



# Conceptual Design of a Used Fuel Packaging Plant



Waste Management, Decommissioning and Environmental Restoration  
for Canada's Nuclear Activities, September 11-14, 2011

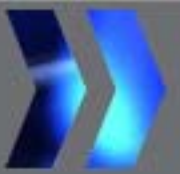
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**nwmo**

NUCLEAR WASTE  
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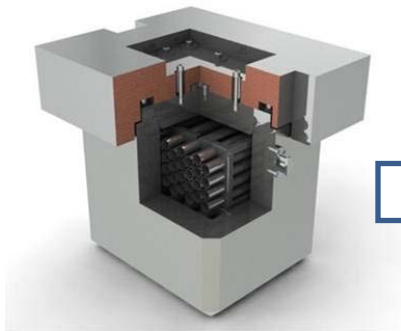
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# Background

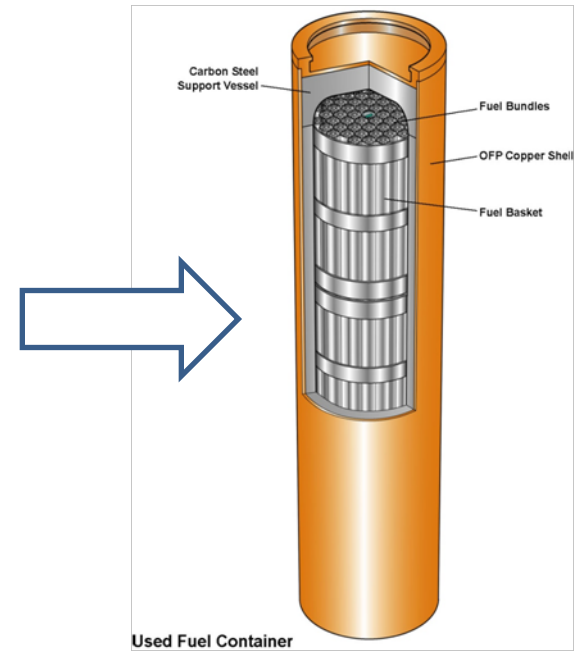


- Part of Adaptive Phased Management
- Conceptual design of the packaging plant updated by SKB International

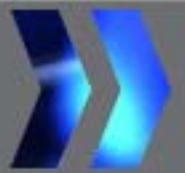
# Purpose



Used Fuel  
Packaging Plant



# Key Assumptions and Requirements

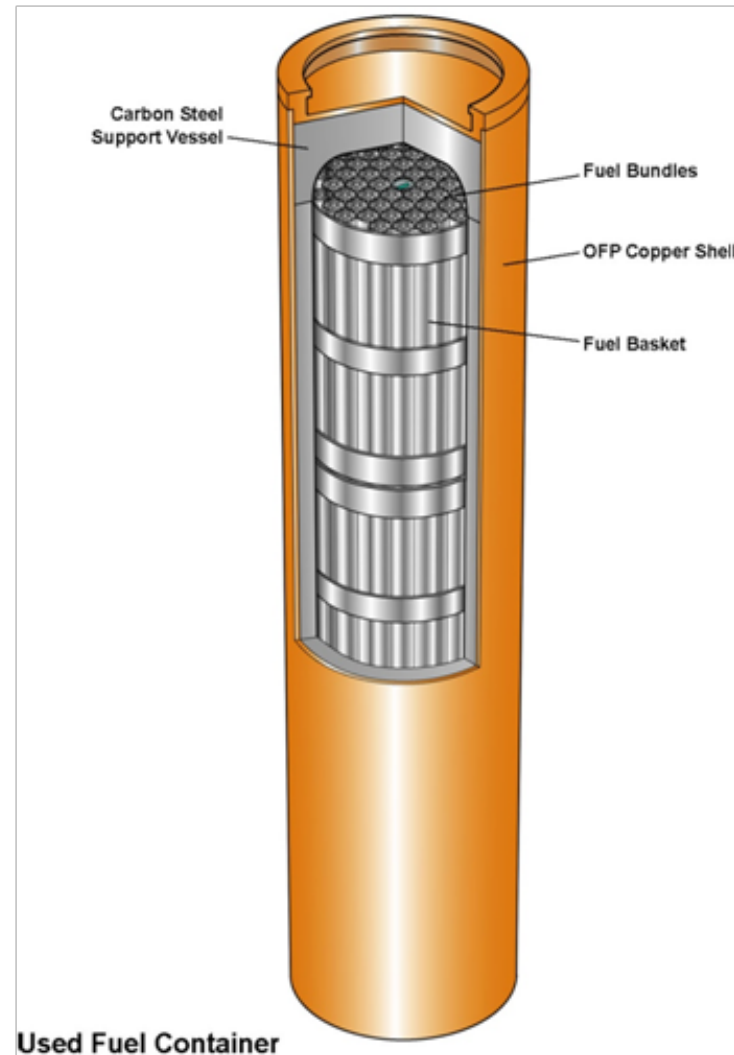


- Located at repository site
- Used fuel arrival by road
- Surge storage for fuel and containers
- 120,000 bundles per year
- 360-bundle container design

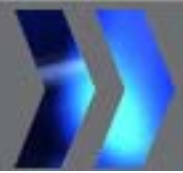


# Used Fuel Container – Reference Design

- 360 fuel bundles
  - Six layers
  - 60 bundles per layer
- Length  $\approx$  4 metres
- Diameter  $\approx$  1.2 metres
- Total mass  $\approx$  27 tonnes



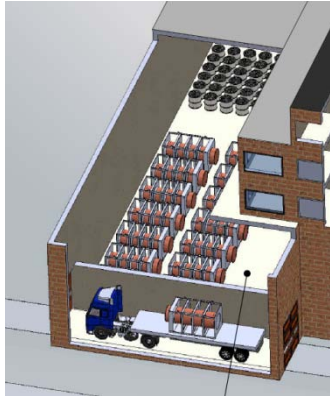
# Overview



- Legend:
1. Receiving and Shipping Hall
  2. Cask Preparation Cell
  3. Module Storage Pool
  4. Module Handling Cell
  5. Fuel Handling Cell
  6. Inerting Station
  7. Welding Station
  8. Machining Station
  9. NDT Station
  10. Filled Container Storage
  11. Dispatch Hall
  12. Receiving Hall for Empty Used Fuel Containers
  13. Shielded Frame
  14. Air-Cushion Transporter



# Empty Container Handling



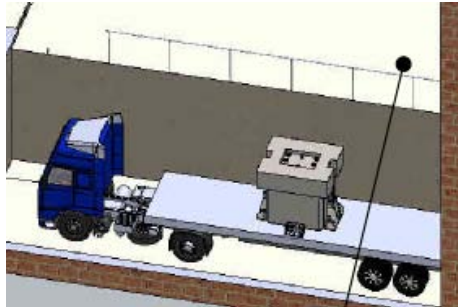
- ➔ Unload from trailer
  - ➔ Inspect and verify
    - ➔ Install in shielded frame



- ➔ Transfer to fuel handling cell
  - ➔ Raise and dock with cell
    - ➔ Remove fuel baskets

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# Used Fuel Handling



- ➔ Unload from trailer
  - ➔ Remove impact limiter
  - ➔ Dock with shielded cell



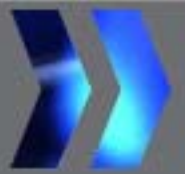
- ➔ Lift into cell
  - ➔ Transfer to adjacent fuel handling cell



- ➔ Push into fuel basket
  - ➔ Verify identity
  - ➔ Lower baskets into container



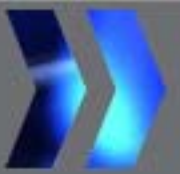
# Container Sealing and Testing



Separate stations for:

- ➔ “Inerting” and bolting of steel lid
- ➔ Welding of copper lid
- ➔ Machining
- ➔ Non-destructive testing

# Friction Stir Welding



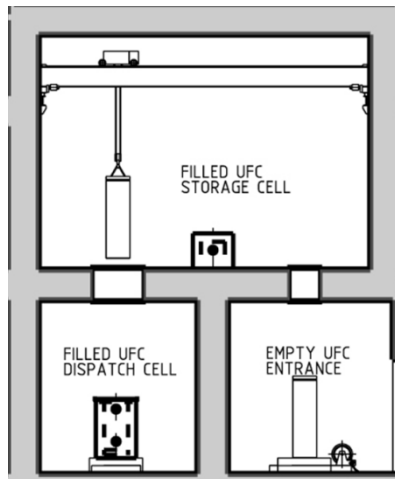
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# Container Storage and Dispatch



- ➔ Remove from shielded frame
  - ➔ Inspect and check for contamination
  - ➔ Transfer to storage position
- ➔ Failed containers are reopened

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- ➔ Lower into shielded transfer cask
  - ➔ Install cask lid
  - ➔ Transfer to rail wagon
  - ➔ Dispatch

# Conclusions

The used fuel packaging plant is:

- **Feasible** – but more work needed to optimize and demonstrate
- **Highly dependent** – on site location and container design
- **Important** – to ensure reliable delivery to the repository

