



Case study

Intermediate Level Waste (ILW) store: ventilation performance assessment

THE CHALLENGE

In order to support decommissioning of the Nuclear Decommissioning Authority site at Dounreay in Scotland, a waste handling and storage facility needed to be constructed.

Included in the designs was a drum store capable of holding Intermediate Level Waste (ILW), which could contain up to 8000 drums - each one containing nuclear waste material that released heat as the radioactive material decayed inside. As such, the integrity of the ILW drums over the storage period demanded strict control over its storage environment.

Frazer-Nash was asked to assess the humidity levels from three ventilation options and provide technical support in the final decision about which ventilation system to use. We were also required to confirm that the ventilation system and flowrates would ensure the temperatures at the roof did not go above the rated temperature of the crane used to move the drums around the store.

OUR SOLUTION

We began by constructing a Computational Fluid Dynamics (CFD) model to realistically represent an individual bay in the drum store. We then used this model to analyse the water vapour released from the drying concrete walls, and the three ventilation systems were assessed for maximum and average humidity.

We found that the humidity levels from all three ventilation systems were tolerable. However, when using a worst-case scenario heat release pattern, we discovered that the heat released from the drums could generate temperatures at the roof in excess of the rated crane temperature. We also found high temperatures inside the drum bays.

BENEFITS

Before this study was carried out, the major issue was believed to be the humidity levels within the drum bays, and little concern had been raised about the air temperature.

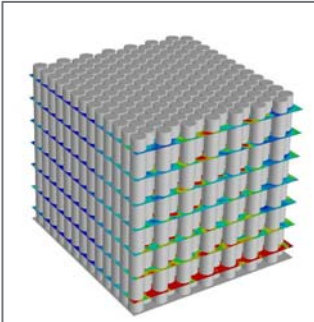
However the results from our computer simulation model showed that degradation of container integrity due to humidity levels was not an issue, and our client can therefore choose a much less-powerful dehumidifier in the ventilation system, and make considerable savings in both capital and operational costs.

The design has now been amended to focus on ways to reduce the peak temperatures resulting from air flow.

Client
Nuvia Ltd

Business need
Assess the likely cause of container degradation in a storage facility handling nuclear waste to optimise countermeasures used

Why Frazer-Nash?
We have considerable experience in the nuclear sector



Airflow velocity within drum store

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