Case Study

CANBERRA

Advisor™

Expertise for Challenging Measurements

Design & Qualification of a Soil Sorter System at La Hague Reprocessing Facility

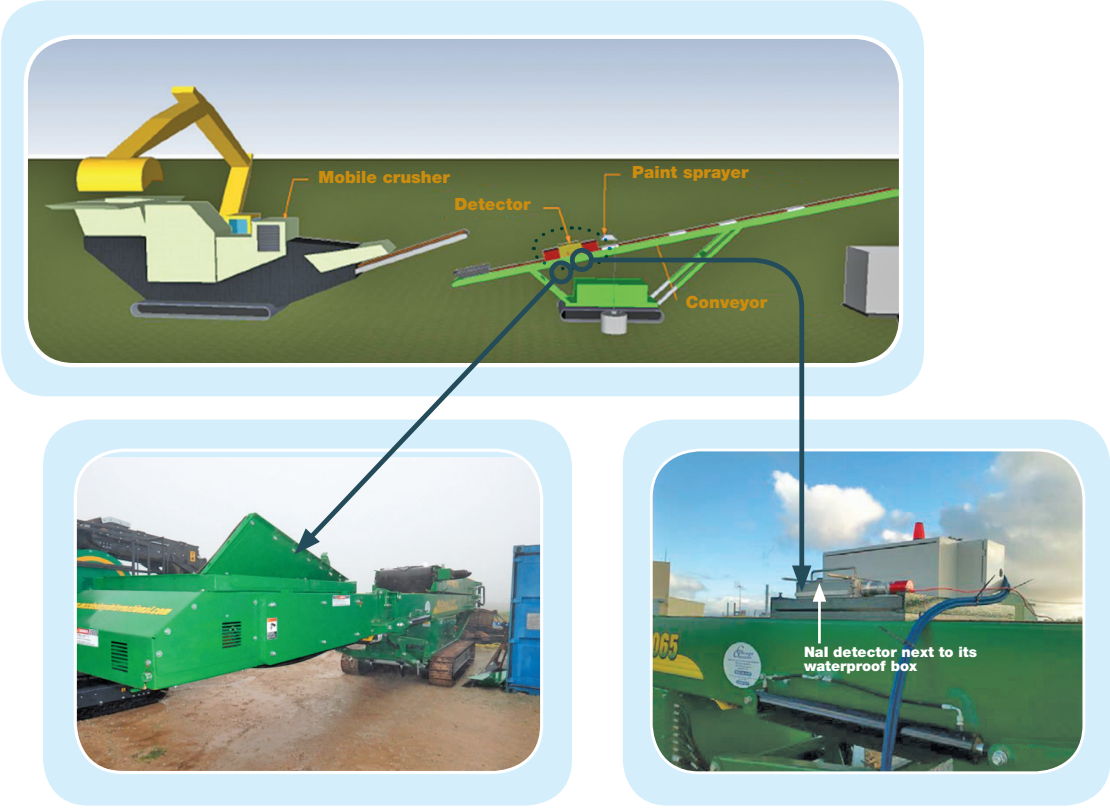
Scope:

- Silo 130 of the AREVA La Hague plant (France) contained legacy radioactive waste and the soil around was potentially contaminated.
- The project consisted of the design and implementation of the optimal detection system for incorporation into a soil sorter to facilitate the removal of contaminated soil according to limits set by the French Authorities.
- The radionuclides of interest were ^{137}Cs and ^{241}Am. The project was led by AREVA who contracted the detection system to CANBERRA, including design, modeling, realization, testing and calibration.

Key Drivers:

The contaminated area had to be cleaned up to allow a new building to be built as required by the French Nuclear Safety Authority (ASN)

- Up to 5000 m^3 of soil had to be measured.
- Soil was loaded on a conveyor, and measurements had to be performed online.
- Project deadlines imposed the need to monitor volumes in the range of 100 m^3/day.
- 100% of the soil had to be monitored.
- The detection system had to be designed such that any ^{137}Cs mass activity of the soil above a 1740 Bq/kg threshold would trigger an alarm while also being sensitive to ^{241}Am contamination.
- The overall cost of the project was mostly driven by the duration of the soil sorting operation, hence the speed of the conveyor.



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MIRION TECHNOLOGIES

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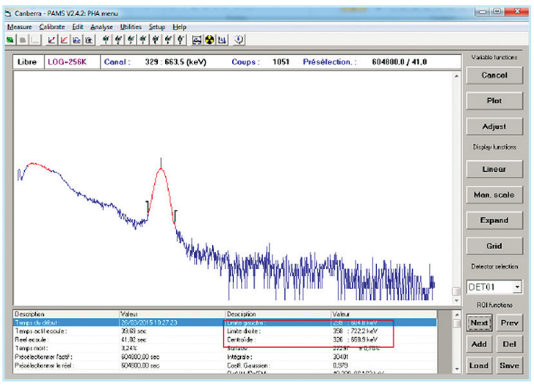
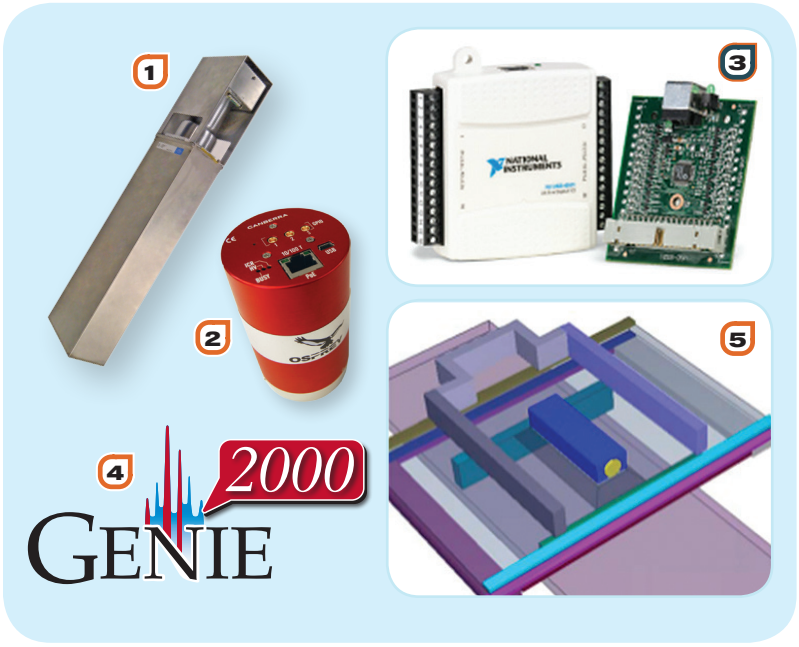
Instruments & Techniques Used:

1. 4L NaI detector Temperature-Stabilized
2. Osprey Analyzer
3. National Instruments Digital I/O Device
4. PAMS and Genie 2000 Spectroscopy software
5. MCNPX calculation code





CANBERRA Solution:

Feasibility Study

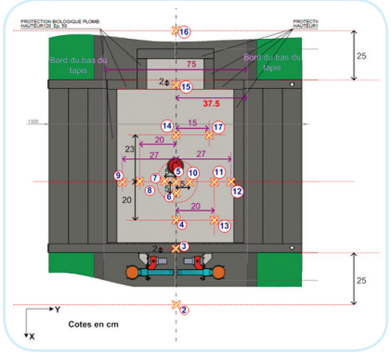
- Define detection technology, detector specifications and online software option adapted to the requirements.
- MCNP modeling of the detection system to carry out efficiencies and MDAs.

System setup and installation

- Detection performed with a large volume NaI detector, equipped with temperature compensation.
- Spectra were acquired every second and analyzed by CANBERRA special application PArameter Monitor Software (PAMS), using Genie 2000 algorithms.

Calibration

- Efficiency calibration was performed for ^{137}Cs and ^{241}Am using MCNPX code, at several conveyor speeds.
- Calculation of related Total Measurement Uncertainties (TMUs).
- The customer could select the speed of the conveyor, according to his needs.
- Setting of an alarm threshold, above which a paint sprayer managed by PAMS software is activated to mark contaminated soil.



ACHIEVEMENTS

- System designed and implemented in less than 2 months, exceeding customer's specifications.
- More than 5000 m^3 of soil have been monitored.
- Reliable system working 5 days a week and 6 hours a day without any issue since day one.
- The system meets all the environmental constraints (high humidity level, strong temperature variations,…).
- Upfront feasibility study ensured AREVA La Hague that the system would meet the technical specifications, thus reducing the risk of the project and assuring the customer of their ability to meet the ASN requirements and deadlines.