YUCCA MOUNTAIN PROJECT

Studies

Viability Assessment Technical Issues, Path Forward, and the Project's Commitment to Quality

Presented to:
Nuclear Waste Technical Review Board

Presented by:
Russ Dyer, Project Manager
Yucca Mountain Site Characterization Office

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

January 26-27, 1999

Table of Contents

- Viability Assessment Technical Issues
- Preliminary Comments on the NWTRB November 1998 Report
- Commitment to Quality
  - Forces Driving Need for Change
  - Paradigm Shift and Nuclear Culture
  - Management Focus and Quality Initiatives
  - Project Reorganization
  - Path Forward
  - FY99 Priorities

Viability Assessment Technical Issues

- **The VA identifies the critical issues that need to be addressed before an evaluation of suitability can be made. This work includes:**
  - **Obtaining more information on volumes, rates, and mechanisms for water seepage into the repository, and transportation of radionuclides by groundwater beneath it**
  - **Testing the performance of candidate waste package materials and evaluating alternative repository designs**
  - **Continuing to analyze the interaction between the repository and the natural processes and improving our representation of the interaction in process models**
  - **Preparing an environmental impact statement, publishing it for public comment in 1999, and finalizing it in 2000**
- **Many issues and associated planned work address comments and recommendations offered by the NWTRB in its November 1998 Report**

November 1998 NWTRB Report

- **The DOE appreciates the Board's recognition of the Project's progress in characterizing Yucca Mountain and the Board's views on the scientific and technical activities of the Project**
  - **The report provides insight into the Board's concerns/ issues, and provides helpful recommendations to consider as we proceed forward**
- **Many of the recommendations for additional work parallel work identified in Volume 4 of the VA, the multi-year plan, and work currently underway**
- **A formal response to the Board's report is in preparation. At this time we can provide information as to where our work plans are in parallel with the Board's comments**

NWTRB Recommendations Unsaturated Zone Testing

- **Issue**
  - ***Testing at Busted Butte to assess transport of colloids and other aqueous species through the UZ should provide enough information to reduce uncertainties***
- **Project Plans**
  - **Planned Phase 1 work at Busted Butte including colloids transport has been completed**
  - **Phase 2 work is continuing and data will be available for TSPA-SR**
  - **Coordinating with the NTS to study Pu colloids near Buckboard Mesa**

NWTRB Recommendations Unsaturated Zone Testing

- **Issue**
  - ***Seepage under ambient conditions can be better estimated by experiments through proposed in situ experiments in the ESF, by analog studies, and by numerical simulations***
- **Project Plans**
  - **Continuing ESF seepage tests**
  - **Current planning efforts will identify funds to construct planned alcoves in cross-drift**

NWTRB Recommendations
Saturated Zone Testing

- **Issue**
  - ***Geochemical studies of groundwater are needed to determine the extent to which reducing conditions may exist in SZ groundwater***
- **Project Plans**
  - **Currently evaluating geochemical conditions (Eh-pH and associated geochemical measurements) in conjunction with the Nye County Drilling Program**
  - **Additional work is planned to evaluate geochemical conditions below the potential repository**

NWTRB Recommendations Saturated Zone Testing

- **Issue**
  - ***Geologic, hydrologic, and geochemical data, including information about long-range colloid transport, are needed for an improved understanding of the SZ***
- **Project Plans**
  - **USGS conducting coordinated investigations to refine regional hydrogeologic framework model**
  - **Cooperative studies with the Nye County drilling program will provide opportunities for geochemical sampling, Eh-pH measurements, paleohydrology studies, water table measurements, and improved geologic and hydrologic stratigraphy**
  - **Cooperative colloidal transport data-use from anthopogenic analogue studies (e.g., at NTS) will add to the project data base**

NWTRB Recommendations
EBS and Waste Package Materials Testing

- **Issue**
  - ***Research needed to confirm long-term performance predictions (e.g., corrosion rates and phase stability)***
- **Project Plans**
  - **Short-term tests are underway to better characterize potential waste package materials, including tests that focus on changes in water chemistry in the crevice between the inner and outer barriers**
  - **Tests are also underway to evaluate crevice corrosion, stress corrosion cracking, hydrogen attack for titanium alloys, and thermal stability for Alloy 22**

NWTRB Recommendations
EBS and Waste Package Materials Testing

- **Issue**
  - ***Lack of data/studies to predict the contribution of zircaloy cladding to long-term performance***
- **Project Plans**
  - **Participating in examination of cladding on spent fuel that has been in dry storage for over 20 years**
  - **Examining the impact of steam and water in contact with cladding**
  - **Initiating studies on localized corrosion of zircaloy cladding and modeling of mechanical failure**

Forces Driving Need for Change

- **Transition from Viability Assessment to Site Recommendation and supporting environmental impact statement as our near-term objective**
- **Paradigm shift to owner/applicant and a nuclear culture**
  - **The Project must transition from a research and development orientation to a nuclear regulatory culture where DOE is the owner/applicant**
- **Management focus and quality initiatives**
- **Demonstrate measurable progress on resolving quality assurance issues**

Paradigm Shift to Owner/Applicant

- **DOE as owner/applicant is committed to:**
  - **Demonstrating commitment to quality and demanding technical excellence**
  - **Being fully knowledgeable and accountable for all aspects of the Project**
  - **Demonstrating and constantly reinforcing a strong safety culture**
  - **Assuring that all products be fully defensible and decisions traceable -- creating a basis for credibility**
  - **Complying fully with regulatory requirements and commitments to oversight organizations**
  - **Creating a focused Project Team**
  - **Focusing on continuous improvement**

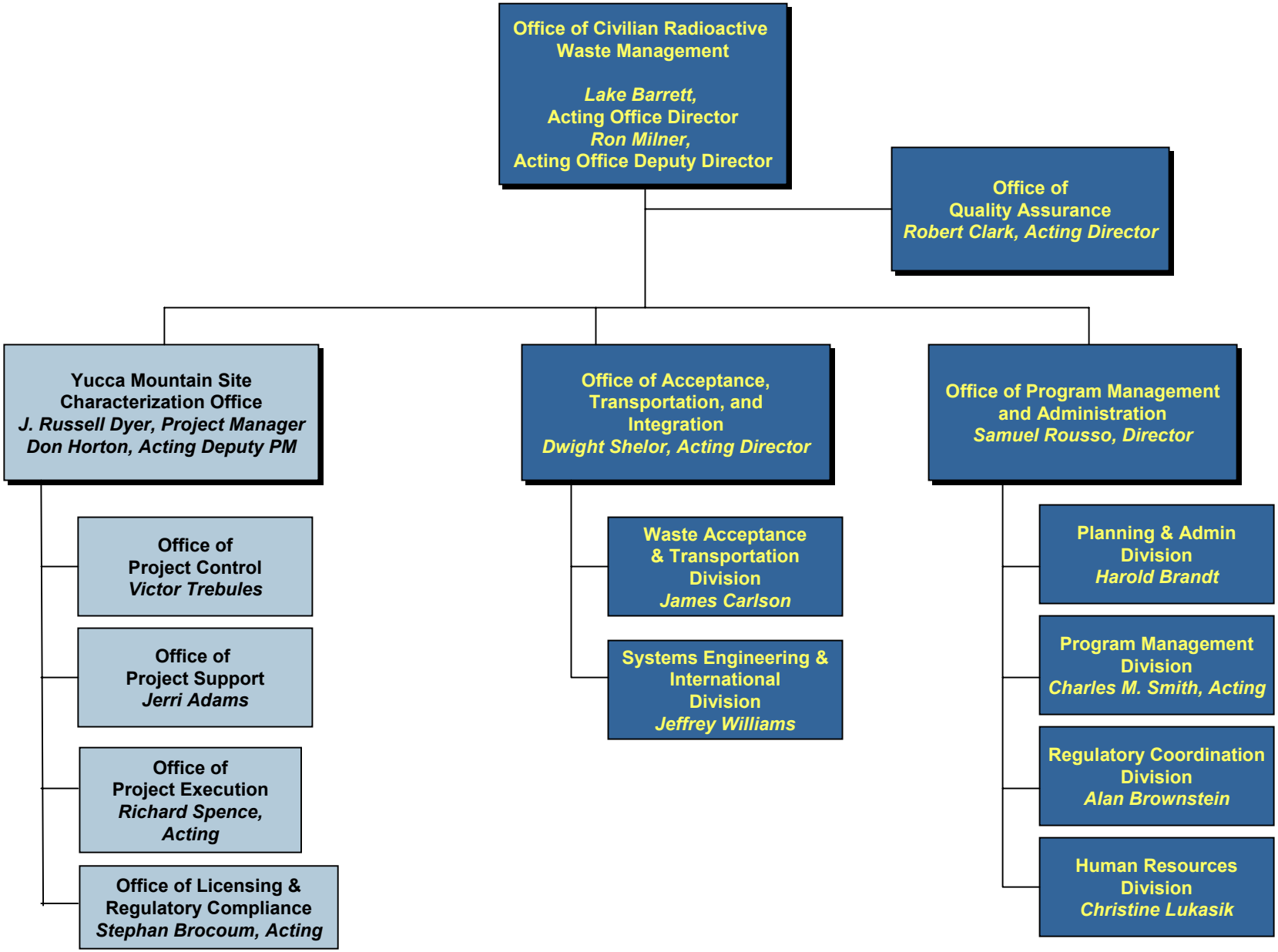
Progress Towards a Nuclear Culture

- **Transitioning to a nuclear culture requires education in its principles and full acceptance by DOE and its Project participants**
- **Senior DOE and Participant managers have demonstrated their commitment to this transition**
  - **Management offsites held to focus on need for change at all DOE and contractor staff levels**
  - **New YMSCO organization to enhance Project oversight**
  - **DOE and contractor personnel have participated in mandatory, all-hands training sessions on the principles of a nuclear culture and its importance to Project success**
  - **DOE and Participant managers are emphasizing accountability for quality improvement and technical excellence**

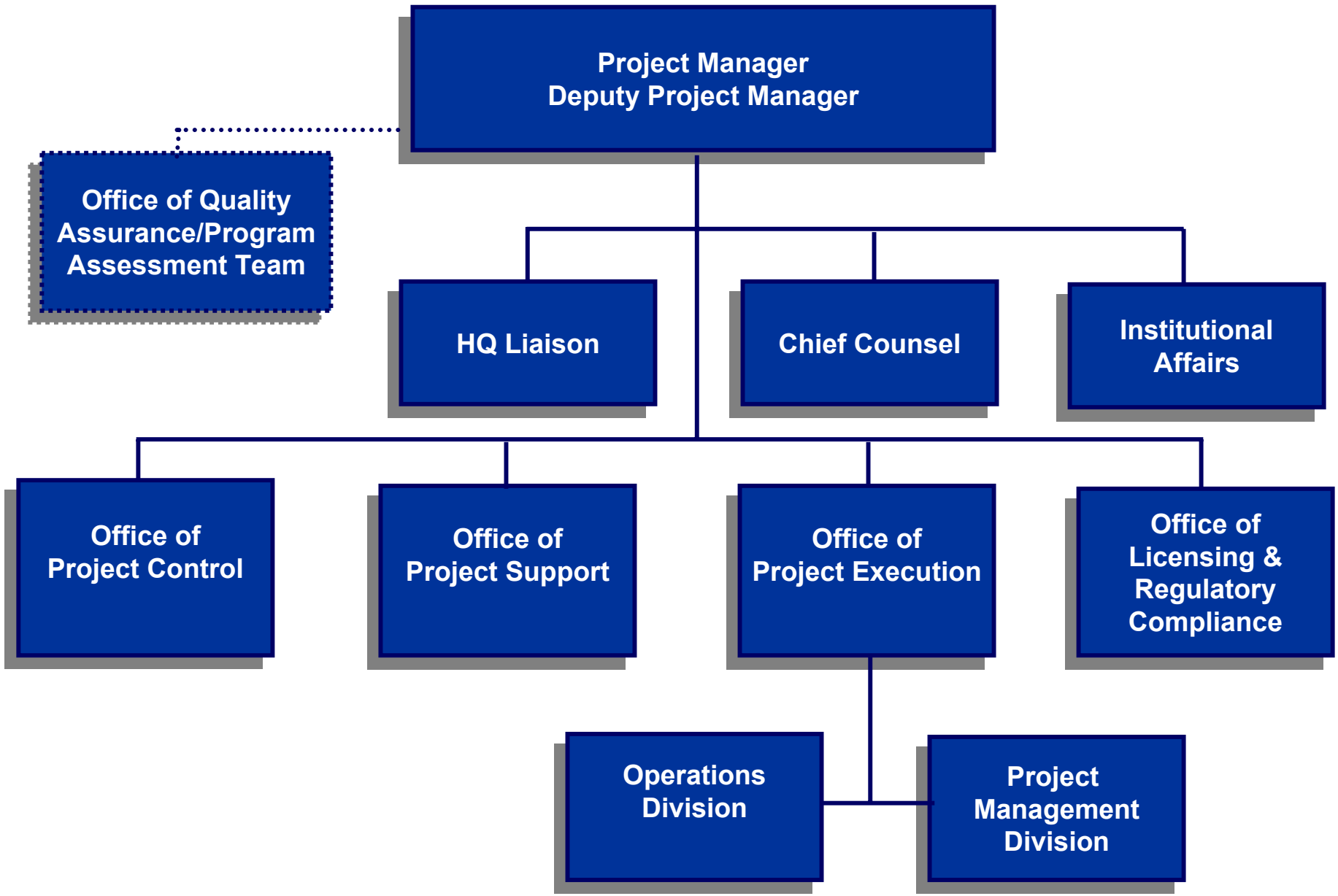
Management Focus and Quality Initiatives

- **Process Validation and Re-Engineering (PVAR)**
  - **Integrated Product Teams formed to validate, correct, or enhance processes**
  - **PVAR efforts coordinated with Corrective Action Request response activities**
- **Consolidated QA Program**
  - **DOE Office of Quality Assurance (OQA) integrated with CRWMS M&O, but verification is independent**
  - **QA Program controls are now implemented for all areas of the technical program related to radiological safety and waste isolation**
- **Project Re-Organization to enhance quality and excellence**

Office of Civilian Radioactive Waste Management

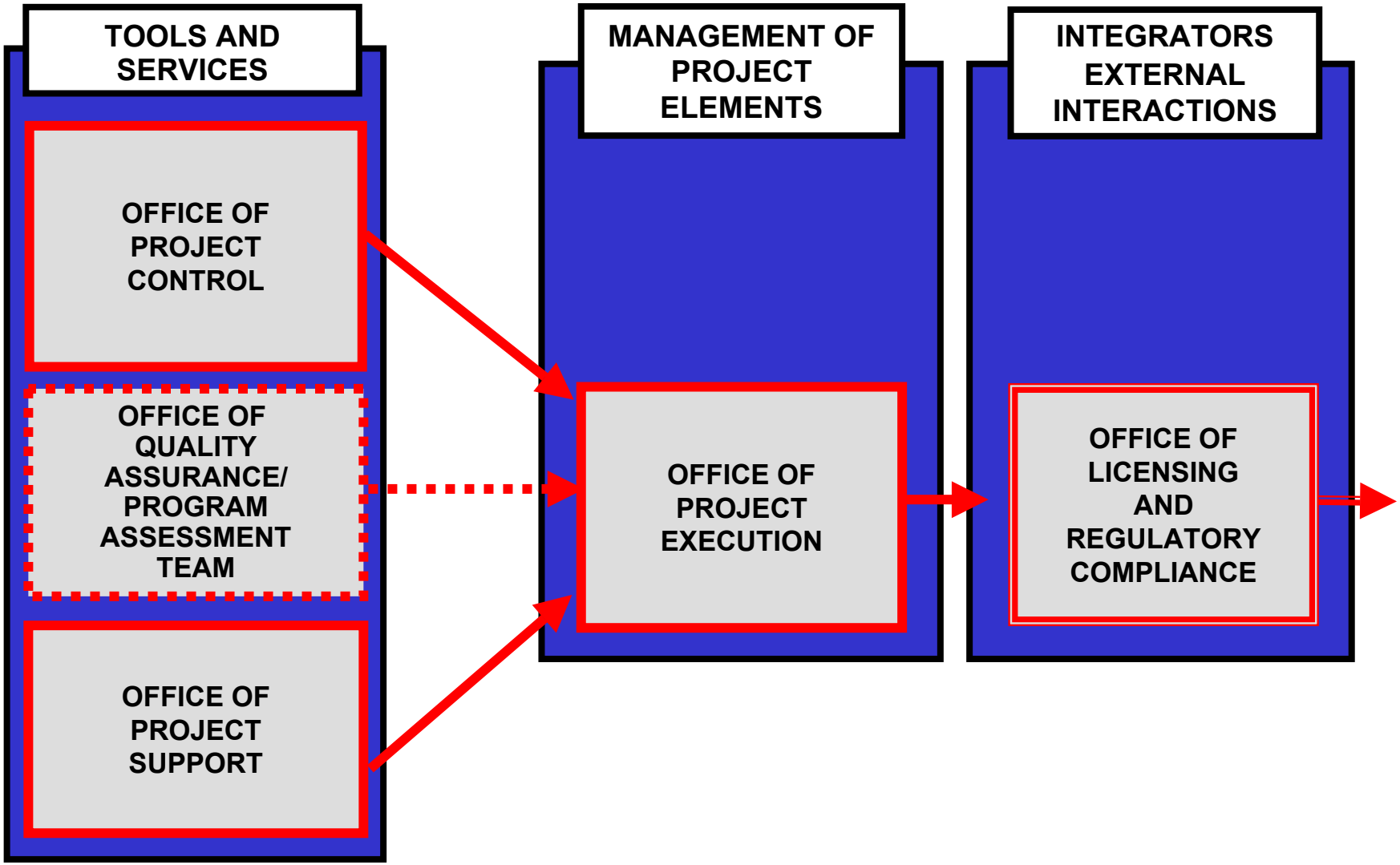


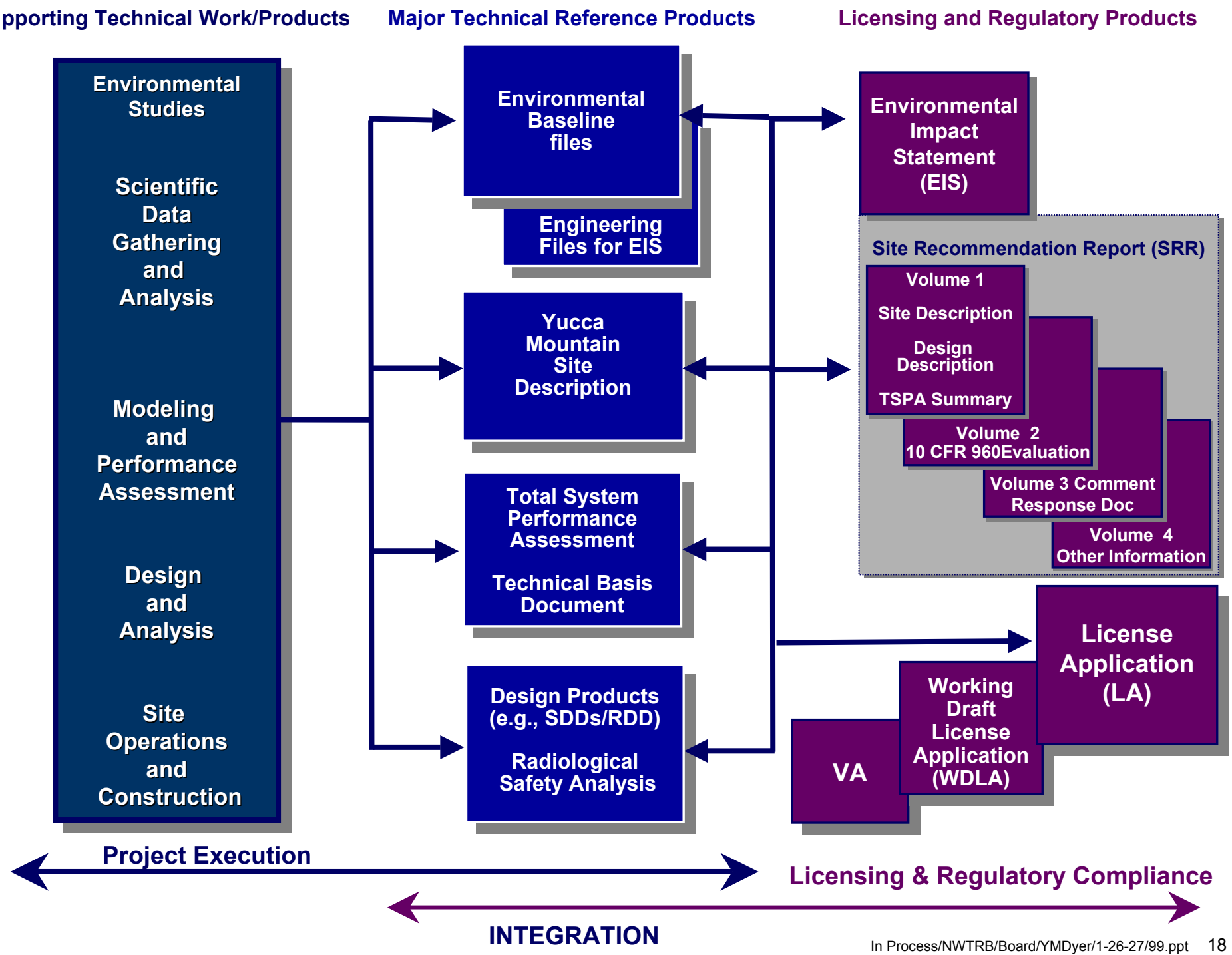
Yucca Mountain Site Characterization Office Organization



Yucca Mountain Site Characterization Office Organization

(Continued)




Supporting Technical Work/Products
Major Technical Reference Products
Licensing and Regulatory Products
Environmental Studies
Scientific Data Gathering and Analysis
Modeling and Performance Assessment
Design and Analysis
Site Operations and Construction
Environmental Baseline files
Engineering Files for EIS
Yucca Mountain Site Description
Total System Performance Assessment
Technical Basis Document
Design Products (e.g., SDDs/RDD)
Radiological Safety Analysis
Environmental Impact Statement (EIS)
Site Recommendation Report (SRR)
Volume 1
Site Description
Design Description
TSPA Summary
Volume 2
10 CFR 960Evaluation
Volume 3 Comment Response Doc
Volume 4
Other Information
License Application (LA)
Working Draft License Application (WDLA)
VA
Project Execution
Licensing & Regulatory Compliance
INTEGRATION

Path Forward

- **To facilitate success as we approach site recommendation and licensing, we are implementing an effective, efficient Project infrastructure**
  - **Customer/supplier organizational concept in place**
  - **Created independent assessment arm reporting through Office of Quality Assurance to Project Manager**
  - **Raised standards for contractor performance and accountability**
  - **Instituted Process Validation and Reengineering (PVAR) as part of our Nuclear Culture Initiative**
    - » **Project initiative to evaluate major processes, and propose enhancements based on this evaluation**

FY99 Priorities Based on Program Needs and Need for Change

- Implement effective, efficient program infrastructure Process Validation and Reengineering (PVAR)
- Develop defensible, traceable and reproducible technical baseline
- Complete Draft Environmental Impact Statement
- Complete the Design Selection for Site Recommendation
- Conduct detailed planning for Site Recommendation

FY99 Priorities Based on Program Needs and Need for Change

(Continued)

- **Finalize approach to site suitability evaluation**
- **Conduct site investigations and laboratory testing to focus on reducing key uncertainties**
- **Revise process models for next iteration of TSPA**
- **Complete System Description Documents**

A Look Ahead

- **Issue Final Environmental Impact Statement for Yucca Mountain site (FY 2000)**
- **Publish revised 10 CFR Part 960 Siting Guidelines (FY 2000)**
- **Yucca Mountain Site Recommendation to the President (FY 2001)**
- **Submit License Application to Nuclear Regulatory Commission (FY 2002)**
- **Issue Request for Proposals for acquisition of waste acceptance and transportation services (FY 2001)**

Transition from Viability Assessment to Site Recommendation and EIS