

Reduction of radioactive waste by improvement of conditioning facilities

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INTRODUCTION

The NES (Nuclear Engineering Seibersdorf) is the only radioactive waste conditioning and storage facility in Austria. It manages waste originating from research, industry and medicine. Its main goal is, not only to treat and store waste safely, but also to optimize processes to further reduce the waste volume. To achieve this goal, the New Handling Facility was built. In this paper we will show how the waste volume can be easily reduced by optimizing the conditioning and waste stream process. The NES owns a water treatment plant for cleaning of active waste water, an incineration plant that is used to burn radioactive waste.

SCOPE

Since 2003 the NES is handling and storing radioactive waste. The conditioning process includes a water treatment, a burning facility and a pre- and or post-conditioning facility for non-burnable wastes, as well as pre-conditioning for burnable wastes. For all waste that is non burnable or needs pretreatment in form of decontamination, demounting, cutting, or post treatment(drying) it was decided in 2008 to further improve the conditioning facility and build the New Handling Facility (NHF), to enhance radiation protection, to reduce the waste volume further, and to have a state of the art facility.

In the paragraphs below the main steps and improvements of this project will be described.

MAIN STEPS

The New Handling Facility (NHF) will improve the waste management of the NES tremendously. The NHF consists of 3 separated underpressurized areas, which will prevent



Figure 1: Schematics of the NHF with 3 Zones.

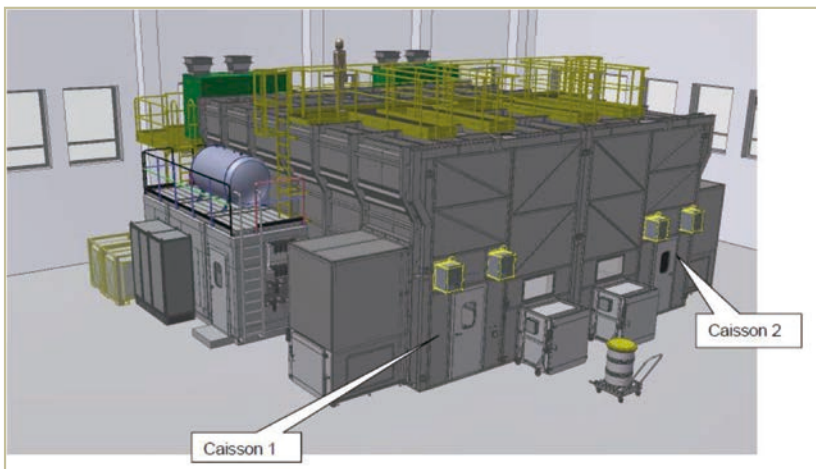


Figure 2: A drawing of the Caissons, with the people lock system.

any radioactivity from being emitted uncontrolled into the environment. In Figure 1 the different zones are shown. Red has the highest underpressure, and those are the zones where work with open radioactive sources is possible, and it includes additional locks for the personnel. The yellow areas represent a lower contamination risk; in grey areas no

work with radioactive material is foreseen. In the next paragraphs I will shortly present the major improvements of the NHF.

IMPROVEMENTS

Caissons

It is necessary for further conditioning processes to pretreat waste, even if waste is contaminated. To enable

theses processes without enhancing the risk of exposing workers to contamination the caissons were built. This system enables to unload waste contamination free from barrels inside or outside of the caisson, if outside with the help of a "Double-lid Transfer Lock" (see figure 3), if inside with the help of a barrel lock. It is also possible to bring shipping containers or bigger material into the caisson and unload and treat waste that is delivered with. There are two Caissons (see figure 2) built back to back which enables quick and safe working. All personnel works with full protective suits and breathing air supply. All work inside the caisson is meant to demount and deconstruct material that is too big to enter the incineration facility directly or for further compaction in the compactor. Plasma oxygen cutting, welding, and all kind of cutting or sawing are possible inside.

Highpressure Compactor

The most important device for reducing the waste is the new high pressure compactor. It is used for automated compaction of 170 l barrels with 1500 t. It replaces the old 1000 t press. In addition all barrels are pierced before compaction to enable gasses and liquids to exit. With a mobile offtake, it is ensured, that all gasses and aerosols are filtered and sucked into the building ventilation system, and a continuous liquid offtake removes all liquids into the liquid treatment facility. All components that are in contact with possibly contaminated materials can be exchanged, and the compactor has features for handling several dimensions.

Hot Cells

The new hot cell has a direct storage facility underneath the cell. The cell can be operated from two sides, facing a 90° angle. All motors and electrical parts for the crans and controlling devices of the cell are mounted outside to enable easy and safe maintenance. It is used for the handling of High activity sealed radioactive sources (HASS).

WASTE STREAM IMPROVEMENT

The NHF enables a clear waste stream management. With the definition of 3 zones (red, yellow, grey) it was made clear how to transport and manage the different waste categories. Several lock systems ensure that no radioactivity can be released uncontrolled into the environment.



Figure 3: Double - lid Transfer Lock.

All fork lifts and transportation systems are clearly dedicated to the zones and are not allowed to cross barriers. An interlocking systems of the doors ensured the underpressure zones.

Material will enter the the NHF either through a barrel lock or is brought in by trucks through the material lock. The barrels will then move in direction of the caissons, where the double -lid transfer lock or the barrel lock ensure that no contamination exits the caissons uncontrolled.

Waste will exit the caisson the same way it entered, and moves then in direction of the high pressure compactor and afterwards into the drying facility.

Also a decontamination room is available on site. This makes it possible that all major waste streams are performed in one building. Raw waste that is delivered can be cleaned, demounted without exposure or contamination risk, compact-

ed and dried. HASS sources can be handled and stored safely without exposure risk in the hot cells. All burnable waste is preconditioned and prepared for the incineration plant.

CONCLUSION

The NHF enables a smoother and safer conditioning of radioactive waste. It is a state-of the-art facility and the most modern in Europe. Due to new facilities like the Caissons and the high pressure compactor it is easily possible to sort and treat waste to a minimum volume. This ensures a safe conditioning process of all kinds of waste for later storage.

REFERENCES

- [1] R.Koppitsch, Neues Handhabungszentrum Nuclear Engineering Seibersdorf, vorläufige Sicherheitsanalyse, Seibersdorf (2014).■