Footprint Reduction: strategy and feedback of the Dutch historical waste management program

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Original situation:

The historical waste program has been launched to remove the historical waste from Petten to the Dutch central radioactive waste storage facility, COVRA. Within this project, 1700 legacy drums should be treated, sorted and sent to the repository. In 2007, the RAP project was started to achieve this goal.

Strategy and update:

The project has encountered several modification with regard to its approach keeping along the IAEA guideline. The current strategy includes the sorting of the waste drums on the Petten site into 3 categories of waste. Those categories are designed according to the respective activities of waste: Low level activity and 2 Intermediate level activity ("Intermediate low" and "intermediate high"). Low level waste drums will be transported for direct storage at COVRA, while the intermediate level activity drums will first be supercompacted and cemented by a foreign service provider before being stored at the COVRA facility. [1]

The resulting challenge for the Petten site lies on the process steps that consists of segregating, sorting, characterizing and packaging each drum. The sequence of event for the drum is explained on figure 1:

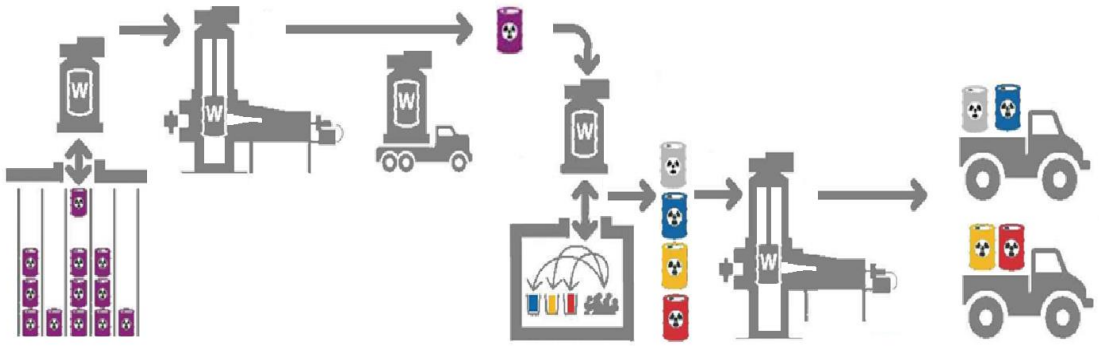

Figure 1: Logistic of the sorting of the waste drums

The logistic aspect of the retrieval is a key point to run the project on "semi-production" mode, i.e. creating consistent waste streams to the disposal. Thus, the retrieval of the drums is organized to treat and sort the drums by "family". Considering the information that retrieved from the archives and the limitation of some infrastructure (to treat for instance alpha emitting waste), it was essential to perform a pre-selection of the waste to be treated. Looking closely at the drums description available in NRG's archives, a pre-sorting of drums and a gathering into families was carried out. A family represents a

group of drums possessing, to a certain extent, the same content and therefore creating the same waste stream.
The plan is to proceed from a simpler family (containing one type of material) to more complex families (containing leftovers of fuel or not documented at all).This way NRG will gain in know-how in terms of footprint reduction parallel to an increase in the complexity of the drums content.
The waste sorting of the first family (representing drums containing the old reactor vessel dismantled and replaced in 1984) occurred over the last few month. (see figure 2 for an example of the actual waste sorting)

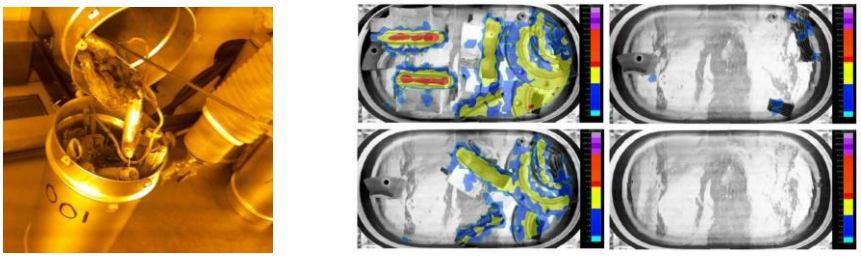

Figure 2: Example of a drum to be sorted and sorting process

Feedback, lessons learned and way further:
Beginning of October, the three first low-level waste drums were sent to the storage facility. Those drums contained mainly parts of the old reactor vessel of the reactor changed in 1984 and some secondary waste from the processing. To comply both transport and storage, a nuclide vector was calculated for the reactor vessel's irradiation during operation considering extremely conservative assumption. COVRA, the storage facility, sent a very positive feedback on the approach taken (pre-sorting, sorting, calculation and reporting)
Still, concerns have been conveyed concerning the high value calculated for some nuclides (Ni-63 and Fe-55 especially). NRG is reconsidering this vector by implementing more optimistic assumptions to study the impact of conservatism on the results.
Overall, the approach showed on figure 1 proved to be an efficient process to deal with historical waste which requires a constant optimization, through feedbacks, calculation and overall communication.

Conclusion:
Nuclide vectors represent an excellent tool to move forward in helping sorting and characterizing waste in general, but also historical waste. They are in any case extremely hard to determine for the historical waste and require altogether a tremendous amount of work and an excellent organization to obtain a workable results.
The overall approach to treat historical waste remains a challenge, communication between the different stakeholders of the project is more than ever the key point, in addition with an active attitude and constant reconsideration of assumptions taken.

References

[1] A. van Heek, R. Groothuis, B. Janssen, B. Metz, "Sorting of mixed historical waste in a hot cell", Presentation at KONTEC 2015, 25-27 March 2015.