


U.S. Department of Energy
Office of Civilian Radioactive Waste Management

A Performance Confirmation Program Planning Approach

Presented to: Integration Group for the Safety Case, Sixth
Plenary Meeting, Topical Session on Monitoring

Presented by: **Abraham van Luik**
Prepared by: **Deborah Barr**
Office of Repository Development
U.S. Department of Energy
Las Vegas, Nevada

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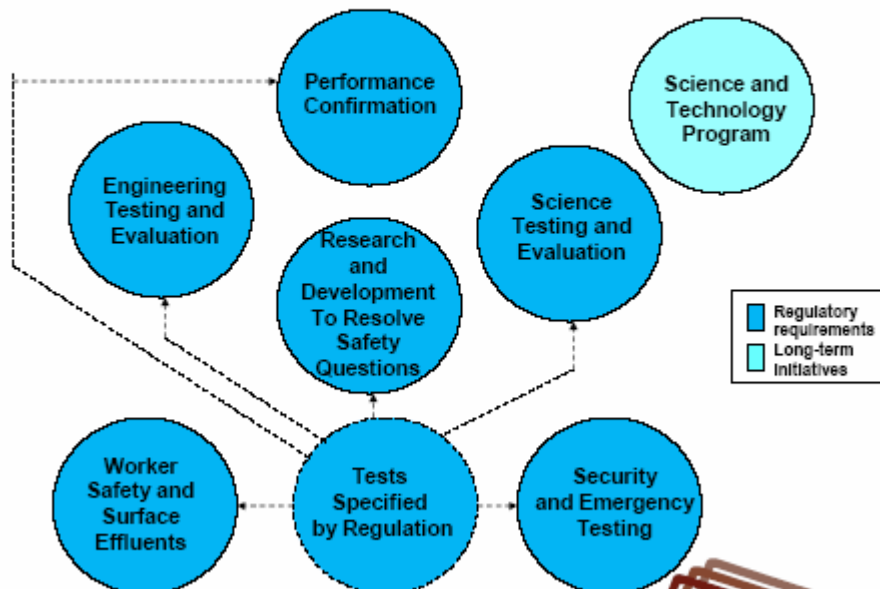
Outline of Presentation

- Objectives of a Performance Confirmation Program
- Testing and Monitoring Categories
- Decision Analysis Approach
- Performance Confirmation Activities
- Path Forward

Purpose of Performance Confirmation

- Performance confirmation is a program of tests, experiments, and analyses is conducted to evaluate the adequacy of the information used to demonstrate safety
- A performance confirmation program should demonstrate that the system and the sub-system components (i.e., barriers) are operating as anticipated

Performance Confirmation Activities



Performance Confirmation is Not the Only Testing and Monitoring Program

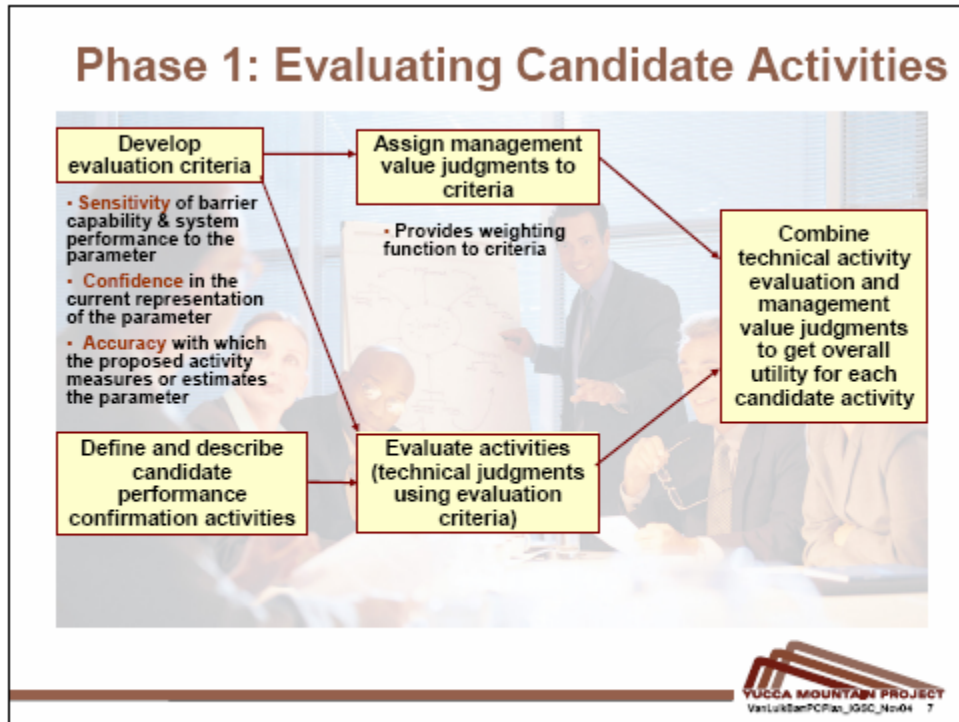
- **The Performance Confirmation Program focuses on**
 - Activities specifically designed to confirm the technical basis for the licensing decision
 - Testing the functionality of the barriers and total system performance
- **Other testing and monitoring programs focus on**
 - Increasing confidence
 - Meeting other regulatory requirements
 - Optimizing the waste isolation processes, specifically by exploring technological improvements that could enhance performance and reduce costs



Decision Analysis Approach

- Provides a consistent, logical, defensible basis for evaluating and comparing activities considered for inclusion in the Performance Confirmation Program
- Explicitly acknowledges that tradeoffs among different objectives and goals may be necessary
- Uses a formal multi-attribute utility analysis in its first phase to develop test and monitoring "portfolios" in a second phase for management use
 - A technically sound mathematical approach for evaluating alternatives where more than one objective is important
 - Has been used by federal agencies, and private companies since the late 1970s to evaluate complex decision problems
- Additional phases involved management reviews and adjustments stemming from applying value-judgments
- A final phase will be the continued reevaluation and updating of this plan





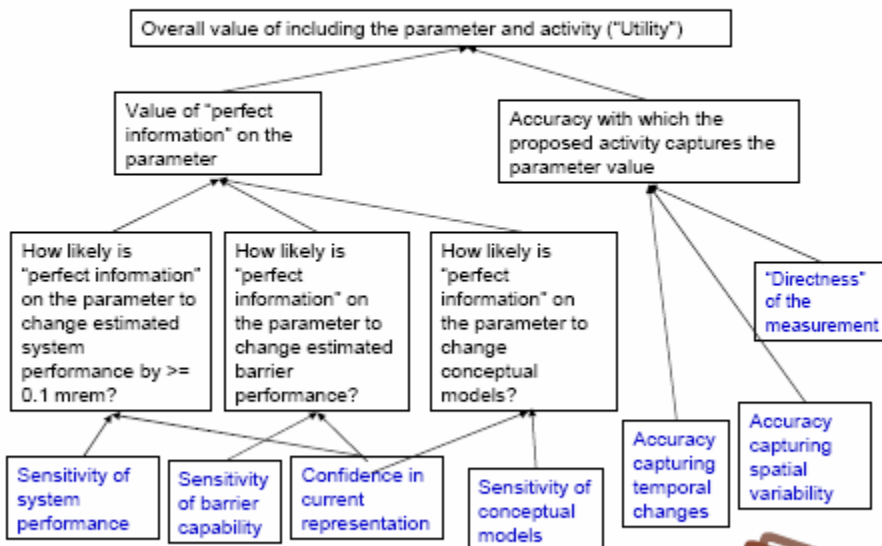
- ## Activity Evaluation Criteria
- At an initial workshop three criteria were defined, to be used in estimating the potential impact of a performance confirmation activity on the performance confirmation program:
 - Barrier capability and system performance sensitivity to the parameter
 - Confidence in the current representation of the parameter
 - Accuracy with which the proposed activity measures or estimates the parameter
 - Workshop participants included:
 - Technical investigators with various areas of expertise
 - Performance assessment analysts and managers
- YUCCA MOUNTAIN PROJECT**
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A Detailed Set of Questions was Developed Around Each Criterion

- The goal of the questionnaire was to elicit technical input on how well proposed parameters and activities meet the three criteria
- The goal of the questionnaire was to improve consistency across model areas
- Workshops were held with each group of technical experts
- During the workshops
 - Each group developed a comprehensive list of parameters to be considered
 - For each parameter identified, the group defined one or more data acquisition methods that could be implemented to provide information on that parameter
 - Several activities were evaluated in each workshop by the group, using the questionnaire



Estimating the Utility of a Specific Activity

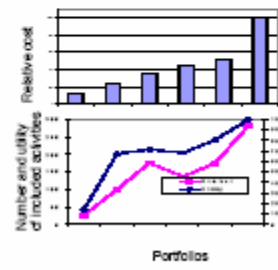
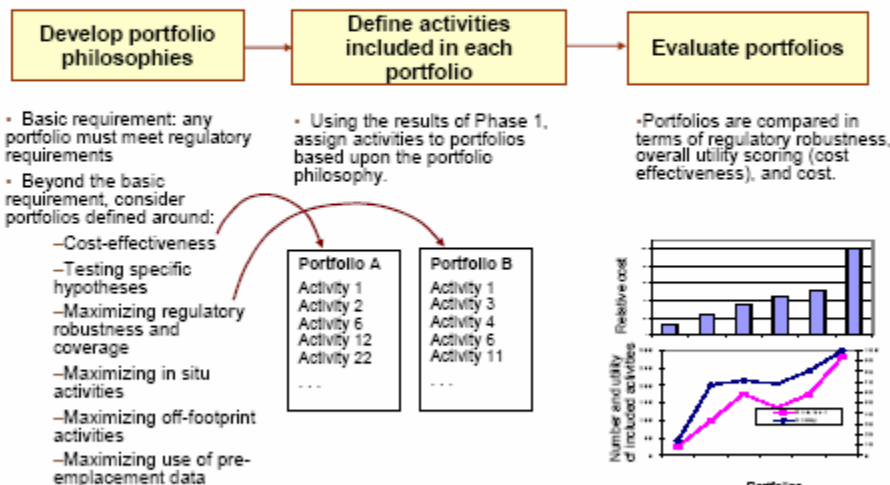


Performance Assessment Managers Provided the Necessary Management Value Judgments

- Managers reviewed the overall process and endorsed the specific criteria being used to evaluate activities
- Managers answered a series of tradeoff questions, designed around the technical questions used in the questionnaire, to establish management value judgments about the relative importance of the criteria
- Management value judgment used in conjunction with the technical judgments to establish the overall utility for each activity
- Participants included the manager of the performance assessment project and the manager and/or deputy for related subprojects: natural systems, engineered systems, performance assessment strategy and scope, and the performance confirmation manager



Phase 2: Developing and Evaluating Alternative Portfolios

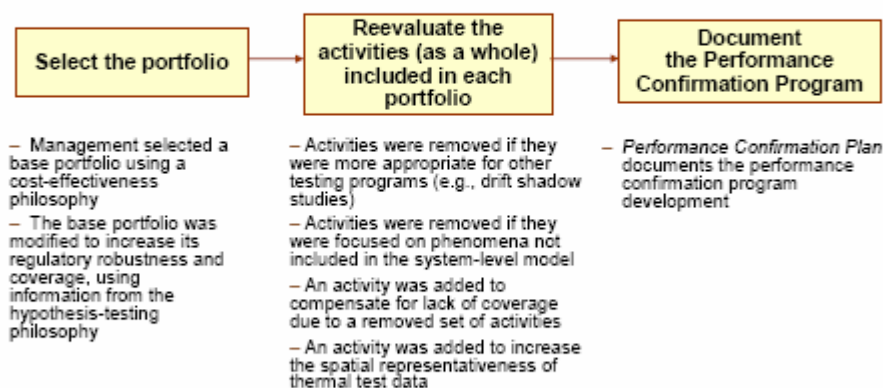


Rationale for Portfolios

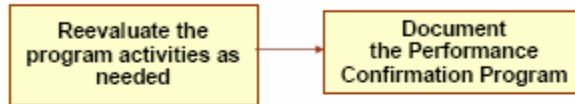
- Each candidate activity contributes to demonstrating compliance with one or more regulatory requirements
- The best portfolio does not necessarily result from ranking activities by utility, cost, or the ratio of utility to cost
 - Some regulatory requirements are not captured by the technical judgments and management value judgments input to the utility
 - Activity evaluations do not account for potential synergies
- Some costs cannot be assigned to individual activities (e.g., observation drift construction and remotely operated vehicle development)
- Portfolios of performance confirmation activities can be evaluated for regulatory compliance and for total cost



Phase 3: Selecting the Portfolio



Phase 4: Updating the Program



– Activities will be added, modified, or changed based on new information

– *Performance Confirmation Plan* documents Phases 1 through 4 of performance confirmation program development

Performance Confirmation Activities

- The process led to a series of twenty Performance Confirmation activities and tests
- Of these twenty, eleven were begun during site characterization:
 - Precipitation monitoring
 - Seepage monitoring
 - Subsurface water and rock testing
 - Unsaturated zone testing
 - Saturated zone monitoring
 - Saturated zone alluvium testing
 - Subsurface mapping
 - Seismicity monitoring
 - Construction effects monitoring
 - Corrosion testing
 - Waste form testing

Performance Confirmation Activities (continued)

- **Two of the twenty activities and tests are planned to begin during construction:**
 - Saturated zone fault zone hydrology testing
 - Seal testing
- **The remaining seven activities and tests are planned to begin during operations:**
 - Drift inspection
 - Thermally accelerated drift near-field monitoring
 - Dust buildup monitoring
 - Thermally accelerated drift environment monitoring
 - Thermally accelerated drift thermal-mechanical effects monitoring
 - Waste package monitoring
 - Corrosion testing of thermally accelerated drift samples



Path Forward

- **Define activities (what, when, where, and how)**
- **Establish expected baseline for performance confirmation activities (required by regulator)**
- **Identify and develop needed test plans and procedures**
- **Develop Integration Group to assess data as a whole**
- **Define process for defining, detecting, and reporting variances and for deciding on the appropriate action**

