

YUCCA MOUNTAIN PROJECT

Studies

Alternative Designs

Presented to:
Nuclear Waste Technical Review Board

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Office of Civilian Radioactive
Waste Management

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Alternative Design Features

- **Thermal loading**
- **Waste package**
- **Ventilation**
- **Human access to repository**

Objectives and Activities

- **VA : Preliminary analysis of alternative designs**
 - **Develop designs and analyze using existing models**
- **LA: Full evaluation of alternative designs and features**
 - **develop designs and analyze using models modified for the purpose**

Thermal Loading

- **Area mass loading alternatives**
 - **> 40 MTU/Acre - boiling isotherms coalesce**
 - **< 40 MTU/Acre - boiling isotherms do not coalesce**
- **Considerations**
 - **Mobilization of water**
 - **Geochemistry**
 - **Structural effects**
 - **Cost (~50 km of additional tunnels)**

Total System Performance

- **Competing effects**
 - Move moisture away and keep away from waste
 - Kinetic effects of temperature on corrosion of corrosion allowance and corrosion resistant materials
- **TSPA calculations (using many TSPA -95 assumptions) suggest potentially improved performance from low thermal load**
 - Models are based on both low and high thermal loading phenomena
 - Models are being updated

Alternative Waste Packages

- **Design considerations**
 - **Corrosion resistance**
 - **Thermal output**
 - **Handling and emplacement**
 - **Cost**
- **Current design considers five basic designs**
 - **12 - 21 PWR assemblies**
 - **44 BWR assemblies**
 - **4 - 5 DOE HLW**
 - **Canistered commercial spent fuel**
 - **Canistered Navy spent fuel**

Alternative Waste Packages

(continued)

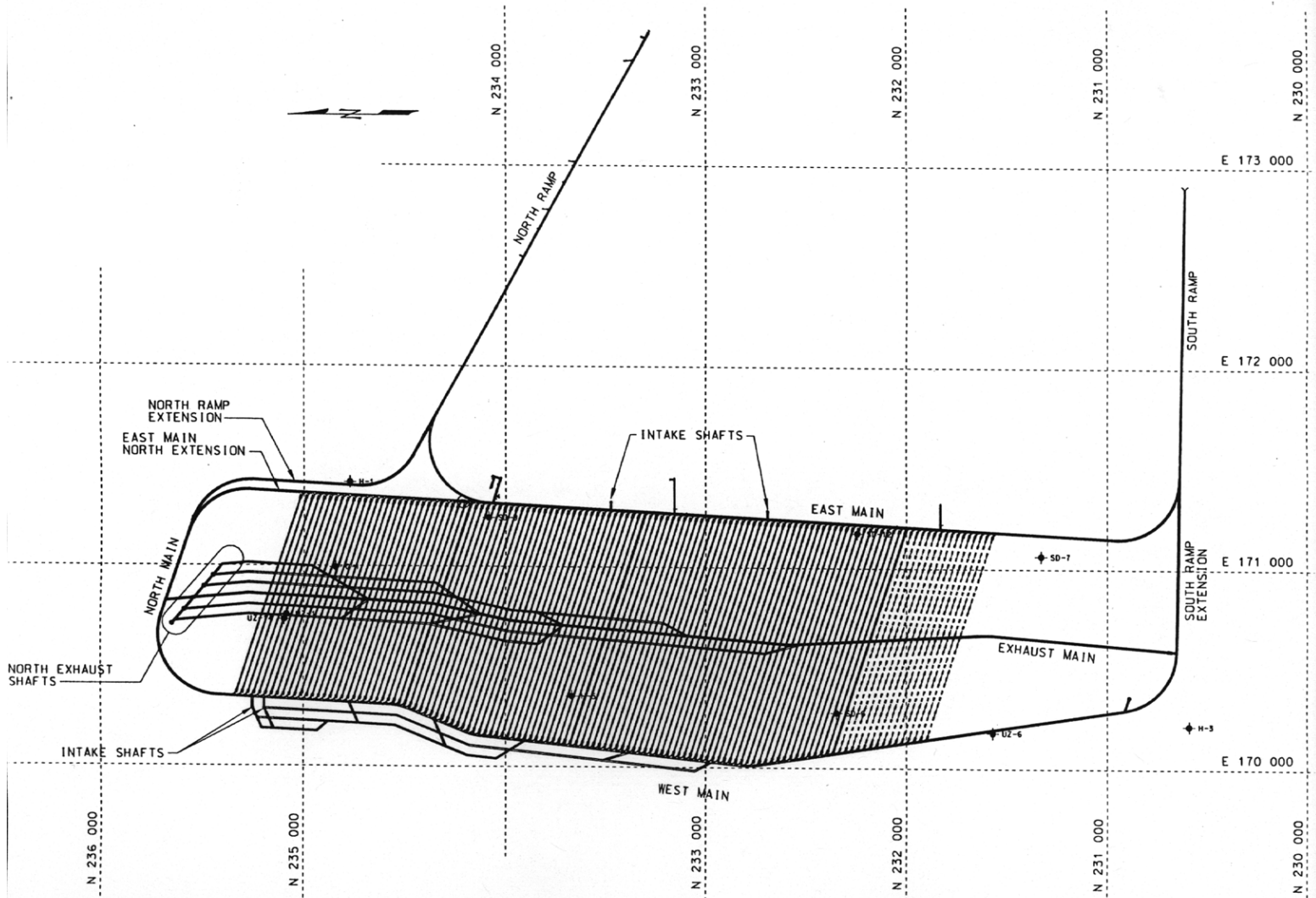
- **Options under consideration**
 - **Shielded and unshielded**
 - **Lower thermal output**
 - **Smaller capacity**
 - **Aged fuel**

Preclosure Ventilation

- **Options**
 - **Current design - 0.1 m³/sec flow through drifts**
 - **Alternative - 10m³/sec through drifts**
- **Considerations**
 - **Heat transferred to natural system**
 - **Moisture in near field**
 - **Cost**

Preclosure Ventilation

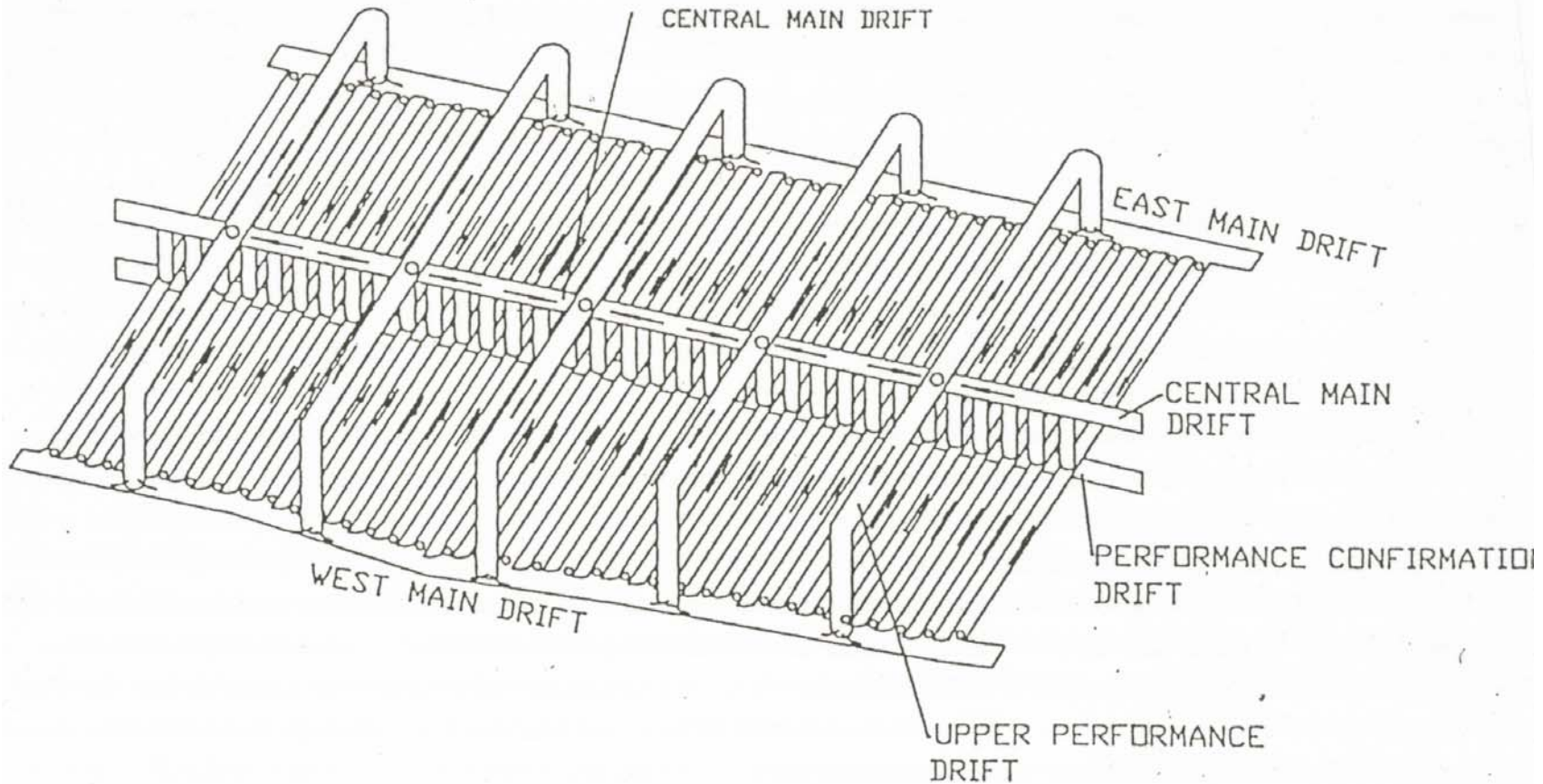
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Postclosure Ventilation

- **Options**
 - **Natural convection**
 - **Human induced and controlled**
- **Considerations**
 - **Feasibility**
 - **Heat and humidity**
 - **Cost**

Natural Ventilation of a Closed Repository (UNR Report to NWTRB)



NOT TO SCALE

Human Access to Repository

- **Option**
 - **Lower capacity waste package and/or aged fuel to reduce thermal output**

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