

Dissertation Thesis - Reviewer's Report

Host Institution: Polish National Centre for Nuclear Research (NCBJ)

Department or Service: Radiation Detectors and Plasma Diagnostics Division (TJ3)

Title: Radiological characterization of low- and intermediate level (LL/IL) radioactive waste

Author: Patrycja DYRCZ

Supervisors: Dr. Łukasz ŚWIDERSKI (NCBJ) & Dr. Matteo MAGISTRIS (CERN, Switzerland)

Reviewer: Dr. Khalil AMGAROU (CEA, France)

The present dissertation thesis is of a high scientific value and closely linked with the problematic of maintenance, upgrade and dismantling activities of the CERN accelerator complex. The innovative research study carried out by Mrs. Patrycja DYRCZ was aimed at developing a novel non-destructive technique to better characterize LL/IL radioactive waste. Broadly speaking, the idea was to be able to identify and quantify key radionuclides, as well as their volume distributions within the objects to be examined. By combining this information with comprehensive analytical calculations, it became possible to classify and thereby evaluate the acceptability of each waste family prior to its final elimination in a dedicated disposal facility. In this context, it can now be formally said that the PhD candidate has largely succeeded in achieving such a remarkable ambition.

Upon reading the whole manuscript, I would like to highlight that it is well written, extremely clear, and logically structured, providing the reader with a full vision of all its contents and allowing him to quickly find any point that may interest him. The introduction complies with the basic elements, namely the justification of the research problem to be addressed and the relevant objectives to be met. The following chapters are in coherence with the topics under study, clearly delimiting the current knowledge in the field, the considered concepts and the applied methodology. In the final part of the document, the most relevant conclusions and contributions are outlined, opening the way to new perspectives for the future in order to continue and extend the present study to other waste categories. The existing literature is properly covered and also shows the importance of the Mrs. DYRCZ's study.

Last but not least, the way in which the research program was designed and executed during this doctoral thesis reveals a good mastery in the field of nuclear instrumentation and that of theoretical simulations, using the FLUKA Monte Carlo code, of the physical phenomena associated with the production and transport of nuclear particles as well as their interactions with matter. All the scientific work was done rigorously, with excellent analytical skills, and the corresponding results can therefore be considered as particularly reliable.

Conclusion

In the present dissertation thesis, the doctoral candidate has provided a scientific work of sufficient quality:

Yes No

In the present dissertation thesis, the doctoral student has demonstrated that he has the necessary knowledge as well as the required level of skill and commitment to conduct relevant research activities:

Yes No

Once the present dissertation thesis is fully reviewed, I am strongly recommending its defence:

Yes No

Date: 16/06/2022

Signature:

