

EGU23-2800, updated on 28 Mar 2023

<https://doi.org/10.5194/egusphere-egu23-2800>

EGU General Assembly 2023

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



BlueSky: a system for in-situ identification of ^{137}Cs in industrial waste

Virginia Strati^{1,2}, Matteo Albéri^{1,2}, Enrico Chiarelli^{1,2}, Tommaso Colonna³, Enrico Guastaldi³, Andrea Iannarone⁴, Nicola Lopane³, Alice Magnoni^{1,2}, Andrea Maino^{1,2}, Fabio Mantovani^{1,2}, Dario Petrone^{1,3}, Kassandra Giulia Cristina Raptis^{1,2}, Filippo Semenza^{1,2}, Mattia Taroni^{4,5}, and Giacomo Zambelli⁴

¹University of Ferrara, Physics and Earth Sciences Department, Ferrara, Italy (strati@fe.infn.it)

²INFN, Ferrara Section, Ferrara, Italy

³GeoExplorer Impresa Sociale S.r.l., Arezzo, Italy

⁴Protex Italia Srl, Forlì, Italy

⁵KAOS Srl, Ferrara, Italy

In industrial waste management the on-site and real-time automatic radiological characterization represents a significant improvement in disposal procedures, minimizing processing times and operators exposure. In a steel mill the accidental fusion of radioactive sources in contaminated metals is an event with a non-negligible extent. In these radiological emergency situations, significant issues arise for the environment protection with negative consequences on the mill's production. The contamination of the separate structures (e.g., furnaces, filtering systems) force a stop on the production and a complex management of the storage and disposal of the contaminated materials. In these situations, a representative sampling is an extremely time-consuming and expensive operation which increases the risks of further radiological contamination both to the environment and the involved personnel.

BlueSky is an innovative measurement system developed and validated in a steel mill for the in-situ characterization of filtering and dust suppression systems contaminated with Cs-137 which were stocked in about 400 containers with an approximate mass of 100 kg each. BlueSky was conceived with the goal of identifying, in-situ and with a 95% confidence level, the containers with an activity concentration lower than 100 Bq/kg, the clearance level which determines their disposal without radiological relevance. A single 20-minute measurement, realized positioning the detector on the top of each container, permits to achieve this objective with a Minimum Detection Activity of 22 Bq/kg.

The BlueSky system includes a 2 x 2 inches cerium bromide (CeBr_3) detector partially collimated with a lead shielding to decrease by 60% the signal contribution from the surrounding environment. The in-situ measurement process has been streamlined by the development of an Android App that, thanks to the Bluetooth module coupled to the detector, manages the data taking process, analyzes the acquired spectrum, displays the results and sends them to the Cloud

Storage Platform.