

# Information Bulletin

## Waste Container Damage Due to Thermal Cycling and Inadequate Venting

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**Summary:** When procuring large metal boxes or other similar containers, give adequate attention to the potential for thermal cycling and possible pressurization which may damage the containers if sufficient venting is not provided.

**Discussion of Activities:** Fifteen large metal boxes (e.g. 20' x 18' x 10') were purchased for the onsite transportation and storage of radioactively contaminated wastes at Hanford. The vendor designed and built the containers in accordance with a Hanford procurement specification. The vendor certified each container in a test and evaluation report. Prior to painting, all interior and exterior welds were inspected by the vendor's certified weld inspector. Following final preparations, the boxes were shipped to Hanford. Upon receipt, the boxes were inspected in accordance with a Quality Assurance Inspection Procedure (QAIP) and accepted for use. The QAIP however, did not require an inspection of interior welds since they were painted thus preventing an effective visual inspection.

While one of the boxes was being prepared for loading, possible weld imperfections and minor weld cracks were discovered on the interior wall stiffeners. Planned shipments of the boxes were immediately suspended, an NCR issued, and an investigation initiated. Inspection of the remaining boxes identified similar issues on 5 additional boxes. The potentially damaged welds were all located in box corners where internal wall stiffeners were joined.

**Analysis:** During the investigation, the internal box welds were inspected by a certified weld inspector and engineering calculations were performed to determine possible failure modes. Although not conclusive, it appears some of the larger boxes were not adequately vented to allow for thermal cycling of the air inside. This thermal cycling likely caused the larger boxes to pressurize and flex the weld joints sufficiently to develop minor weld cracks. The larger boxes were designed with up to eight vent ports each, however during transport to Hanford all but two ports were closed with plugs to prevent water and dirt from entering during transport, and during onsite storage prior to use. The two open ports had vendor supplied filter-vents which may not have provided adequate venting to the boxes. As an immediate action, an additional vent port was opened on each of the empty boxes. As a note, the outer skin of the boxes forming the box containment/confinement barrier did not at any time show evidence of damage.

As a path forward, calculations were performed to confirm the correct number and types of filter/vents required to adequately vent each box for Hanford onsite transport and storage.

**Recommended Actions:** The *Packaging Management Program* procedure, applicable Procurement procedures and Procurement Specifications for large metal containers are being modified to ensure thermal cycling and pressurization are adequately considered, and to ensure

vendors are given adequate instructions for the preparation and shipment of containers to the Hanford site. Large containers already onsite will be evaluated to determine if an adequate number of filtered vents are installed.

**Cost Savings/Avoidance:** The costs to repair these six large metal boxes could exceed \$50,000. The procedural changes recommended, when implemented, are expected to prevent similar events in the future.

**Work Function:** Packaging and Transportation, Procurement

**Hazards:** Defective

**ISM Core Functions:** Not Applicable

**Keywords:** Procurement, Packaging

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**References:** NCR-07-D&D-001