN)
3	PREPARE - Innovative integrative tools and platforms to be prepared for radiological emergencies and post-accident response in Europe. EURATOM/FP7-Fission: NERIS-TP: Principal Contractor: CIEMAT. IST-ID Coordinator: P. Vaz (IST/CTN).
4	MetroMETAL - Ionising radiation metrology for the metallurgical industry.EMRP Project: <i>IND04</i> . Prime Contractor: CIEMAT. IST/ITN Coordinator: C. Oliveira (IST/ITN)
5	MetroNORM - Metrology for Processing Materials with High Natural Radioactivity. EMRP Project: <i>JRP- IND57</i> . Prime Contractor: BEV/PTP. IST-ID Coordinator: C. Oliveira (IST/CTN).
6	ARIAS - Application of Ionizing Radiation for a Sustainable Environment, FCT-2012 RECI/AAG-TEC/O400/2012. Principal Contractor: IST/CTN, Campus of Loures. Coordinators: M. Luisa Botelho, M. Fernanda Margaça (IST/CTN).

7	EAGLE - Enhancing education, training and communication processes for informed behaviors and decision-making related to ionising radiation risks. EURATOM/FP7 call on Public information, education and training in the field of ionising radiation. Principal Contractor: SCK-MOL. IST-ID Stakeholder: I. Paiva (IST/CTN).
8	Internal ongoing research work on radiocaesium adsorption/desorption on geomaterials from “Raña” deposits originated from the NE Portugal Mainland, following the FCT <i>KADRWaste</i> project.
9	IGD-TP - Implementing Geological Disposal of Radioactive Waste Technology Platform. IST Representative at IGD-TP: I. Paiva (IST/CTN).
10	WPAQ - Technical/Scientific Committee of the European Union. National expert on radwaste: I. Paiva (IST/CTN).
11	OSPAR - Oslo and Paris Convention: Radioactive Substances Committee (RSC). Technical/Scientific Committee. National representative: I. Paiva (IST/ITN).
12	Article 37th Euratom Treaty Group of Experts Technical/Scientific Committee of the European Union. National expert: I. Paiva (IST/CTN).
13	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, IAEA. National Contact Point: I. Paiva (IST/CTN).
14	GRRR - Co-Coordination of the Radioprotection and Radioactive Waste Management Group Management Activities (UPSR/LPSR).
	Research & Development
	Support to Technical & Scientific Committees (international representations)
	Management Activities
	Training & Education

WORK SUMMARY

Nº	Work Summary and Main Achievements
1	Kick-Off meeting, October 2-3, 2013, École des Mines de Nancy:
2	1 st Meeting in Berlin (April 9, 2013): Presentation of CMET working group; Draft of strategy and work plan; Draft of ToR.. 2 nd Meeting in Madrid (November 20, 2013): Corrections to the StrAP strategy and action plan were suggested; Feasibility study of voluntary accreditation system (ECVETS and KSC) was discussed; the role of EHRO-N and OECD/NEA was clarified by the analysis of 2008 CEDEFOP doc and ENEN NUSHARE presentation; the complementarities with PETRUS III WP4 were analyzed; CMET input to IGD-TP Exchange Forum was discussed; CMET ToR were finalized; Future actions were distributed; Next meeting March 29/14.
3	Kick-Off meeting of WP6 (MUTADIS, Paris, March 14-15, 2013). WP6: Information and participation of the public: Emergency and post-emergency expertise networks establishment and interactions were discussed within the context of information and participation of affected populations; Analysis of the role of institutional experts was introduced; The role of social and traditional media in the evaluation and improvement of global communication for nuclear/radiobiological emergency was discussed; It was decided to carry out a questionnaire by oral interviews to national bodies related to Fukushima experience. This phase is ongoing within the WP6 partners. The WP6 2 nd Project Meeting and 1 st International Workshop on “Managing complexity in nuclear accidental situations” was carried out at IST/CTN, Lisbon, November, 27-29, 2013.
4	An n-type HPGe detector was characterized and detector parameters were determined. A model of this detector was created using the MCNP code and validated. Two reports were written and two workshops were organized with the stakeholders and final users. Two abstracts were submitted to an international conference and other two publications are being written.
5	The 1 st Meeting of this Joint Research project was at BEV/PTP, Vienna, September 2013. A questionnaire to determine currently used devices/systems for measuring the activity of radionuclides in some NORM industries was prepared and sent to the industries by each partner in its country. Collection of answers is still ongoing. A discussion about the reference materials and standard sources to enable accurate and traceable calibrations

	involved all partners. A general work proposal for the T&E prototype module about NORM and measurement applications to be developed by IST has been presented. An oral communication in an international conference was presented.
6	Project kick-Off. LINAC undergoing tests.
7	The main goal of the project is to enhance public understanding of ionising radiation and to facilitate a coordinated communication approach. Participation in the First EAGLE project Conference for Stakeholders (IRSN, Paris, November, 26 th , 2013) “Let’s Communicating Ionising Radiation”. Aims: Publicly launch the project and present it to stakeholders; Discuss key topics: problems, needs and challenges to communicate ionising radiation, potential solutions to bridging the gap in public understanding and of these issues; The role of the ONG’s in the communication; Decision to establish an EAGLE stakeholder network and found the Platform for Communication on Ionising Radiation.
8	Continental detrital sediments known as <i>raña</i> , mainly constituted by clay minerals such as smectite, kaolinite, and illite, originated from the NE Portugal seepage deposits, have been studied in terms of their performance as liner/backfill/buffers for low and intermediate radioactive level wastes (LILW) repositories: Distribution coefficients K_d and radiocaesium adsorbed fraction values for <i>raña</i> decrease with increasing caesium concentrations; The highest values found for caesium at trace and low concentrations seem related to the stronger affinity of radiocaesium for the frayed edge sites (FES) of the clay fraction from <i>raña</i> ; Studies were also carried out to evaluate the influence of other ions competing (K^+ and Mg^{2+}) in the media; Irreversibility of radiocaesium sorption in the natural clay-rich matrix is demonstrated by the higher desorption K_d and the lower radiocaesium desorbed fraction values in comparison with adsorption data.
9	Participation in the IGD-TP through CMET. Participation online in discussions. Due to financial constraints, no specific IGD-TP meetings were attending in 2013.
10	Support to the WPAQ only through online discussions (Radwaste and Water Directives). No WPAQ meetings were attending in 2013.
11	Participation in the OSPAR Convention for the Protection of the Marine Environment for the North-East Atlantic, Radioactive Substances Committee (RSC) meeting in Haia, February 5-7, 2013. Initial discussions on future JAMP plans working towards the 4th Periodic Evaluation and delivering an improved assessment in 2016, WG were formed including FR, NL, UK and PT; An Expert Assessment Panel (EAP) was established with PT and GE in two main WG’s. Its 1 st Meeting was in London, 2013. Due to financial constraints, PT did not attend this first OSPAR/EAP research meeting.
12	About 10 reports on decommissioning of nuclear installations were received for analysis. Due to financial constraints, PT has not been in any Article 37 ^o meetings.
13	Participation in the First Inter-Sessional meeting of Contracting Parties (CP) to the Joint Convention at IAEA, Vienna, 16-18 April 2013, as NCP and support to the COMERSIN. Analysis of: feedback from the WG of experienced officers of JC and the CNS; proposals suggested by CP TO IMPROVE IMPLEMENTATION OF jc; discussion of docs related to the Fifth Review Meeting.

PUBLICATIONS

- Duarte, P., Silva, I., Mateus, A. Araújo, M.F. Reis, M., Trindade, R., Paiva, I., Radiological and geochemical characteristics of an ultramafic massif (NE Portugal) and their significance in the assessment of the site aptness to host a near surface repository for low and intermediate level radwaste”, Environmental Earth Sciences, Vol. 68, Issue 2, Pages 547-557, DOI:10.1007/s12665-012-1758-0, Jan (2013).
- C. Oliveira, L. Portugal, I. Paiva, M. Reis, C. Cruz, R. Trindade, *A metrologia das radiações ionizantes na indústria metalúrgica*, “Medições e Ensaios”, N° 5, Maio (2013).
- P. Vaz, I. Paiva and L. Portugal, “*Status of the safety and security of radioactive sources in Portugal*”, Proceedings of the International Conference on the Safety and Security of Radioactive Sources: Maintaining Continuous Global Control of Sources throughout their Life Cycle, Abu Dhabi, 27-31 October (2013).

- M. Palmu, M-C. Cantone, I. Paiva and C.Vivalda, “Towards an European CMET strategy: The CMET Working group actions within IGD-TP”, Proceedings of EURADWASTE’13 Conference, Vilnius, June (2013)
- I. Paiva, R. Trindade, M. Gonçalves and A. Mateus, “Development of a specific methodology to assess suitable sites to receive a repository for L/ILW in the Portuguese territory”, Proceedings of the ASME 2013 15TH International Conference on Environmental Remediation and Radioactive Waste Management, September 8-12, Brussels (2013).
- I. Paiva, R. Trindade, “The impact of council directive 2011/70/Euratom and IAEA Joint Convention on the ongoing establishment of the Portuguese regulatory framework and the future national radioactive waste national plan”, Proceedings of the ASME 2013 15TH International Conference on Environmental Remediation and Radioactive Waste Management, September 8-12, Brussels (2013).
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COMMUNICATIONS

- “Development of a specific methodology to assess suitable sites to receive a repository for L/ILW in the Portuguese territory”, I. Paiva, R. Trindade, M. Gonçalves and A. Mateus, ASME 2013 15TH International Conference on Environmental Remediation and Radioactive Waste Management, September 8-12, Brussels (2013), Oral presentation.
- “The impact of council directive 2011/70/Euratom and IAEA Joint Convention on the ongoing establishment of the Portuguese regulatory framework and the future national radioactive waste national plan”, I. Paiva, R. Trindade, M. Gonçalves and A. Mateus, ASME 2013 15th International Conference on Environmental Remediation and Radioactive Waste Management, September 8-12, Brussels (2013), Oral presentation.
- “Establishing and E&T platform on NORM related industries”, I. Paiva, M. Reis, L. Portugal and C. Oliveira, NESTet 2013 17-21 November, Madrid (2013). Oral presentation.
- “Gestão de Resíduos Radioactivos em Portugal: Fontes Radioactivas Seladas”, I.Paiva, Iniciativa Riscos: Riscos Tecnológicos, FCG, Maio, 23 (2013), Oral presentation.
- “Incidentes e acidentes em Siderurgias”, Workshop “Ionizing radiation metrology for metallurgical Industry”, Project EMRP:IND04 MetroMetal, April, 3rd, CTN (2013), Oral presentation.

EDUCATION

- IST/CTN Supervisor (I.Paiva), unfinished Ph.D. Thesis, by Pedro Duarte, in collaboration with FCUL/Dpt. of Geology, until July 2013.
- Post-Graduation Course on Introduction to lab research with radioisotopes, safety and good practices, “Radiological protection, manipulation of radioactive materials, decontamination procedures, emergencies and radioactive waste management in medical/bioscience laboratories (microbiology, RIA, nuclear medicine)”, Department of Immunology FCM/UNL, 13nd. September, 2013. Annual invited lecture

PROJECTS

- *PETRUS III* – Implementing Sustainable E&T Programmes in the Field of Radioactive Waste Disposal.FP7/Euratom for Nuclear Research and Training. IST/CTN Coordinator: I. Paiva.
- CMET. - Competence Maintenance, Education and Training, IGD-TP/SRA, Secretariat Project SecIGD2. IST/CTN Coordinator: I.Paiva

- *EAGLE* - Enhancing educAtion, traininG and communication processes for informed behaviors and decision-making reLatEd to ionising radiation risks. IST/CTN Stakeholder and Coordinator: I. Paiva.

CONFERENCE ORGANIZATION / COMMITTEES

- Organization of *PETRUS International Master* on Geological Disposal and Radioactive Waste Management by videoconference with IST/CTN (PT), INPL (FR) and University of Madrid (SP), IST-Alameda, Lisbon, June, 17-28 (2013).
- Co-organization of the Workshop “Ionizing radiation metrology for metallurgical Industry”, Project EMRP: IND04 *MetroMetal* Presentation, April, 3rd, IST/CTN (2013).
- Co-organization of the Workshop “A Metrologia da radioactividade na indústria metalúrgica”, Project EMRP: IND04 *MetroMetal* Meeting with Stakeholders, December, 6th, IST/CTN (2013).
- Co-organization of the 2nd *PREPARE/WP6 project progress* meeting and 1st Workshop on “*Managing complexity in nuclear accidental situations-experts interacting with experts and society*”, November, 27-29, IST/CTN (2013).
- Co-organization of the “4rd *IND04 MetroMetal project progress meeting*”, April, 23-24, IST/CTN (2013).