

RISK INFORMING URANIUM RECOVERY

Present Status of Case Study

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OUTLINE

- **Background and Scope**
- **Case Study Plan Draft Questions**
- **Case Study Plan Draft Screening Criteria**
- **Observations**
- **Preliminary Conclusions**



BACKGROUND AND SCOPE

- **In April 2001, Brookhaven National Laboratory began the Case Study for Uranium Recovery**
- **Focus is Uranium Milling and In-Situ Leaching**
- **Work-In-Progress**
- **Background Information Available on Web at:**
<http://www.nrc.gov/NMSS/IMNS/riskassessment.html>

CASE STUDY DRAFT QUESTIONS

- **Designed to meet objectives related to**
 - **Current and Potential Value of Risk Information**
 - **Feasibility and Utility of Safety Goals**
 - **Information Needs for Risk-Informed Regulatory Approach**
- **These are categorized as**
 - **Screening Criteria Analysis/Risk Analysis Questions**
 - **Safety Goal Analysis Questions**
 - **Questions Upon Developing Draft Safety Goals**

URANIUM MILLING

- Focused on White Mesa site in Blanding, Utah, as an example
- Licensed by NRC in 1979
- Has processed 4 million tons thru 1999
- Mill Tailings on Site
- Only operating mill (currently scheduled for transfer to DOE in 2025).

IN-SITU LEACHING

- **Focused on Smith Ranch in Wyoming as an example**
- **Licensed by NRC in 1992**
- **Demonstrated Annual Production Capacity: 770 tons U**
- **Current Annual Production Capacity: 580 tons U**
- **Site has active & inactive wells and has recently been granted license renewal by NRC**

SCREENING CRITERIA ANALYSIS/RISK ANALYSIS QUESTIONS

Risk information currently available:

- NUREG -1531: Environmental Impact Statement for Atlas Uranium Mill
- 1996 ANS Conference paper on Atlas Uranium Mill:
“Risk/Cost Analysis: A Case Scenario in the Decommissioning of a Radiological Site”
- NUREG - 1508: Crown Point In-Situ Leach facility--informal use of risk information in assessing alternatives
- Risk Assessment by CNWRA on ISLs

SCREENING CRITERIA ANALYSIS/RISK ANALYSIS QUESTIONS (Cont'd)

Quality of Studies

Atlas EIS considers both accident risks and “incident-free” risks: alternative disposal option

Atlas Mill Risk Assessment paper supports its conclusions

CNWRA work based on NRC mission related to radiological releases: worker risk and environmental impact

SCREENING CRITERIA ANALYSIS/RISK ANALYSIS QUESTIONS (Cont'd)

Need for Additional Studies

Realism of scenarios

Assessment of uncertainties

SCREENING CRITERIA ANALYSIS/RISK ANALYSIS QUESTIONS (Cont'd)

Use of Risk Information by NRC and Licensees

- **NRC considers risks in transportation**
- **EIS's for Crown Point ISL and Atlas Mill**
- **Risk is already considered in Uranium Recovery**
- **NRC-sponsored Risk Assessment of ISLs by CNWRA**

SCREENING CRITERIA ANALYSIS/RISK ANALYSIS QUESTIONS (Cont'd)

Societal Benefit and Public Perception

- **Provides energy resource**
- **Public perception depends on site-- factors to consider:**

Environmental Impact and Public Health

Economic and Social Value to Community

SAFETY GOAL ANALYSIS QUESTIONS

Basis for the current regulations

- **Uranium Mill Tailings Radiation Control Act of 1978**
- **Standards set by Environmental Protection Agency**
- **Working Understandings with other Agencies**
- **10 CFR 2, 10 CFR 20, 10 CFR 40, 10 CFR 51, 40 CFR 190, 40 CFR 192**
- **10 CFR 40, Appendix A , Congressionally mandated, not risk-informed**
- **Development of 10 CFR 41 discontinued by NRC**

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Explicit or Implicit Safety Goals in Regulatory Documents

Generic Environmental Impact Statement(NUREG-0706):

“Operation of uranium mills and the management of mill tailings...to appropriately assure the public health and safety and the preservation of environmental values”

Framework Document (SECY 99-100): notes public and worker risks; provides four strawman risk metrics

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

**Basis for the development of the strategic goals,
performance goals, measures and metrics**

Current approach follows 10 CFR 40, Appendix A

Standards set by Environmental Protection Agency

Individual State Standards

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Safety goals, limits, or other criteria implied by decisions or evaluations

- **NRC Radiological Concentrations for Air and Water Effluent**
- **EPA Standard for Groundwater (MCL)**
- **Occupational Protection Guides and Standards**

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Tools/data needed for validation of safety goals for uranium recovery

Models and data for risks to workers during operation

Models and data for long-term and short-term environmental impact

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Populations potentially at risk

During normal operations: mainly workers

During off-normal events: nearby population

**After operations cease: those in contact with site,
including via liquid pathway exposures**

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Potential consequences to the populations at risk

Workers: industrial, transportation, and chemical risks;
exposure to radon, other radionuclides

Public: exposure to effluents from off-normal events (e.g. wind-blown particulate, groundwater contamination); transportation accidents

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Parameters to be considered for the safety goals

workers / public

individual / societal

off-normal events / normal operations

acute / latent fatality or serious injury

environmental and property damage

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Feasibility of developing safety goals for uranium recovery

Worth pursuing, would help to focus regulatory oversight

>>>need input from stakeholders

SAFETY GOAL ANALYSIS QUESTIONS (CONT'D)

Methods, data results, safety goals, or regulatory requirements to risk-inform similar cases

For some low-level waste facilities approaches could be similar

Byproduct material disposal

QUESTIONS UPON DEVELOPING SAFETY GOALS

To be addressed in next phase of project

DRAFT SCREENING CRITERIA

To be tested against specific case studies in order to develop final screening criteria.

Final screening criteria will be used as part of a framework for prioritizing the use of risk information in materials and waste regulatory applications.

DRAFT SCREENING CRITERIA (Cont'd)

- **Maintain or improve safety?**
- **Improve efficiency or effectiveness?**
- **Reduce unnecessary regulatory burden?**
- **Help to communicate a regulatory decision?**

DRAFT SCREENING CRITERIA (Cont'd)

- **Do sufficient information and models exist or could they be developed to support a risk informed approach?**

DRAFT SCREENING CRITERIA (Cont'd)

- **Can a risk-informed approach be implemented at a reasonable cost and provide a net benefit?**

DRAFT SCREENING CRITERIA (Cont'd)

- Do others factors exist which would preclude implementing a risk-informed approach?

OBSERVATIONS

- **Atlas Risk Studies showed how risk information can provide additional perspective**
- **ALARA principles demonstrated to be useful to regulation in this area**
- **Current CNWRA risk study suggests efficacy of risk-informed approaches**

PRELIMINARY CONCLUSIONS

- **Expanded use of risk information appears possible for uranium recovery**
- **Safety Goals may be feasible**
- **Screening criteria have been useful in this case study**