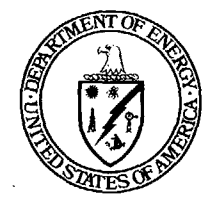




Overview of Total Systems Performance Assessment-Site Recommendation (TSPA-SR) and Total Systems Performance Assessment- License Application (TSPA-LA) Strategy

Presented to:
DOE/NRC Technical Exchange on Total System
Performance Assessment,
San Antonio, Texas

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

May 25-27, 1999

Legacy Mountain

Overview of this Presentation

- **Major TSPA-SR Drivers (Goals/Objectives/Requirements)**
 - Yucca Mountain Project priorities under Nuclear Culture
 - Comments on TSPA-VA
 - Implementation of proposed EPA standards, NRC regulatory requirements and DOE guidelines
 - » 40 CFR 197
 - » 10 CFR 63
 - » 10 CFR 963
 - NRC's IRSR acceptance criteria (and draft Yucca Mountain Review Plan)
- **Philosophy and scope of TSPA-SR Iterations**
- **Schedule of TSPA-SR**

Yucca Mountain Project's Priorities under the Nuclear Culture (Dyer 11/25/98)

- **YMP is placing emphasis on the transition from a project centered around data collection, testing and analysis to a project focussed on meeting regulatory requirements and defensibility of RW products under a nuclear culture**

Yucca Mountain Project's Priorities under the Nuclear Culture (Dyer 11/25/98)

(Continued)

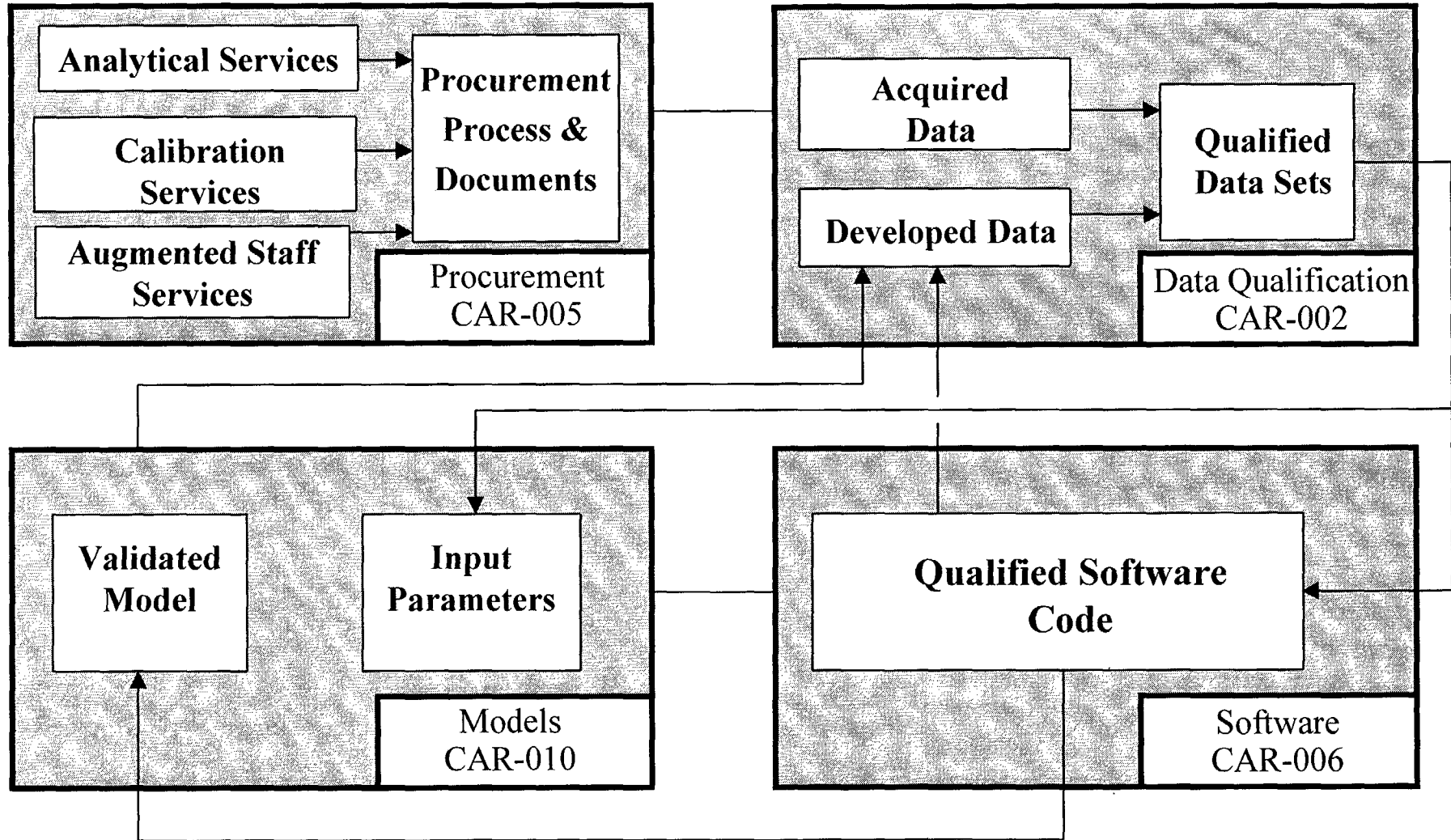
- **YMP's priorities under a nuclear culture include:**
 - **Ensure the defensibility of RW products by developing and maintaining the validity, traceability, reproducibility and retrievability of data, information, and products used to prepare RW products**
 - **Meeting the site recommendation schedule (July 2001) using the principle of minimal, necessary and sufficient work**
 - **Expeditious implementation and improvement of procedures and processes**
 - **Completing the required technical work and design necessary to support the LA schedule**

Goal to Improve the Defensibility of Products: Corrective Actions

- **Four major corrective action requests (CARs) exist related to validity, traceability, reproducibility and retrievability of data, information and products**
 - **CAR-98-002 Data Qualification**
 - **CAR-98-005 Procurement of Services**
 - **CAR-98-006 Software Qualification**
 - **CAR-98-010 Model Control**

*21 of 52
actions
completed*

Integrated CAR Relationships



Goal to Improve the Defensibility of Products: Corrective Actions

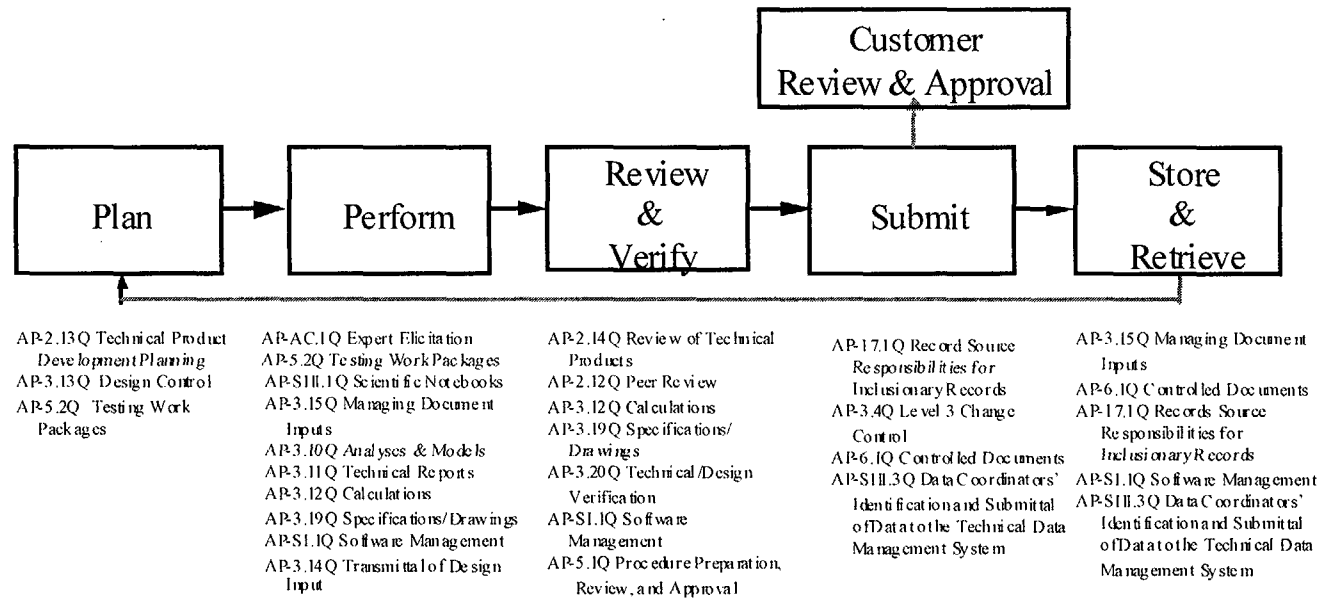
- **Responses to these CARs have identified**
 - Remedial actions
 - Actions to determine extent of conditions
 - Root causes
 - Actions to preclude recurrence
 - » includes revised procedures and training
- **All actions are scheduled for completion by 10/29/99**
- **DOE's OQA and NRC are conducting surveillance's of the interim completion milestones**

Goal to Implement Improved Processes & Procedures

- **Process Validation and Re-engineering (PVAR) effort has resulted in**
 - **19 processes being identified for improvement/consolidation**
 - **27 new Administrative Procedures developed and 49 procedures cancelled**
 - **Training to be conducted in June 1999**

Goal to Implement Improved Processes and Procedures

Clear Concise Guidance to Users



Infrastructure Support

1. AP-5.1Q Procedure Preparation, Review, and Approval
2. AP-2.1Q Identification and Training of Personnel
3. AP-2.2Q Verification of Education and Experience of Personnel
4. AP-9.1Q Control of Special Processes
5. AP-REG-001 Lessons Learned Program

Note: This Slide Depicts 1st Tier PVAR Procedures

Goal to Implement Improved Processes & Procedures

(Continued)

- **All data, analyses, models and software used as a basis for TSPA-SR will be controlled in accordance with improved procedures**
 - **Training, self-assessments, surveillances and audits will continually evaluate the effectiveness of these controls**

Goal to Implement Improved Processes & Procedures

(Continued)

- **Performance-based QA audit conducted of PA Operations on May 3-14, 1999**
 - **Observations included strong team integration, positive attitudes towards nuclear culture and thorough understanding of roles and responsibilities**
 - **5 process recommendations**
 - **1 Deficiency Report (development of work direction under AP-3.10Q)**

Summary of Major Technical Drivers on TSPA-SR

- **Interpretation of TSPA-VA results**
- **Comments received on TSPA-VA**
 - **NRC (6/98;3/99)**
 - **Performance Assessment Peer Review Panel (2/99)**
 - **NWTRB (11/98;4/99)**
 - **ACNW (4/99)**
- **Changes in**
 - **repository and waste package designs**
 - **process models**
- **Focus on key information to address specific regulatory requirements**

NRC Staff Review of TSPA-VA

- **Comments on TSPA-VA from SECY-99-074 note general agreement between the DOE and NRC approaches with five major areas where significant differences exist**
- **Unclear whether sufficient data on waste package corrosion under conditions applicable to the proposed repository, can be acquired to demonstrate compliance with NRC requirements**
- **Data and models of the quantity and chemistry of dripping water are inadequate to describe the process of dripping under ambient and thermally-altered conditions**

NRC Staff Review of TSPA-VA

(Continued)

- **The saturated zone has not been sufficiently characterized to the proposed 20-km receptor location to adequately assess its contribution to performance**
- **Volcanic disruption analyses are**
 - **i) not representative of YM basaltic volcanism**
 - **ii) based on insufficient data to evaluate WP and WF behavior under appropriate conditions**
 - **iii) based on assumptions which are inconsistent with those used elsewhere**

NRC Staff Review of TSPA-VA

(Continued)

- **Implementation of QA Program has raised the issue of whether data/products will be acceptable and appropriately qualified**

Key Findings of the PA Peer Review Panel on TSPA-VA

- **TSPA-VA and TSPA-SR have significantly different objectives. Recognition of this distinction should be an important element of a path forward**
 - **Objective of TSPA-VA was on “probable behavior”**
 - **Objective of TSPA-SR (& LA) will be on reasonable assurance that repository complies with regulatory limits**
- **Use of simplified bounding analyses may be necessary to achieve the desired level of confidence (for TSPA-SR & -LA)**

Key Findings of the PA Peer Review Panel on TSPA-VA

(Continued)

- **“For cases in which it is feasible to improve either the component models or their underlying data, the Panel recommends that efforts be made to implement such improvements wherever such changes would affect the overall assessment**
- **Where conservative bounding analyses do not result in unduly pessimistic estimates of the total system performance, the Panel recognizes that it may not be cost-effective to spend additional time and effort refining the assessments and making them more realistic**

Key Findings of the PA Peer Review Panel on TSPA-VA

(Continued)

- **For those issues for which, by virtue of their complexity, it is not feasible to produce more realistic models supported by data, the Panel recommends that a combination of bounding analyses and design changes be applied”**

NWTRB Comments on TSPA-VA

- **Identifying important sources of uncertainty, estimating the magnitude of those uncertainties, reducing critical uncertainties through focussed research and evaluating the effect of residual uncertainty on repository performance are essential for supporting a defensible site-suitability determination and license application**
- **Eliminating all uncertainty is not possible or necessary**

NWTRB Comments on TSPA-VA

(Continued)

- **DOE should evaluate alternate repository designs that have the potential to reduce uncertainties in projected repository performance**
- **Agrees with PA Peer Review Panel that additional data are required to improve the credibility of the TSPA**

ACNW Comments on the TSPA-VA

- **DOE should provide a TSPA of sufficient transparency so NRC staff can readily determine the interrelationships among all models of the TSPA**
- **Supporting evidence should be provided at the model level**
- **NRC should provide guidance on what are acceptable model assumptions and parameter uncertainty**
- **NRC should identify attributes of defense in depth**

Philosophy of Future TSPA Iterations

- **Initial TSPA iterations (-91, -93, -95) were scoping in nature**
- **TSPA-VA placed controls on the abstracted model inputs, software, analyses and documentation**
- **All future TSPA's, (-SR Rev. 00, -SR Rev. 01, and -LA) will have controls on all data, models, software, analyses and documentation**
 - **any changes will be controlled under the change control process, which includes conducting impact analyses**
- **TSPA-SR Rev. 00 forms the fundamental controlled basis to which incremental changes may be made**

TSPA-SR Overall Scope

- **Develop process models, abstraction models and TSPA model**
 - Incorporate features most significant (including potentially detrimental features, events and processes) to performance
 - Include uncertainty in conceptual models and parameters
- **Identify and screen relevant features, events and processes (FEPs)**

TSPA-SR Overall Scope

(Continued)

- **Conduct analyses using process, abstraction and total-system models in accordance with applicable QA controls for data, models, and software**
- **Document analyses and technical basis in the TSPA-SR document and Process Model Reports**
- **Summarize analyses and basis in Vol. II of the Site Recommendation Report**

Scope and Content of Future TSPA Iterations

- **Consideration Hearings Draft TSPA-SR (Rev. 00)**
 - Screen FEPs using regulatory criteria
 - Use controlled models, analyses, software and data
 - * – Evaluate mean total-system performance incorporating uncertainty
 - Conduct stylized human intrusion scenario analysis
 - * – Perform limited subsystem performance evaluations

Scope and Content of Future TSPA Iterations

(Continued)

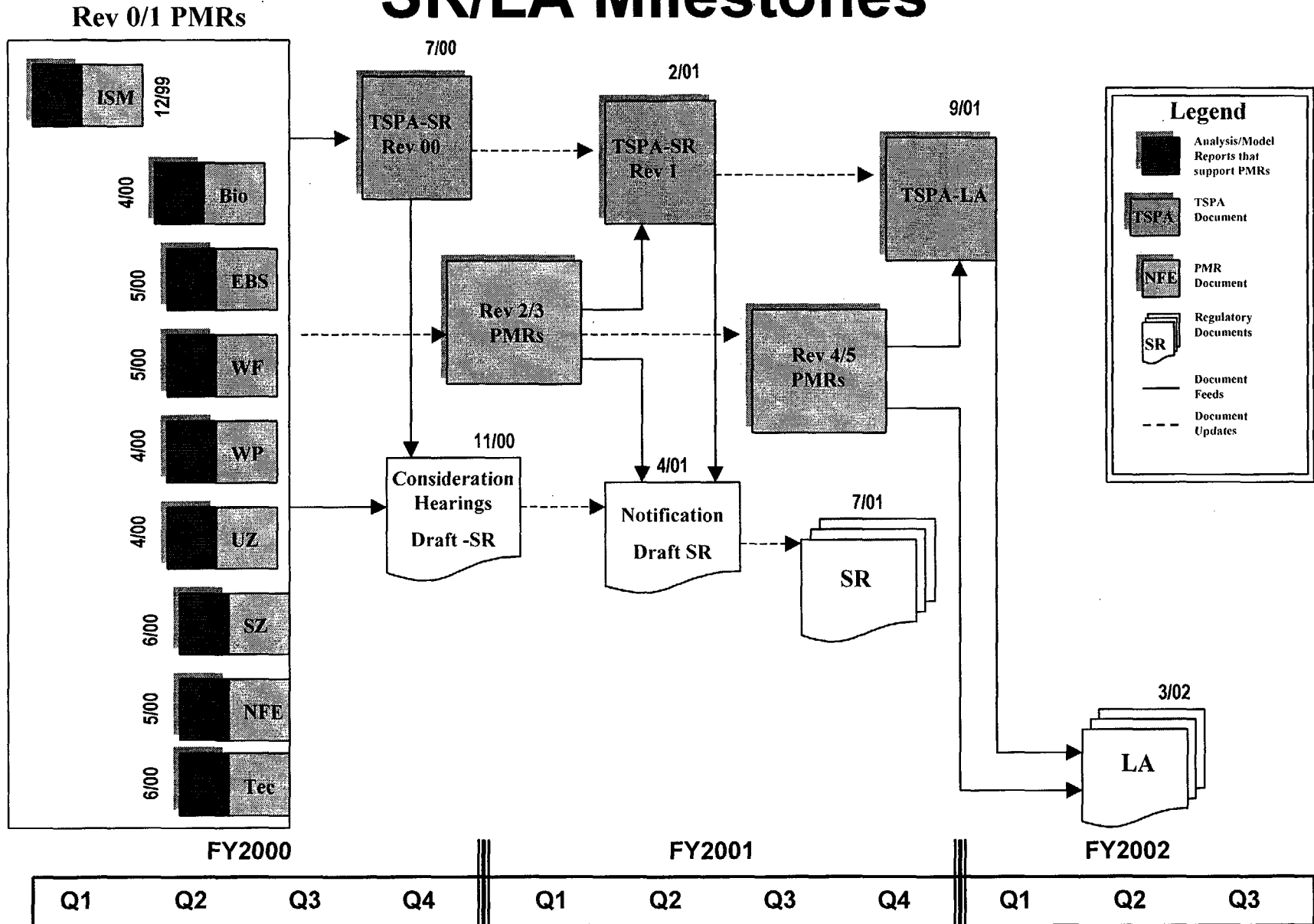
- **Notification Draft TSPA-SR (Rev. 01)**
 - Respond to comments on Rev. 00
 - Revise Rev 00 analyses with applicable, significant changes in models or data (including qualification of TBV information)
 - Conduct subsystem performance evaluations
 - Conduct specific multiple barrier analyses
 - Document results and interpretation in accordance with regulatory acceptance criteria

Scope and Content of Future TSPA Iterations

(Continued)

- **TSPA-LA (Rev 02)**
 - **Respond to comments on TSPA-SR Rev. 01 (especially NRC sufficiency comments)**
 - **Revise Rev. 01 analyses with applicable, significant changes in models or data (includes qualification of TBV information)**

Linkage of Major Programmatic SR/LA Milestones



Schedule of Major Inputs to SR Consideration Hearings Draft

*DOE
acceptance*

	<u>Preliminary Draft</u>	<u>Draft</u>	<u>Final</u>
SR-Suitability Criteria Compliance Evaluation (Vol. II)	4/00	7/00	11/00
TSPA-SR Document Rev. 00	4/00	7/00	9/00
TSPA-SR Rev. 00 Analyses	1/00	3/00	4/00
Process Model Reports Rev. 00/01	8/99-2/00	10/99-4/00	1/00-6/00
Process & Abstraction Models and Analyses Rev. 00	3/99-10/99	6/99-1/00	7/99-2/00

Schedule of Major Inputs to SR Notification Draft

	<u>Preliminary Draft</u>	<u>Draft</u>	<u>Final</u>
SR-Suitability Criteria Compliance Evaluation (Vol. II)	1/01	2/01	3/01
TSPA-SR Rev. 01	12/00	1/01	2/01
TSPA-SR Rev. 01 Analyses	11/00	12/00	1/01
Process Model Reports Rev. 02/03	8/00	10/00	11/00
Process & Abstraction Models and Analyses Rev. 01	4/00	6/00	7/00

Summary

- **TSPA-SR Rev 00 will place all data, models, analyses, and software under baseline control**
- **Focus of TSPA-SR will be on the minimal, necessary and sufficient information, to provide technical basis for compliance evaluation**

detailed supporting calculations may not be fully qualified

Summary

(Continued)

- **As recommended by the PA Peer Review Panel, the TSPA-SR will include**
 - **Conservative bounding analyses if the results are not unduly pessimistic**
 - **Combinations of bounding analyses and design changes for complex issues where it is not feasible to produce more realistic models**
 - **Limited improvement in component models (and underlying data) where such changes significantly affect the overall TSPA**