YUCCA MOUNTAIN PROJECT

Studies

Organization and Rationale of License Application Plan

Presented to:
NRC/DOE Technical Exchange
License Application Plan

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

License Application Plan

Viability Assessment Volume 4

PURPOSE OF THE LICENSE APPLICATION PLAN
(Civilian Radioactive Waste Management Program Plan)

- To identify remaining scientific investigations and engineering information needed to complete the License Application
- To identify costs associated with securing this information

LONG-TERM GOAL

- Submitting a docketable License Application to the Nuclear Regulatory Commission

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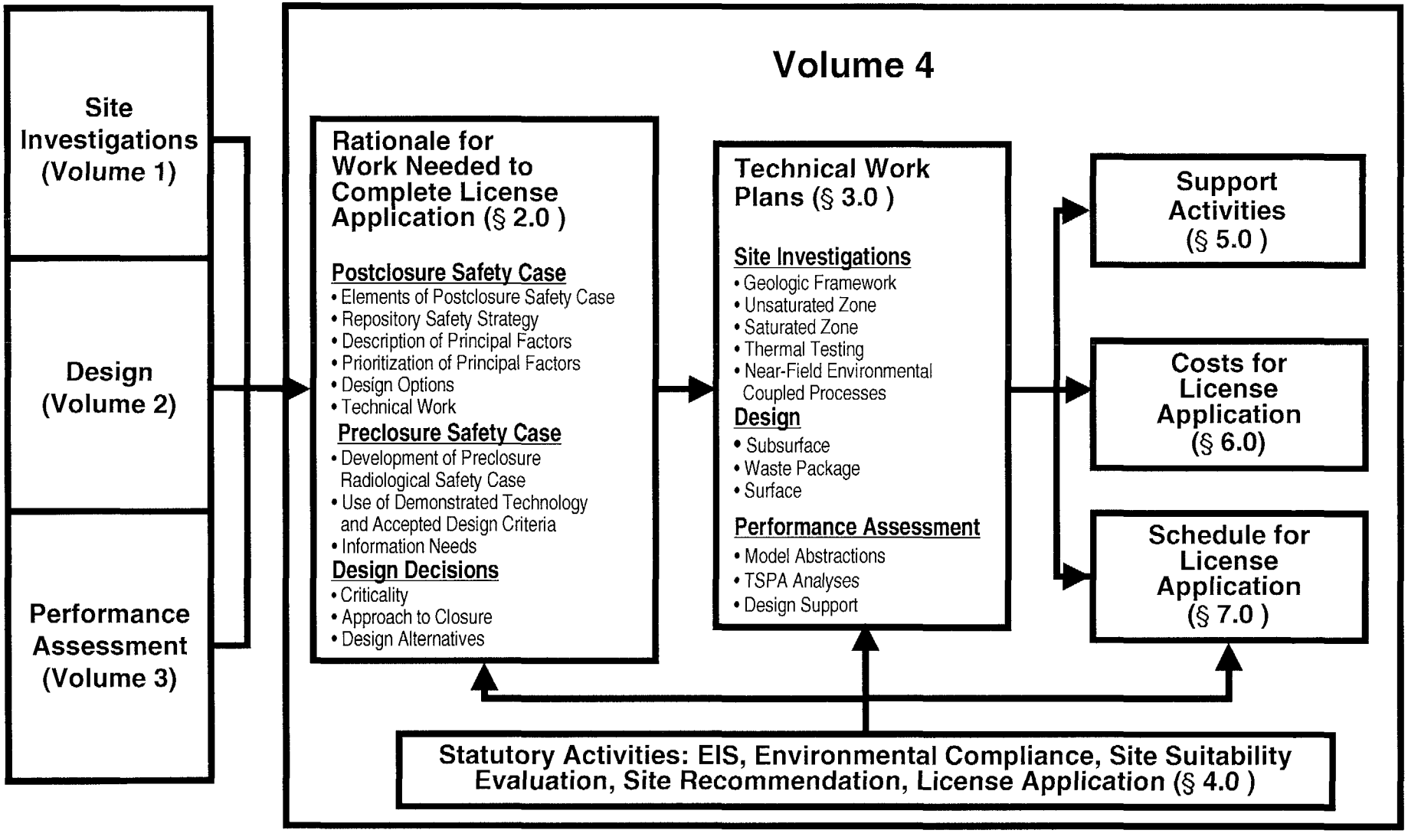
CONSIDERATIONS

- Opportunity to assess adequacy of revised approach to site characterization and design
- Draw on available models and data describing the natural system, repository, and waste package design
- Draw on Total System Performance Assessment
- Draw on strategy for evaluating waste containment and isolation (Repository Safety Strategy)
- Performance confirmation program continuing during construction and operation to further reduce performance uncertainties

License Application Plan in the Viability Assessment



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CONTENTS OF LA PLAN

Overview

1 - Introduction

2 - Rationale for technical work needed to complete the License Application

3 - Technical Work Plans

4 - Statutory and Regulatory Activities

5 - Support Activities

6 - Costs

7 - Schedule

8 - Reference

Appendix A - Glossary

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SECTION 2: RATIONALE FOR TECHNICAL WORK NEEDED TO COMPLETE THE LICENSE APPLICATION PLAN

2.1 Overview

2.2 Rationale for Technical Work Needed to Complete the Postclosure Safety Case

- Postclosure Safety Case
- Repository Safety Strategy
- Principal Factors of the Repository Safety Strategy
- Conditional Prioritization of Principal Factors
- Performance of Design Options
- Summary of Technical Work

2.3 Rationale for Technical Work Needed to Complete the Preclosure Radiological Safety Case

- Preclosure Radiological Safety Case
- Use of Demonstrated Technology and Acceptable Design Criteria
- Information Needs

2.4 Rationale for Additional Technical Work to Support Design Decisions

- Technical Work to Address Criticality Issues
- Technical Work to Address Approaches to Repository Safety and Closure
- Technical Work to Evaluate Design Alternatives

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2.2 POSTCLOSURE SAFETY CASE

- In the License Application, the postclosure Safety Case will provide the basis for determining whether or not a repository at Yucca Mountain will meet compliance standards with reasonable assurance

- The License Application Plan defines 5 elements of the Postclosure Safety Case to provide a framework for needed data and analyses

- The License Application Plan also summarizes technical work to address each element

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2.2 POSTCLOSURE SAFETY CASE
(CONTINUED)

- **Postclosure Safety Case elements**

  1 - Assessment of expected performance
  2 - Design margin and defense-in-depth
  3 - Consideration of disruptive processes and events
  4 - Insights from natural and man-made analogues
  5 - A Performance Confirmation Plan

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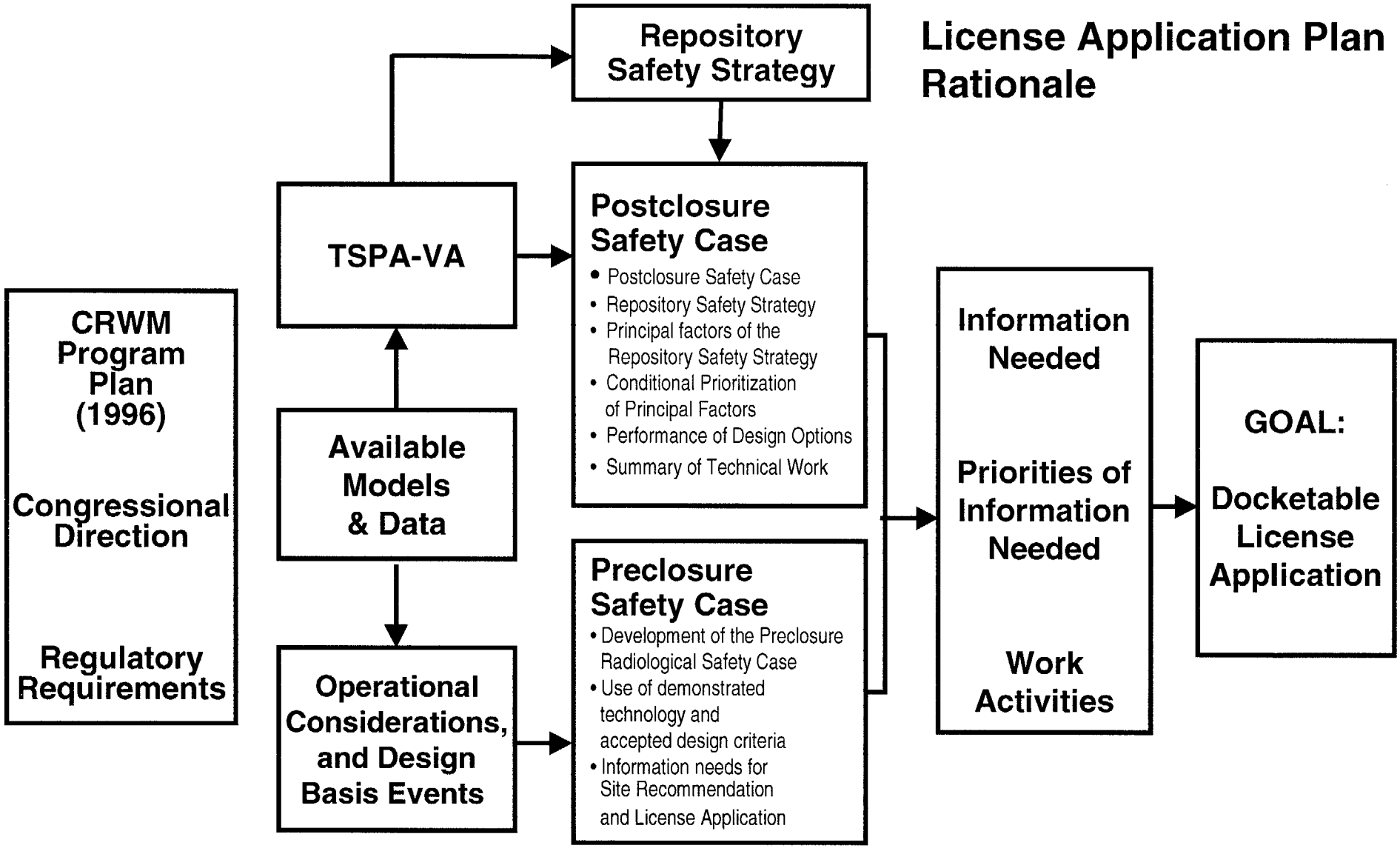
PRINCIPAL FACTORS

- **19 factors important to postclosure performance, termed principal factors, have been identified in performance assessment sensitivity studies for the VA base case with the reference design**
- **DOE has identified and prioritized its remaining technical work related to postclosure repository performance based on:**
  - The relative importance of each factor
  - The degree of confidence in the current representation of each factor in the performance assessment models
  - The confidence that could be obtained by the time of LA submittal through further testing and analysis

License Application Plan Rationale



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2.3 PRECLOSURE RADIOLOGICAL SAFETY CASE

- **Comprises the body of evidence necessary to demonstrate protection of worker and public health and safety while waste is being emplaced and monitored, before the repository is permanently closed**
- **Based on comprehensive safety analysis identifying facility operations and waste emplacement scenarios which evaluate:**

  1 - Design Basis Events

  2 - Safety classification of structures, systems, and components

  3 - Verification of system design for compliance with requirements

  4 - Use of demonstrated technology and accepted design criteria

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2.4 RATIONALE FOR ADDITIONAL TECHNICAL WORK TO SUPPORT DESIGN DECISIONS

- Technical work needed to support design decisions
- Conduct evaluations leading to selection of initial design for Site Recommendation and License Application

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SECTION 3: TECHNICAL WORK PLANS

3.1 Site Investigations

- Geologic Framework and Disruptive Events (Table 3-1)
- Unsaturated Zone Processes Group (Table 3-2)
- Saturated Zone Processes (Table 3-3)
- Thermal Testing
- Near-field Environment and Coupled Processes
- Performance Confirmation
- Management, Int. and Field Support

3.2 Design

- Subsurface Design
- Waste Package
- Surface

3.3 Performance Assessment

- Model Abstractions
- Total System Performance Assessment Analyses
- Design Support

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SECTION 4: STATUTORY AND REGULATORY ACTIVITIES

- **Environmental Impact Statement and Environmental Compliance**
- **Site Recommendation**
- **Licensing**
  - Licensing Activities
  - License Application Status and Schedule
  - Nuclear Regulatory Commission Interaction and Key Technical issues

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SECTION 5: SUPPORT ACTIVITIES

- **Field Construction and Operation**
  - Land Area, Facilities
  - Surface Testing Facilities
  - Exploratory Studies Facility
  - General Services
- **Other Support Activities**
  - Information Technology
  - Systems Engineering
  - Quality Assurance Program

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SECTION 6: COSTS

- Viability Assessment to License Application

SECTION 7: SCHEDULE

- Work described as necessary for License Application in Sections 2 & 3
- Statutory Milestones in the CRWM Program Plan were used to derive Project Summary Schedule
- Project Summary Schedule forms the basis for costs shown in Section 6 and Schedule shown in Section 7
- These activities are being used to revise the Multi-Year Plan

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CONSIDERATION OF KEY TECHNICAL ISSUES

- **Throughout Viability Assessment - Key Technical Issues have been correlated with specific discussions, when appropriate**

  Volumes:

  - 1. Site Description
  - 2. Design
  - 3. TSPA-VA
  - 4. License Application Plan

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CONSIDERATION OF KEY TECHNICAL ISSUES

(CONTINUED)

Volume 4

- Technical Work - Activities correlated with specific Key Technical Issues
- Section 4-3-3 Nuclear Regulatory Commission Interaction and Key Technical Issues
- Table 4-2 Location of Information Related to Key Technical Issues in Viability Assessment Vol. 1-4

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Locations of Information Related to Key Technical Issues in VA Volumes 1 through 4

Key Technical Issue	Volume 1 Sections	Volume 2 Sections	Volume 3 Sections	Volume 4 Sections
Igneous Activity	2.2.7		2.3.2, 4.4.2	3.1.1, 3.3.1
Structural Deformation and Seismicity	2.2.1, 2.2.7		3.4.1, 4.4, 4.4.3	3.1.1, 3.2.1, 3.2.2, 3.2.3, 3.3.1, 4.3.1
Evolution of Near-Field Environment	2.2.6	5.1.3	2.2.3, 3.4.2, 4.1.3, 4.1.4, 5.2.2, 6.5.1	3.1.2, 3.1.4, 3.1.5, 3.2.1, 3.3.1
Container Life and Source Term		5.1.3, 5.1.4	2.2.3, 3.2.2, 3.3, 3.4, 3.5.2, 5.5.1	3.1.4, 3.1.5, 3.2.2, 3.3.1
Thermal Effects on Flow	2.2.6		3.1.1, 3.2, 4.1.5, 5.2	3.1.1, 3.1.2, 3.1.4, 3.1.5, 3.2.1, 3.3.1
Repository Design and Thermal-Mechanical Effects	2.2.6	3.1.2, 3.3.4, 4.2.2, 4.2.7, 4.3	5.2.2, 6.5.1	3.1.1, 3.1.4, 3.1.5, 3.2.1, 3.2.2
Total System Performance Assessment and Integration			2.1, 2.3.3, 3.5, 3.6, 3.7, 3.8, 3.8.3, 4.4, 6.5.3	3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.2.2, 3.3.1
Activities Related to Development of the EPA Yucca Mountain Standard ^	Not Addressed	Not Addressed	Not Addressed	Not Addressed
Unsaturated and Saturated Zone Flow Under Isothermal Conditions	2.2.2, 2.2.3, 2.2.4, 2.2.5		3.1.1, 3.2.3, 3.3.1, 3.4.2, 3.6.1, 3.7.2, 4.1.3, 4.1.4	3.1.1, 3.1.2, 3.1.3, 3.3.1
Radionuclide Transport *	2.2.5, 2.2.6		5, 5.2.2, 6.5.1	3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.2.2, 3.3.1

^ NRC has indicated no issue resolution status report will be developed for this key technical issue.

* Issue resolution status report is not yet available. Subissue statements are expected to change when issue resolution status report is issued.

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CONCLUSIONS

- To ensure that we are able to meet our goal of submitting a docketable License Application to the NRC, the License Application plan presents a comprehensive safety case and a detailed rationale for needed additional work
- Technical work remaining to be completed for the Postclosure Safety Case receives the strongest emphasis
- Regulatory, statutory, and other activities are developed with lesser detail
- Consideration of Key Technical Issues are included throughout the License Application Plan, as well as throughout the Viability Assessment

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CONCLUSIONS
(CONTINUED)

- DOE believes that the License Application Plan has met the requirements of Congress and the CRWM Program Plan by identifying and prioritizing remaining scientific work, engineering, and other work necessary to submit a docketable License Application

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SUBSEQUENT PRESENTATIONS

Jean Younker	Evolution of the Postclosure Repository Safety Strategy and Safety Case
Jack Bailey	Performance Allocation and Identification of Needed Information
	DISCUSSION & EXAMPLES OF REMAINING TECHNICAL WORK
Jean Younker	Site Investigation
Richard Snell	Design
Holly Dockery	Performance Assessment
Jean Younker	Status of Quality Controls on the Technical Program
April Gil	Regulatory Program and Path Forward