

International Network for Nuclear Waste Characterization IAEA-LABONET: Facts and Future

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ABSTRACT

LABONET was launched early 2011 by the International Atomic Energy Agency (IAEA) as an international network on nuclear waste characterization. Its objective is to improve the quality of, and harmonize, activities related to the radioactive waste characterization in IAEA Member States. It is widely accepted that proper characterization of radioactive waste through its entire flow-sheet is a key activity and will improve the sustainability of waste (e.g. immobilized waste packages). In particular the needs and problems in radioactive waste characterization in the participating countries are a main concern within LABONET, as the programs are not elaborated to the same level in the various countries. LABONET wants to facilitate the exchange of international experience in the application of proven, quality assured practices for the characterization of waste and waste packages. This will be beneficial for the less developed countries. The objectives of LABONET are achieved via different actions: a) exchanging information and expertise via presentations and discussions at technical meetings; b) expert meetings on particular topics of interest, for instance e-learning and e-platforms; c) training sessions in less developed countries, for instance, on non-destructive assay of waste packages; d) facilitate the exchange of information amongst its members; and e) assist Member States in establishing characterization plans that are cost effective and of good quality. LABONET is continuously encouraging institutions or professionals who need some assistance or can help in solving questions about characterization to be a member. Currently, LABONET is preparing for its future, including projects addressing common problems of its members. Aiming at the dissemination of this important network for the professionals involved in radioactive waste characterization, this paper will discuss the following issues: (1) the objectives of LABONET, (2) its structure, membership and organization of meetings, (3) some achievements, and (4) plans for the future.

KEYWORDS: *IAEA-LABONET, radioactive waste, characterization, exchanging information, training*

INTRODUCTION

The safe management and a sustainable disposal of low and intermediate level radioactive waste requires accurate and quality assured characterization by non-destructive and destructive methods or other means, to determine the radionuclide inventory, chemical, physical properties in the different stages of waste management. Relevant procedures, standards and practices have been developed and continue to be refined in waste characterization facilities in Member States [1, 2, 3].

[1] INTERNATIONAL ATOMIC ENERGY AGENCY. Characterization of Radioactive Waste Forms and Packages. Technical Report Series No 383, Vienna. (1997).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY. Strategy and Methodology for Radioactive Waste Characterization, TECDOC-1537, Vienna. (2007).

[3] INTERNATIONAL ATOMIC ENERGY AGENCY. Determination and Use of Scaling Factors for Waste Characterization in Nuclear Power Plants. Nuclear Energy Series, Technical Reports No. NW-T-1.18. Vienna (2009).

Sharing of information between organizations and practitioners underpin the on-going development of such procedures, standards and practices [5, 5].

A number of Member States with less developed programs however may not have such laboratories or organizations. Consequently, for these countries, achieving satisfactory characterization programs is a complex technical challenge requiring both scientific and financial resources. The IAEA wishes to support organizations, either currently engaged in or seeking to develop, such characterization programs, through their inclusion in a network to cooperate in and coordinate relevant actions, training and technical progress. LABONET is the network created for this.

LABONET, the International Network of laboratories for Nuclear Waste Characterization was launched in 2011 and focuses on proven practices and their successful implementation. It builds on world class research and characterization activities both nationally and internationally by sharing information between Member States. Since then LABONET ran a number of activities including training sessions and technical meetings. In 2017 the Terms of Reference of the network were revised to gain closer alignment with the needs of Member States and to reflect the priorities of the IAEA - laid down in a 5-year working plan.

In particular LABONET is aiming to:

- Facilitate the exchange of knowledge and experience among organizations with characterization facilities.
- Support organizations or Member States with less advanced capabilities for characterization of radioactive waste, by facilitating access to the relevant skills, knowledge, management practices and approaches and expertise from Member States with mature characterization capabilities.
- Develop and implement training and demonstration activities with a global, regional or thematic focus, provide hands-on, user-oriented training and demonstration of proven procedures and technology.
- Plan and implement projects through dedicated working groups to address recognized needs of Member States in waste characterization.
- Propose Coordinated Research Projects (CRP) to the IAEA for relevant technical needs of Member States.
- Contribute waste characterization expertise to the IAEA and be a forum in which experts' advice and technical guidance may be provided to IAEA's relevant programs.

LABONET produces outcomes directly relevant to the needs of the Member States and in alignment with the objectives of the IAEA. The Steering Committee proposes to the IAEA at a regular basis topics to take into account as these topics are addressed by representatives of Member States at annual plenary and technical meetings of LABONET. As example the following projects proposals have been defined in the new 5-year plan, covering the period 2017-2021.

- Assist Member States to find and apply safe, cost-effective solutions to characterize radioactive waste
- Facilitate exchange of information and expertise between Member States on waste characterization
- Provide training and education in waste characterization activities

[5] VANISEGHEM, P., BRUNEL, G., LIERSE, CH., MORALES, A., ODOJ, R., TROIANI, F., HUGON, M., The European Network for Quality Checking of Waste Packages: objectives and status. Management and Disposal of Radioactive Waste, Editor T. McMenamin, EUR 17543, 286-295 (1997).

[5] TIETZE-JAENSCH, H., VANISEGHEM, P., DODARO, A., ANTHONI, S., NECKEL, W., PINA, G., VAN VELZEN, L., GUISSSET, J.P., KEKKI, T., STEYER, S., DIONISI, M., VICO DEL CERRO, E., LIERSE, CH., FUKS, L., ENTRAP and its potential interaction with the IGD-TP". Mineralogical Magazine, Vol 79(6), 1515-1520 (2015).

- Assist Member States to improve the effectiveness and efficiency of waste characterization activities.

In the 5-Year plan of 2017-2021 it is also stated how to produce valuable outcomes of these projects. LABONET proposes to organize thematic technical meetings. These technical meetings have to be held on a regular basis and will provide a platform for LABONET members and other participants of these projects to interact with each other, sharing information and experience on the mentioned topics. The foreseen outcome will be published as a “Wiki”-document at the IAEA-LABONET website.

LABONET structure

Membership of LABONET is open to individuals as well as organizations. The network welcomes the participation of commercial entities where their activities within the network are not commercial in nature.

LABONET comprises IAEA and its Scientific Secretary, Members, Working Groups, Steering Committee, LABONET Chairperson and Vice-chairperson, and Sponsors. Individuals and organizations may apply to become a member by contacting the Scientific Secretary. Once appointed, members will remain in LABONET until resignation.

Members of LABONET might be individuals involved in characterization of low and intermediate level waste (scientific, technical or management responsibilities), but also organizations with waste characterization capabilities. These capabilities might be suitable for development, demonstration and/or training and a willingness to share their resources with other Member States or organizations engaged in planning, implementing, improving or operating capabilities for characterization of low and intermediate level waste, and who are willing to participate and actively support in the activities of LABONET.

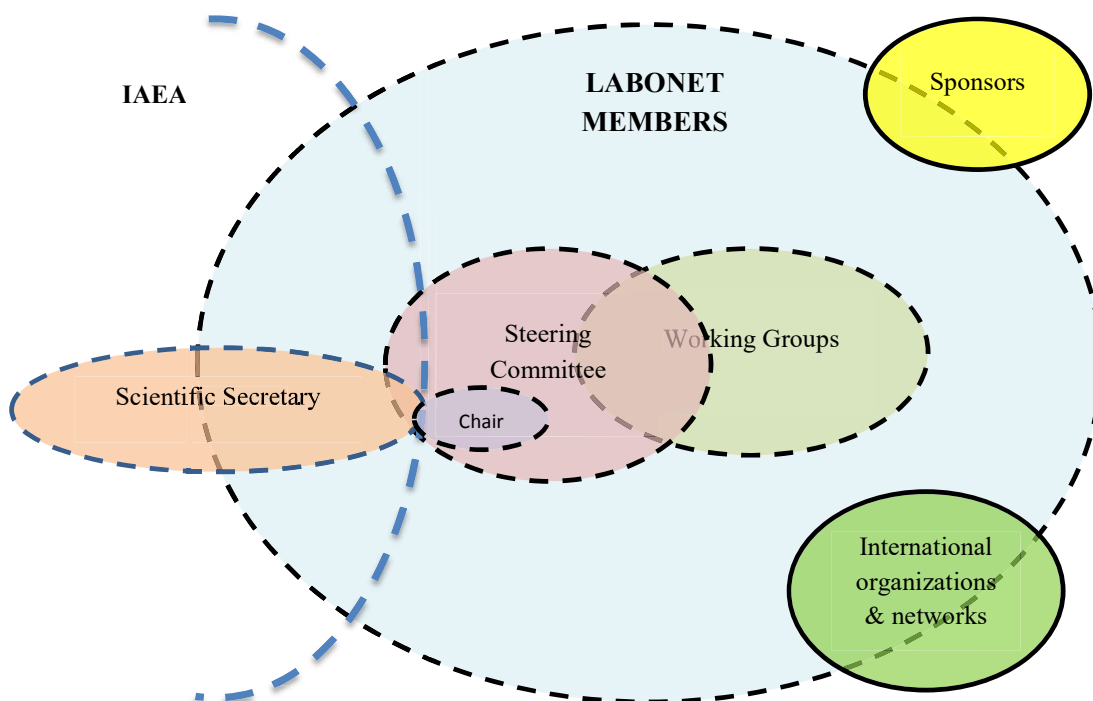


Fig. 1 Structure of LABONET and the interrelations of participants

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Working Groups are non-permanent groups that conduct the target projects and comprise members specifically appointed by the Steering Committee. Among their responsibilities, they deliver measurable and targeted outputs that are relevant to Member States and supported by the IAEA, organize technical visits and meetings to progress their projects as required and may interface with other working groups, other networks or external organizations.

The Steering Committee is composed of individual members and the Scientific Secretary of LABONET provided by the IAEA. This Committee reviews LABONET activities and provides advice to the IAEA. The collective responsibilities of the Steering Committee are to liaise with Member States to understand the needs of Member States in waste characterization and influence and persuade LABONET members to ensure their active participation in the network activities. The Chair and Vice-chairperson of the LABONET are members of the Steering Committee appointed by the Steering Committee for a 3-year term. The Chair of the LABONET should mainly support the Scientific Secretary to coordinate LABONET activities and organize and chair all network and steering committee meetings. The Vice-Chair should support the chairperson as required.

Sponsors are organizations that will work with the IAEA to provide either financial or technical support to LABONET activities. These may include commercial entities.

Figure 1 shows the structure of LABONET and the interrelations of participants.

LABONET achievements

Since LABONET was launched in 2011, some 45 Member States joined LABONET. Six technical meetings have been held in Slovakia, Italy, Austria, France, Belgium, the Netherlands and Czech Republic, as well as training sessions and dedicated expert meetings. Up to 25 participants joined each of these technical meetings.

The presentations and meeting reports were made available on a dedicated website [6] () accessible by its members. Topics covered in the presentations during the technical meetings can be grouped into 5 categories: (1) overviews of the national programs on radioactive waste management; (2) determination of the radionuclide inventory through analysis (e.g. non-destructive, destructive), modelling calculations, scaling factors; (3) other characterization techniques; (4) immobilized waste; (5) other topics like the segregation of ILW in high-ILW, LLW and free release (if possible). LABONET is primarily focusing on very low, low and intermediate level radioactive waste.

Plans for the future

A 5-year plan has been discussed and set up at the end of August. It will guide the activities of LABONET and ensure specific, measurable and realistic outcomes, directly relevant to the needs of the Member States, aligned with the objectives of the IAEA and make sure that this is achieved in a timely manner.

These activities will be delivered as ‘projects’. Table 1 gives an impression of the proposed activities in this 5-Year plan to the IAEA. The projects will be scheduled in the next 5 year period subject to resources and the availability of LABONET members to join the respective Working Groups.

The project “Guideline for Sampling Radioactive Waste” aims to elaborate guidance for LABONET members to establish sampling procedures for their waste characterization program. This guidance will provide a tool with recommendations for the elaboration of country-based sampling procedures adapted to the different realities of Member States.

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[6] <https://nucleus.iaea.org/sites/connect/LABONETpublic> (2017)

Table 1: Project proposals for next 5 years

Project / Activity	Primary Output	Expected duration
Develop a Guideline for Sampling Radioactive Waste	LABONET Wiki article on guidelines for sampling radioactive waste	3 years
Develop a Guideline for Analysis of toxic, non-radioactive constituents in radioactive waste	LABONET Wiki article on non-radioactive toxic substances in radioactive waste and their management options.	4 years
Develop a catalogue of methodology for demonstrating compliance with WAC (Waste Acceptance Criteria)	LABONET Wiki article with a catalogue of methods for demonstrating compliance with WAC	5 years
Develop a Guideline for Data quality management of the declared characteristics of waste	A LABONET Wiki article on data quality management of the declared characteristics of waste	2 years
Inter-comparisons; Destructive Analysis (DA) proficiency tests on samples and a Non-Destructive Analysis (NDA) proficiency tests on full size re-usable 220 litre drums including certified re-usable calibration sources	A report on NDA and DA inter-comparison on full size 220 litre drums	5 years
Developing e-Learning modules for Scaling Factor method	Waste Characterisation e-Learning Modules published on CONNECT.	3 years

The project “Guideline for Analysis of toxic, non-radioactive constituents in radioactive waste” aims to publish a report, consisting of (1) an overview of the toxic, non-radioactive constituents in radioactive waste of relevance for the Member States; (2) possible techniques to determine these inventories; and (3) recommendations for further research if needed, and subsequent recommendations for cooperation between members of LABONET.

The project “Catalogue of methodologies for demonstrating compliance with Waste Acceptance Criteria” aims to create a catalogue with recommended methodologies for a number of selected waste fluxes (immobilized or not) of interest for Member States, and list the according waste acceptance criteria; in addition, collect the known information on the radionuclide inventory; select a few waste fluxes, and perform estimations using different combinations e.g. (1) no DA, only NDA and Scaling Factor (SF), (2) NDA, DA, SF, (3) NDA, modeling calculations, SF.

The project “Guideline for Data quality management of the declared characteristics of waste” aims to develop a guideline that should be applicable for waste producers and waste management organizations of Member States to collect the data of the origin as well of the non- as of the radioactively contaminated materials present in wastes, so that the radioactivity present in this waste can be obtained by routine ND characterization with the best accuracy.

The project “Inter-comparisons; DA proficiency tests on samples and a NDA proficiency tests on full size 220 litre drums” aims to design and perform, due to the repeated requests of participants of Members States at LABONET meetings, a full-size NDA inter-comparison on 220 liter drums. It is worth to mention that the designed full-size 220 litre drums will be re-usable (e.g. simulating homogeneous and non-homogeneous raw waste and compacted waste) including the incorporated calibration sources.

The project “Developing e-Learning modules for Scaling Factor method” aims to develop an “e-Learning module” for studying and developing lesson materials/procedures to apply the Scaling Factor method correctly.

Conclusions

The IAEA created LABONET in 2011 to facilitate the international exchange of expertise on radioactive waste characterization. Another major objective was to assist countries with less advanced programs on radioactive waste characterization in order to improve their capabilities. Presently more than 45 Member States have already been participating in LABONET events. LABONET is very successful through its annual technical meetings and training sessions. Currently, the SC of LABONET and the IAEA prepare to strengthen the operation of LABONET, by adding to the present approach a number of technical projects that will meet the needs of Member States and to strengthen the interaction with other IAEA networks, like IDN and ENVIRONET, respectively IAEA’s International Decommissioning Network and IAEA’s Environmental Remediation Network.