B/6

# Depleted Uranium Modeling:
## Approaches and Assumptions

Presentation to States
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# Presentation Overview

- Purpose and Objective
- Approach
- Assumptions
- Data Exchange
- Model
- Preliminary Findings
- Next Steps

# Purpose and Objective

- Purpose of Analysis
  - To assist in responding to the Commission direction provided in Order CLI-05-20 (October 19, 2005)
  - "Outside of the LES adjudication, [staff should] consider whether the quantities of depleted uranium (DU) at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55 (a)(6) or the section 61.55 (a) waste classification tables."
- Objective
  - Perform a PA analysis that defines conditions (if any) where DU may be suitable for near-surface disposal. Conditions include site properties, disposal technologies, and regulatory constraints (e.g., receptors, time period)

# Approach

- Build full-range model
  - Site conditions – arid and humid
  - Scenarios – include resident intruder
  - Depths – up to 30 m
  - Time periods – 1,000 to 1,000,000 years
- Policy decisions will select reasonable and appropriate conclusions to move forward

# Assumptions

- Scenarios result from:
  - Direct disruption of waste (intruder)
  - Two primary indirect pathways (resident):
    - Radon
    - Groundwater
- Intruder Receptors:
  - Chronic intruders - excavates or drills into waste layer for home construction, residence is located above the DU source, uses water if potable
  - Resident - residence is located adjacent to the DU source area (no indoor radon), uses water if potable
- Depths:
  - Less than 3 m – Excavation (would be most limiting)
  - Greater than 3 m but less than 6 m – Driller and Excavation
  - Greater than 6 m – Driller

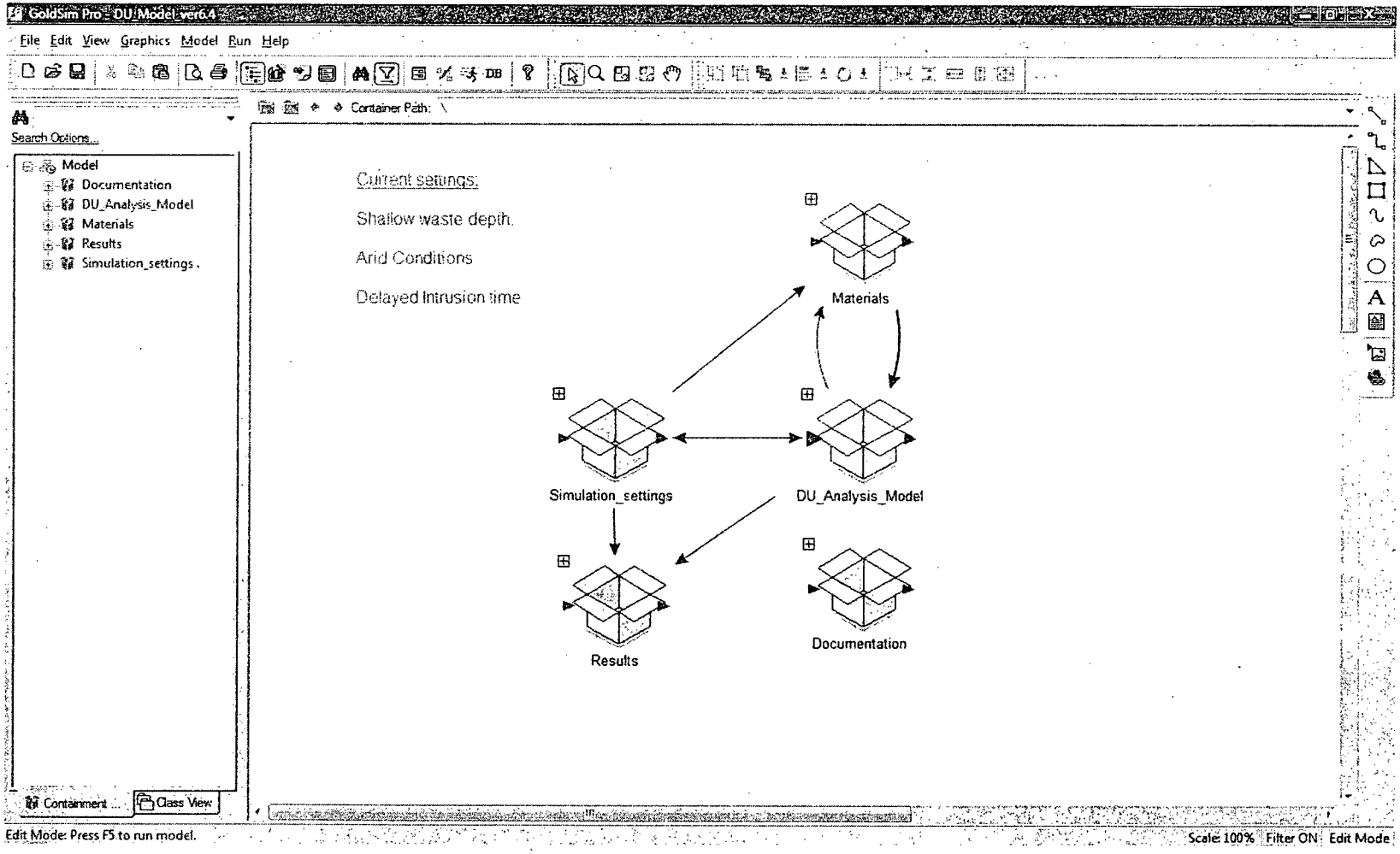
# Assumptions

- Source Term
  - Quantity
    - Current inventory at Portsmouth and Paducah
      - 700,000 metric tons $DUF_6$ or 7 - 8 million $ft^3$ (205,000 – 203,000 $m^3$) $DU_3O_8$
    - Facility lifetime production from LES and USEC (217,000 and 535,200 metric tons $DUF_6$)
  - Form
    - $DU_3O_8$ in steel containers
    - Assume 5 m thick layer
  - Physical properties
    - Low density (1.5 – 4 g/cc) powder

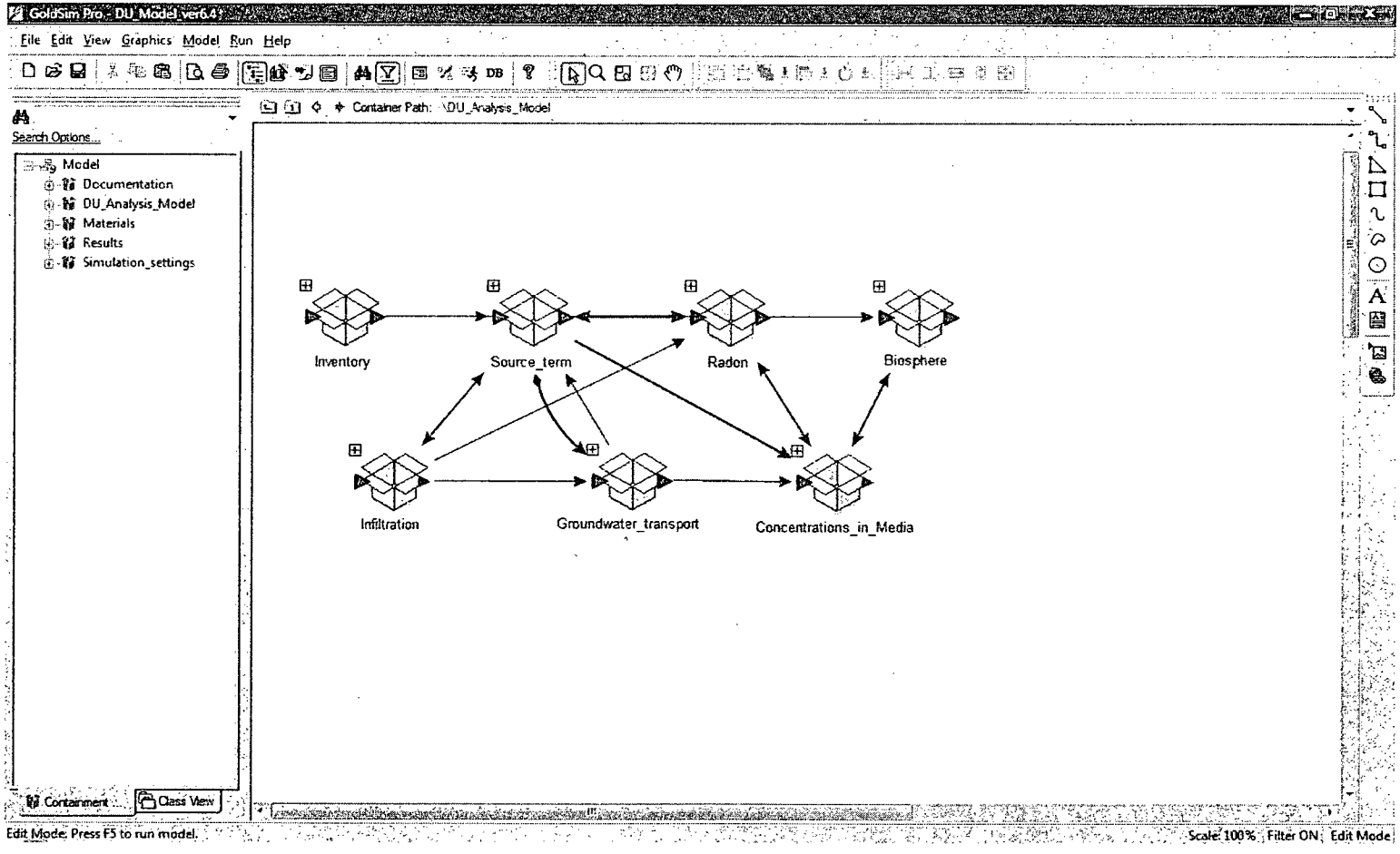
# Model

- GoldSim – source release, geochemistry, engineered barriers, unsaturated zone transport, saturated zone transport, radon emanation and transport
- Biosphere – dose calculations for direct disruption and indirect exposure pathways
- Radon – requires special consideration
- Sensitivity/Uncertainty Analysis
- Iterative development approach

# Model Elements and Linkages



# Submodels


GoldSim Pro - DU_Model_ver6.4
File Edit View Graphics Model Run Help
Container Path: \DU_Analysis_Model
Search Options...
Model
Documentation
DU_Analysis_Model
Materials
Results
Simulation_settings
Inventory
Source_term
Radon
Biosphere
Infiltration
Groundwater_transport
Concentrations_in_Media
Containment
Class View
Edit Mode. Press F5 to run model.
Scale: 100% Filter ON Edit Mode

# Preliminary Findings

- Radon dose may be most significant at arid sites
  - Soil saturation and radon transport is highly non-linear function
- Water pathways are most significant at humid sites
- Peak doses occur at 1,000,000 year timeframes
- Grouting the waste improves the likelihood of an arid site meeting POs

# Next Steps

- Complete model and perform analyses
- Summarize results for inclusion in SECY
- Deliver SECY to EDO - September 30, 2008
- Await Commission policy decision on how to proceed