GOLDSIM COMMENTS

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Presentation Outline

- GoldSim Description and Usage

- Various Technical Issues

- General Usage Issues

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GoldSim Description and Usage

- GoldSim design goals: *Versatility, Transparency, Extensibility, Reliability*.
  - User creates a graphical representation of the modeled system.
  - Like a visual programming language (C+++)…
  - *Requires the user to deeply understand their facility and the software*.
- Widely used in non-radwaste modeling:
  - Environmental, mining, processing, water resources, aerospace, business…

GoldSim RadWaste PA Usage

- Countries
  - Australia
  - Brazil
  - Canada
  - China
  - Czech Republic
  - Egypt
  - Finland
  - France
  - Germany
  - Japan
  - Korea
  - Lithuania
  - Macedonia
  - Netherlands
  - Pakistan
  - Romania
  - Slovakia
  - South Africa
  - Spain
  - Switzerland
  - Taiwan
  - United Kingdom
  - United States

- Low-Level Facilities
  - **United States:**
    - Oak Ridge EMWMF Mixed Waste Facility
    - West Valley Demonstration Project
    - Savannah River Site E-Area
    - Nevada National Security Site Areas 3 and 5 Radioactive Waste Management Sites
    - WCS Texas Compact Disposal Facility
    - Energy Solutions Clive, Utah facility
    - Waste Control Specialists' (WCS) Andrews County Facility, for the Compact Waste Facility and the Federal Facilities Waste Disposal Facility
    - Los Alamos National Laboratory (LANL) Technical Area 54 Remediation Feasibility Investigation
    - LANL Material Disposal Area (MDA) G LLW PA
    - LANL MDA H

  - **International:**
    - Drigg, Dounreay, UK
    - Wolseong, Korea
    - Rokkasho, Japan
    - Sites in Germany, Hungary, Slovakia, Ukraine, Brazil, elsewhere…

- Also used for HLW, ILW, D&D, environmental restoration.

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GoldSim Status Update

- Major new release around 2012 year-end:
  - Enhanced support for scenarios.
  - Built-in decay chains, dose factors (ICRP).
  - Enhanced ability to model dynamic flow systems.
  - Enhanced probabilistic analysis support.
    - "Result categories"…
  - Enhanced spreadsheet interface.

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Technical Issue: Code Capabilities

- Model QA/QC
- Model transparency
- Adaptability/flexibility
- Deterministic or probabilistic capability
- Sensitivity analysis capability
- Extensibility
- Ease of use and availability.

These are all important!

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Technical Issue: Model Purpose

- You don't need a sledgehammer to swat a fly.

    - But be careful: a simple model that isn't conceptually correct is a liability.

    - Generally, the price of simplicity is additional conservatism.

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Technical Issue: Uncertainty Analysis

- Avidly avoided in the LLRW arena.

- Lack of an in-depth uncertainty analysis makes a safety case fragile.

- Many types of uncertainty: parameters, processes, "the future", model uncertainty…
  - Model uncertainty has two flavors:
    1. Approximation effects (e.g., use of Kd's, grid discretization…).
    2. Alternative conceptual models: porous medium vs fractured medium.

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Model Design Process (compare to FEPs)

1. What are the components of the system?
2. What are the attributes of each component? ("*state variables*")
3. What are the behaviors of each component?
4. What are the interactions?
5. What are the external influences?

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Technical Issue:
Scenarios or Probabilistic Approach?

- Software should support both.

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General Software Usage Issue

- Most non-PA specialists are unaware of the range of FEPs and modeling issues required to do a good PA model.
  - This applies to both developers/consultants and regulators.
- PA software can't overcome this.

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