



Case study

Intermediate Level Waste (ILW) Store: Ventilation Performance Assessment

ISSUE

In order to support decommissioning of the NDA site at Dounreay, a waste handling and storage facility is to be constructed. As part of this facility, a drum store to hold Intermediate Level Waste (ILW) is being designed. Once full, the store will contain up to 8000 drums with each drum containing nuclear waste material that releases heat as the radioactive material inside decays.

The integrity of the ILW drums over the storage period demands strict control over the environment within the store. Nuvia Limited asked Frazer-Nash to assess the humidity levels from three ventilation options and to provide technical support in the final decision about which ventilation system to use. As a secondary requirement, the client requested confirmation 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.

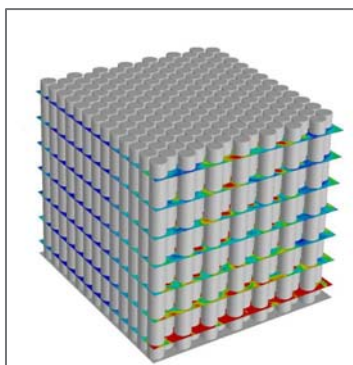
SOLUTION

A Computational Fluid Dynamics (CFD) model was constructed of a representative bay in the drum store. The water vapour released from the drying concrete walls was modelled, and the three ventilation systems were assessed for maximum and average humidity.

The humidity levels from all three ventilation options were found to be tolerable. However, when using a worst-case scenario heat release pattern, the heat released from the drums was found to generate temperatures at the roof in excess of the rated crane temperature. In addition, high temperatures were found within 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 our results show that degradation of container integrity due to humidity levels will not be an issue. These results will support the use of a less-powerful dehumidifier in the ventilation system resulting in significant savings in both capital and operational costs. In addition, the high predicted temperatures have re-focused the design on ways to reduce the peak temperatures.



Airflow velocity within drum store

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?

Frazer-Nash expertise in the nuclear sector has grown for many years to become one of the most renowned consultancy in the nuclear sector.

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