



RISK AND PERFORMANCE ANALYSIS OF DISPOSAL OPTIONS

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WHY DO RISK ANALYSIS? WHY DO PERFORMANCE ANALYSIS?

- Fundamentally, one must do analysis because no direct demonstration of performance is possible for a unique system that needs to work for many thousands of years.
- Two very different reasons for assessment:
 - To demonstrate that regulations are met
 - To understand the system in order to improve it

[Improve it??]

- **improve performance**
(risk to the public)
- **reduce cost**
- **reduce worker risk**
- **reduce environmental
disruption**

CHARACTER of the REGULATIONS

- **The obvious concern of the public is long term exposures to radioactivity.**
- **Any regulatory regime must cope with this concern, presumably by setting dose levels that must not be exceeded for a selected regulatory time period.**

CHARACTER of the REGULATIONS Continue

But the regulator's task is not a simple one

- How much confidence?
- What is the form of the compliance demonstration?
- Over what time period?
- Who are the “receptors” of the dose?
 - the “average” person?
 - the “most sensitive” people?
 - what behavior? (food, etc.)
- 5) Trade offs --- Operational vs. post-closure period

[THE ANALYST'S TASK]

➤ Input

- the design configuration
- site information
- the objective(s) of the analysis

➤ Lots and lots of data

- natural-system data
- engineered-barrier system data
- waste-form data

[THE ANALYST'S TASK]

- **Structure of the analysis**
 - fundamentally probabilistic in character
 - capturing all of the uncertainties is key

[THE ANALYST'S PITFALLS]

- Avoid the idea that the analysis is a prediction.
- Avoid arrogance about what the analysis does and
doesn't do (humility is better!)
- Emphasize the insights from the structure of the analysis --- they are almost always more robust than the “bottom-line” numbers.

[THE ANALYST'S FRIEND]

- Peer review

THE IDEA OF A “LIVING” ANALYSIS

- **New data**
- **Operational experience**
- **Better design methods**
- **Improved materials**
- **Changing perceptions of the risks**
- **Different operating modes (“retrievability”?)**
- **Better analysis**