Transmitted with letter
6/2/99

6/2/99

Summary Highlights
of
NRC/DOE Management/Quality Assurance Meeting
NRC T2B3, Rockville MD
Hillshire Blue Room, Las Vegas, Nevada
DOE Headquarters, Room 7F091
CNWRA San Antonio, Texas
April 22, 1999, 1:00 p.m. to 6:00 p.m. EDT

The Management/Quality Assurance Meeting between the U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) included a brief discussion of the status of various programmatic issues, but was focused primarily on the status of and progress made in addressing concerns regarding implementation of DOE's QA program since the Management Meeting in December, 1998. This meeting summary includes a brief description of the presentations, the meeting agenda (attachment 1), the attendance list (attachment 2), and a copy of slides used at the meeting (attachment 3).

Management Issues Overview: DOE and NRC discussed the completion of the revision to the NRC/DOE Procedural Agreement; the reorganization of NRC's Division of Waste Management; NRC review and acceptance of the Nye County Quality Assurance Program Plan for the Early Warning Drilling Program; the status of DOE's proposed rulemaking at 10 CFR 960; recent NRC sponsored meetings with the public in Beatty and Las Vegas on proposed 10 CFR Part 63; the status of DOE's regulatory and licensing training and the schedule for DOE's draft Environmental Impact Statement (EIS) and draft License Application (LA); the status of the NRC's NRC's Yucca Mountain Review Plan (YMRP); and DOE's integrated schedule for site recommendation (SR) and LA activities.

DOE indicated that it had received the NRC's YMRP and would work with NRC to achieve consistency between the LA outline and the YMRP. NRC and DOE will meet at the staff level to discuss the YMRP at the end of May during the planned technical exchange on Total System Performance Assessment.

DOE expects to have its integrated schedule for SR and LA activities available for NRC's information in June or July 1999. NRC requested that NRC and DOE meet to discuss this schedule, once it is issued.

Quality Assurance Issues Overview: The meeting focused on management and corrective actions taken by DOE to resolve NRC's concerns with the implementation of DOE's QA program, and the results of the NRC QA Task Force's visit to the Yucca Mountain Site Characterization Office were summarized (reference the NRC's February 24, 1999 letter to DOE).

DOE provided the status of implementation of corrective actions for Corrective Action Reports (CARs). DOE reported that many corrective actions have been completed; however, the results of the independent Office of Quality Assurance (OQA) interim verification of corrective actions resulted in identification of areas where corrective actions that had been committed to were either not completed or completion was not effective. DOE expects to issue its Verification Report on April 23, 1999. OQA reported that, based on progress to date, approaches and resource commitments would require reevaluation to meet the projected October date for completion of corrective actions. NRC expressed concern about DOE's ability to demonstrate sufficient improvement in QA implementation by October 1999, when NRC's Division of Waste Management must brief the Commission on the status of DOE's QA program. DOE needs to

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have sufficient data, models and codes qualified to demonstrate that the QA program will be adequately implemented and sufficient for licensing by the time of Site Recommendation (SR)/LA. NRC will continue to monitor DOE's quality assurance program implementation, and DOE will notify NRC if problems arise in implementing the planned improvements on schedule. NRC requested a conference call within 30 days to discuss the status of DOE progress.

The DOE methodology used to conduct root cause determinations was described, results of the determinations were summarized, and remedial actions previously identified were validated. DOE acknowledged that additional actions may be necessary to prevent recurrence of similar deficiencies.

NRC requested and DOE agreed to a follow-up telephone conference within 30 days to discuss DOE's progress in implementing Process Validation and Re-engineering and preparing Process Model Reports. NRC also requested a diagnostic addressing differences in the resolution of scientific notebook issues between the DOE laboratories.

NRC and DOE agreed to schedule the next Management/QA Meeting in July, and to expedite completion of meeting minutes in order to allow approval of minutes within thirty days of the meeting.

Miscellaneous Action Items

NRC indicated that it would like to discuss DOE and M&O configuration management control.

NRC recommended that the Quality Assurance Management Assessment (QAMA) Team take DOE Regulatory and Licensing Training, since the training was a QAMA Team recommendation. The NRC would like to meet with the QAMA Team prior to October 1999 and recommended that the Team attend the training prior to that meeting.

The NRC expressed an interest in having the On-site Representatives attend the training; if the training is conducted locally, J. Greeves would like to attend the training. Nye County representatives also expressed interest in attending the training. DOE will keep NRC informed of training dates and discuss the status of the training at the next management meeting.

The State of Nevada Nuclear Waste Task Force requested an extension of the comment period on 10 CFR 63. NRC indicated that a possible extension was being evaluated and that the Task Force and DOE would be informed of the outcome as soon as possible.

Sandra L. Wastler
Performance Assessment &
HLW Integration Branch
Division of Waste Management
Office of Nuclear Material
Safety and Safeguards
U.S.Nuclear Regulatory Commission

Nancy H. Slater
Regulatory Coordination Division
Office of Civilian Radioactive
Waste Management
U.S. Department of Energy

QA: N/A

LIST OF ATTENDEES

NRC/DOE MANAGEMENT/QUALITY ASSURANCE MEETING

NRC Headquarters, Rockville, MD ←
Hillshire Blue Room, Las Vegas, Nevada
DOE Headquarters, Room 7F091
CNWRA, San Antonio, Texas
April 22, 1999
1:00 p.m. to 6:00 p.m. (EDT)

NAME	ORGANIZATION	TELEPHONE
DENNIS RICHARDSON	YMP/M&O - RSL	702-295-4392
Ronald J. Stevens	M&O Reg & Lic.	702-295-4412
MG KOLB	M&O	702 295 5422
Sidney Crawford	Self	301 515 6396, scrawfrd@erols.com
Bob Gamble	MTS/BAH	702-794-1440
Jack BAILEY	M & O	702 295-4251
Tom Bruno	M+O	703-862-9400
S Wastler	NRC/NMSS/HLWB	301-415-6724
Steve Hanauer	DOE	202-586-3517
Dick Spence	DOE	(702) 794-1455
ROBERT F. KEELE	YMP/M&O	(702) 295-5566
APRIL GIL	YMP/DOE	702 794-5578
Dan Wilkins	M&O/TRW	702 295 5143
Jean Younker	M&O TRW	702 295 5497
Russ DYER	DOE/YMP	702 794-1300
Bill DAM	NRC/NMSS/DWM	301-415-6210
Robert Johnson	NRC/DWM	301-415-7282
Kien Chang	NRC/DWM	301-415 6612

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NAME	ORGANIZATION	TELEPHONE
Rod McCullum	NEI	202-739-8082
TOM MATULA	NRC	301 415 8563
RG VAWTER	M&O	702-295-5517
Ken Hooks	NRC	(301)415-7777
Bill Reamer	NRC	301-415-6537
MANNY COMAR	NRC	301-415-6074
DON HORTON	DOE	702-794-1301
Bob Clark	DOE	702-794-5583
Charles Metzger	Bech. Allen	202-626-1054
Colin Heath	M&O	202-488-6740

QA: N/A

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NAME	ORGANIZATION	TELEPHONE
Catherine Hampton	DOE	4-1387
Woody Hudson	OQA/QATSS	4-1490
HANK GREENE	OQA/QATSS	5-2459
Richard Beck	OQA/QATSS	4-1494
Frank Kraftenan	MTS	4-5057
Marty Bryan	M&O Licensing	5-6751
Jim Linhart	NSNFP/LV	5-0366
WAYNE BOOTH	QSAI	702-804-1330
Tom COLANDREA	QSAI	619-487-7510
JOHN R. LONGENECKER	QSAI	619-792-6031
RAM B. MURTHY	DOE/OQA	702-794-5549
Chad Glenn	NRC	702-794-5046
Ken Ashe	M&O Licensing	702 295-5563

QA: N/A

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April 22, 1999
1:00 p.m. to 6:00 p.m. (EDT)

NAME	ORGANIZATION	TELEPHONE
NICK STELLAVATO	Nye County	(775) 727-7727
E.V. TIESENHAUSEN	CLARK COUNTY	702 455-5184
Mel Murphy	Nye County	(360) 943-5610
SUSAN ZIMMERMAN	State of Nevada	(775) 687-3744
JOE PRICE	DOE	(702) 794-1441
Judy Treichel	NV NWTF	248-1127
Steve Frishman	State of NV	775-687-3744
DENNIS R WILLIAMS	DOE	(702) 794-5526
Robert W. Craig	USGS	(702) 295-5456
SAM HORTON	OQA/QATSS	(702) 794-1497
ROBERT HASSON	OQA / QATSS	(702) 794-5023

QA: N/A

LIST OF ATTENDEES

NRC/DOE MANAGEMENT/QUALITY ASSURANCE MEETING

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April 22, 1999
1:00 p.m. to 6:00 p.m. (EDT)

NAME	ORGANIZATION	TELEPHONE
Budhi Sagar	CNWRA	522-5252
BRUCE MABRITO	"	210-522-5149
WES PATRICK	"	210-522-5158
Tom Trbovich	"	210-522-3145
Navam Sridhar	"	*5538
Asad Chowdhury	"	210-522-5151

DOE/NRC Management/QA Meeting
DOE/HQ – Room 7F091 ←
April 22, 1999

	Name:	Organization:	Phone:	E-mail:
1.	Chris Einberg	DOE/HQ	(202) 586-8869	christian.Einberg@HQ.DOE.GO
2.	Ray Wallace	USGS/HQ	(202) 586-1244	rwallace@usgs.gov
3.	C. A. Kouts	DOE/YUCCO	(202) 586-1253	Christopher.Kouts@rw.de.go
4.	DAN FEHRINGER	NWTRB	703-235-4473	fehringer@nwtrb.gov
5.	JIM YORK	BOR Allen & Hamilton	202-626-1067	jim_york@ow.doe.gov
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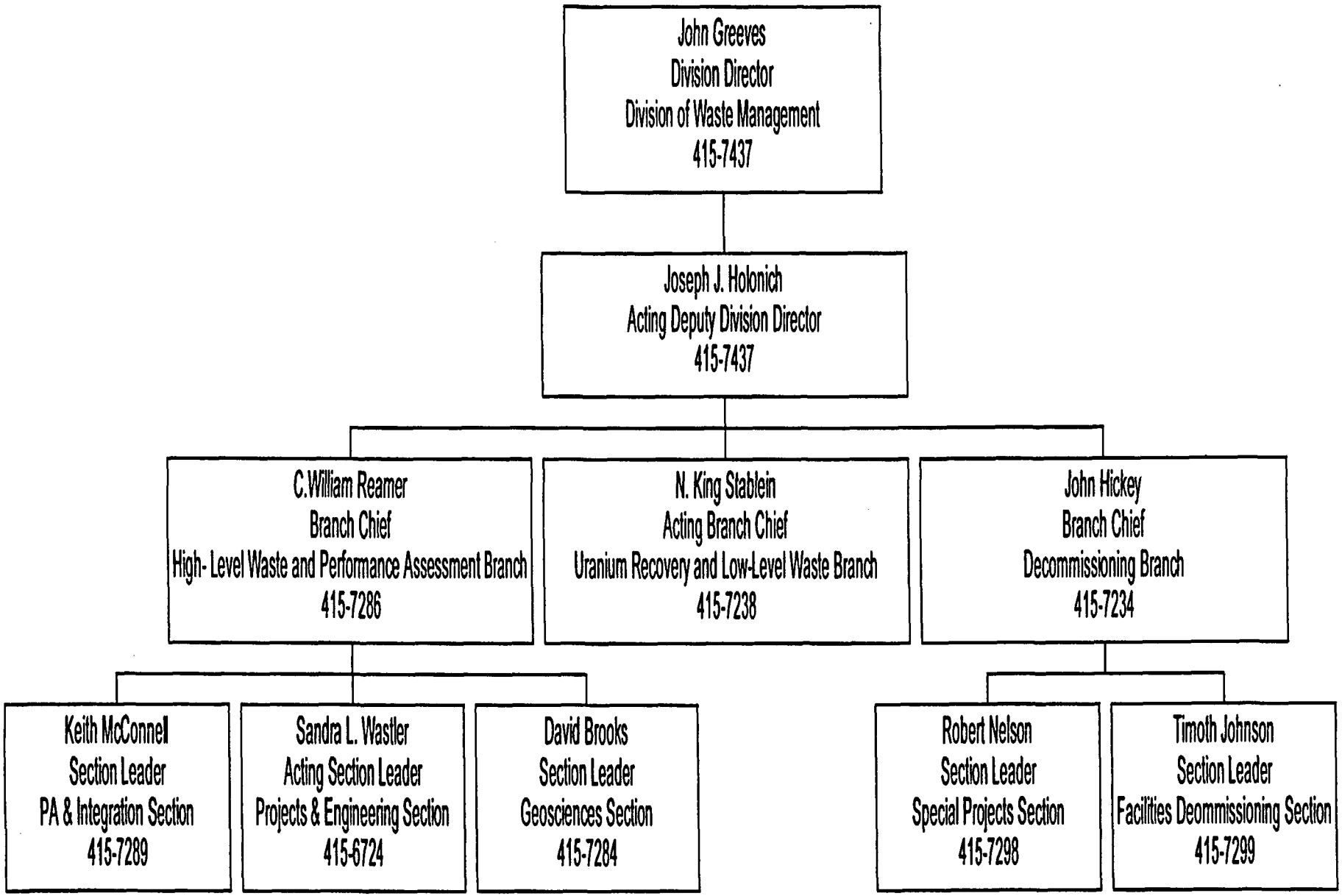
NRC/DOE MANAGEMENT/QUALITY ASSURANCE MEETING
NRC Headquarters, Rockville, MD
Hillshire Blue Room, Las Vegas, Nevada
DOE Headquarters, Room 7F091
CNWRA, San Antonio, Texas
April 22, 1999
1:00 p.m. to 6:00 p.m. (EDT)

1:00 p.m.	**INTRODUCTIONS**	All
	MANAGEMENT MEETING	
1:10 p.m.	**NRC Program Status** • Nye County Early Warning Drilling Program/QA • Meeting Summaries • DOE Addressing KTI in Audits	John Greeves, NRC
1:15 p.m.	**DOE Program Status** • Status of 10 CFR 960 • Draft Environmental Impact Statement • DOE s Preliminary Response to VA comments • Revision to the "Agreement Between DOE/OCRWM and NRC/NMSS Regarding Prelicensing Interactions"	Lake Barrett, DOE
	• Yucca Mountain Review Plan Outline	Steve Brocoum, DOE
	QUALITY ASSURANCE MEETING	
1:30 p.m.	**NRC's QA Task Force Report**	Ken Hooks, Bill Belke, NRC
1:45 p.m.	**DOE Management Commitment to Quality Initiatives**	Russ Dyer, DOE
2:00 p.m.	**M&O Management Commitment to QA Implementation**	Dan Wilkins, M&O
2:15 p.m.	**Overview of Management and Corrective Actions**	Steve Brocoum, DOE
2:30 p.m.	**Process Model Reports**	Jack Bailey, M&O
2:45 p.m.	**Status of Corrective Actions**	Jean Younker, M&O
3:15 p.m.	**Break**	All

3:30 p.m.	**Verification of Corrective Actions**	Bob Clark, DOE
3:45 p.m.	**Root Cause Determinations**	Ron Stevens, M&O
4:00 p.m.	**Additional Corrective Actions to Address Root Causes**	Jean Younker, M&O
4:15 p.m.	**Process Validation and Re-engineering (PVAR)**	Jerry Koll, M&O
4:45 p.m.	**Technical Program Status of QA Implementation**	Dick Spence, DOE
5:00 p.m.	**Status of Other Topics**	Bob Clark, DOE
5:15 p.m.	**Evolution of the Repository Design: M&O Recommendation**	Jean Younker, M&O
5:45 p.m.	**Closing Remarks**	NRC, DOE
6:00 p.m.	**Adjourn**	All

DIVISION OF WASTE MANAGEMENT



YUCCA
MOUNTAIN
PROJECT

Management Commitment to Quality Initiatives

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Dr. J. Russell Dyer, Project Manager
Yucca Mountain Site Characterization Office

April 22, 1999

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

Presentation Outline

- Status of December 1998 Management Meeting actions
- Improved management processes/tools
  - Management actions
  - OCRWM concerns program
  - Quality Assurance Management Assessments
  - Self-assessments
  - Lessons learned
- Approach to resolution of CARs
- Resolution of existing Corrective Action Requests

December 1998 Management Meeting

- Addressed Project focus on Site Recommendation activities, paradigm shift to the nuclear culture and implementation of quality initiatives leading to resolving quality issues and improving operations
  - Reorganization
  - Process Validation and Re-engineering
  - Corrective Action Report (CAR) resolution plans
  - Near term priorities (DEIS, FEIS, SR)

Actions from December NRC/DOE Management Meeting

- Provide Clark County Representative specific information on LLNL C-22 coupon issue - completed (letters of 1/27/99 and 3/11/99)
- NRC questioned Q status of TOUGH2 and other codes - information provided to On-site representatives in January 1999
- Summary CAR response activities and due dates table revised - revision included with letter of 1/25/99

Actions From December NRC/DOE Management Meeting
(Continued)

- Request for detailed discussion of the SR and LA schedules - DOE plans to provide by June 1999, when integrated schedule is complete
- Request for additional information on the use of the prioritization tables presented in Volume 4, Viability Assessment and what information will be available at SR - DOE committed to present in future meeting (after integrated schedule is complete)

Improved Management Processes/Tools

- Product oriented Work Breakdown Structure and budget structure to focus program needs
- New Responsibility Assignment Matrix (RAM) for enhancing individual responsibility and accountability
- Enhanced planning process to better define Project needs and performance metrics for contractor performance

Improved Management Processes/Tools
(Continued)

- New policy/decision/integration processes
  - Reorganized to enhance integration and actively seeking staff with appropriate qualifications to operate in the nuclear culture
  - Established YMP Project Operations Review Board
  - M&O contractor established Corrective Action Board (CAB) to assess effectiveness of the corrective action process
  - Licensing training

Improved Management Processes/Tools
(Continued)

- Improved Project execution
  - Process Validation and Re-engineering to enhance Project work processes
  - Focus on quality initiatives

Improved Management Processes/Tools
(Continued)

- Use of QA performance standards and indicators for contractors and staff
  - Contractors' performance criteria include demonstrating compliance with QA program
  - Employment conditional on full compliance with and commitment to QA program
  - Satisfactory performance of staff includes full compliance with QA program

Improved Management Processes/Tools
(Continued)

- OCRWM Concerns Program
  - Program initiated June 1991
  - Process is controlled by administrative procedure AP-32.1, *OCRWM Concerns Program*, and provides an avenue for direct communication of concerns
  - OCRWM concerns program web page in final stages of preparation
- QA Management Assessment (QAMA)
  - QAMAs have been conducted for eight years

Improved Management Processes/Tools
(Continued)

- QAMA 1998 identified issues in the areas of:
  - Nuclear regulatory culture
  - Technical data
  - YMP planning
  - Lessons learned
  - Performance metrics
  - Balance between science and engineering
  - Corrective actions
- These issues will be discussed during this meeting

Improved Management Processes/Tools
(Continued)

- Self-assessments
  - Readiness Review is planned for Engineering Design Control
    - Purpose of the review is to assess the adequacy of the design control processes as being sufficient to initiate the MGR design effort for SR and LA
  - Busted Butte review is planned to ensure proper controls have been met for collection of critical data

Improved Management Processes/Tools
(Continued)

- Lessons Learned
  - Using experience from WIPP and NRC licensed facilities to improve:
    - Process for controlling use of technical data
    - Evaluation of records for defensibility, traceability, and transparency

Approach to Resolution of CARs

- Implemented CAR Management Plan
  - Specified adequacy of immediate steps validated by root cause analysis
  - Specified steps to address CAR deficiencies
- Long term actions involve procedural and cultural changes
- Quality checks introduced into the document preparation process
- Centralized Q procurement authority and review

Approach to Resolution of CARs
(Continued)

- "Tiger Teams" established to review process models for TSPA-SR
- Training on control and use of Scientific Notebooks, and completed review of currently open Scientific Notebooks
  - Numerous outstanding issues identified to be resolved by 7/30/99

Resolution of Existing Corrective Action Requests (CARs)

- DOE has committed to resolving outstanding CARs by October 1999
- We have encountered difficulties in implementation of the approach; however, our goal remains full resolution of these CARs by October 1999
- Subsequent presentations address actions underway to improve management processes, resolve CARs, and improve operations

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MOUNTAIN
PROJECT

Overview of Management and Corrective Actions

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Dr. Stephan Brocoum
Acting Assistant Manager,
Licensing & Regulatory Compliance

April 22, 1999

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

Background

- NRC was briefed last December on DOE initiatives to instill a nuclear culture and enhance quality
  - Management initiatives taken prior to root cause determinations
    - Project-wide transition to a nuclear culture
    - Process Validation and Re-Engineering (PVAR) effort coordinated with Corrective Action Request (CAR) response activities
  - Implementation of integrated CAR management plan

Transition to a Nuclear Culture

- Training to educate management and staff
  - All-hands training sessions complete
  - Regulatory and licensing training provided emphasizes lessons learned
  - Management implementation continues
- Increasing staff recognition of
  - Roles and responsibilities in ensuring quality
  - Necessity and importance of adherence to procedural controls
- Metrics for DOE and contractor performance

Integrated CAR Management Plan

- The plan is being implemented, with interim verifications by DOE OQA complete
- Today information will be provided on:
  - Proposed Process Model Reports (PMRs) and role in addressing quality issues
  - Status and verification of corrective actions
  - Data qualification strategy
  - Status of data and software qualification
  - Root cause determinations and additional actions to address root causes

PVAR Initiative

- Evaluations of 19 processes identified:
  - Need for improvements in existing procedures
  - Opportunities for consolidation of procedures
  - PVAR results consistent with and complement root cause results and corrective actions
- Revision of 1st tier procedures underway
  - 27 new Administrative Procedures (APs)
  - 49 cancellations at effective date
  - Train to revised procedures in May-June

Status

- Our nuclear culture initiatives are in place and being worked
- PVAR has resulted in 27 new procedures, with the net elimination of 22 procedures
- The integrated corrective action plan is being implemented and the implementation is being verified by OQA
- The PMR process is being proposed as a means to document input data, codes, and models supporting TSPA

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MOUNTAIN
PROJECT

Process Model Reports (PMR)

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Jack Bailey
Director, Regulatory and Licensing, M&O

April 22, 1999

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

Process Model Reports (PMRs) Purpose

- The purpose is to document the technical basis supporting each TSPA process model
  - Supports the postclosure site suitability evaluation
  - Supports the postclosure safety case for licensing
- PMRs will focus the development of technical information on what is relevant to developing a defensible TSPA
  - i.e., The information the Project is relying upon to demonstrate postclosure compliance
- The PMR development process will ensure traceability of data, information, and references

PMR Scope

The following PMRs will be developed

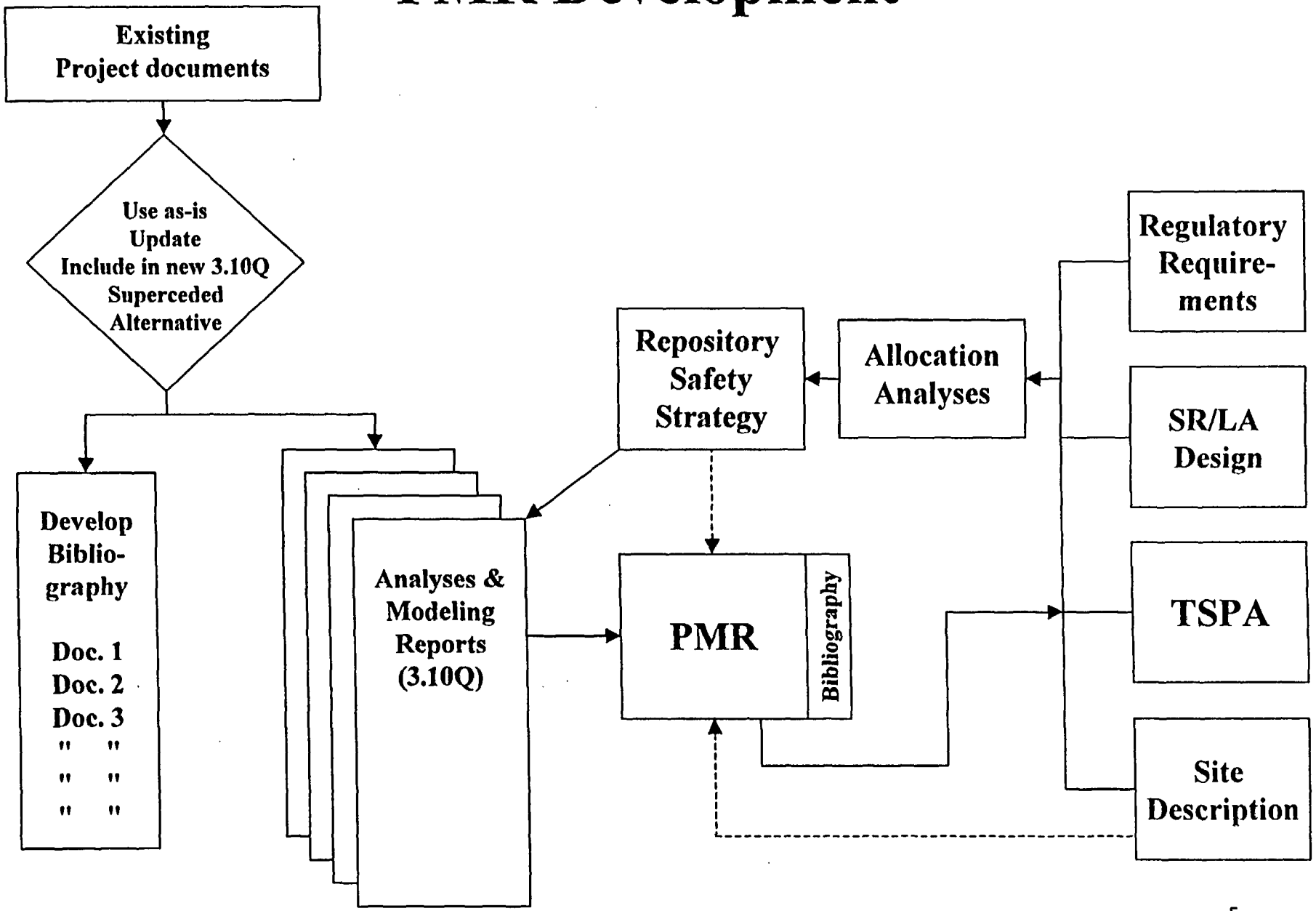
1. Integrated Site Model
2. Unsaturated Zone Flow and Transport
3. Near Field Environment
4. Engineered Barrier System Degradation and Flow/Transport
5. Waste Package Degradation
6. Waste Form Degradation
7. Saturated Zone Flow and Transport
8. Biosphere
9. Tectonics

PMR Scope
(Continued)

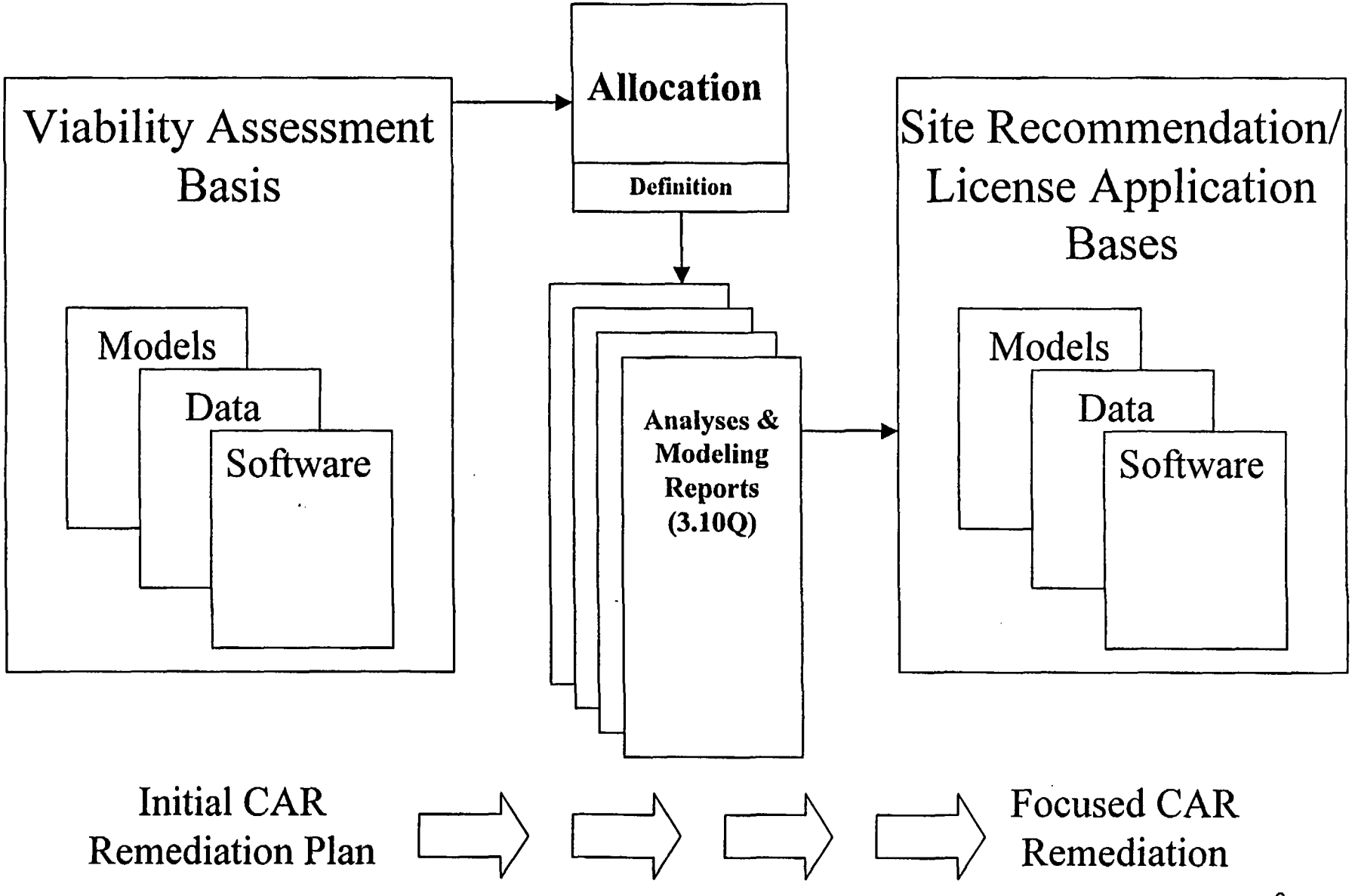
PMRs will contain:

- Description of the model and submodels
- Abstraction of the model into TSPA
- Relevant data and data uncertainties
- Assumptions and bases
- Model results (outputs)
- Information on code verification/model validation
- Opposing views
- Information necessary to support regulatory evaluations

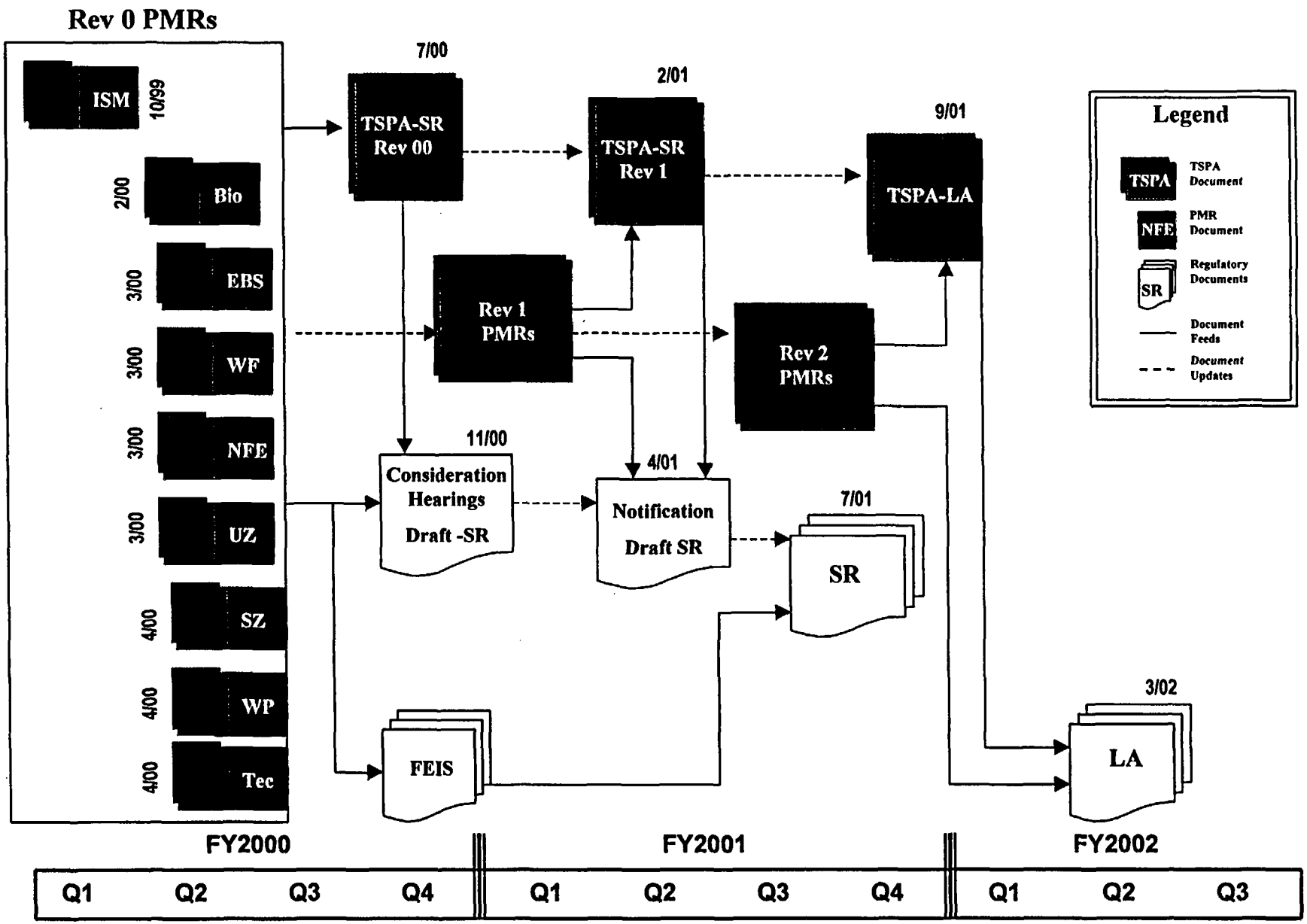
PMR Development



PMR Role and Path Forward



How PMRs Link to EIS, SR and LA



YUCCA
MOUNTAIN
PROJECT

Status of Corrective Actions

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Jean Younker
Deputy Assistant General Manager, Technical

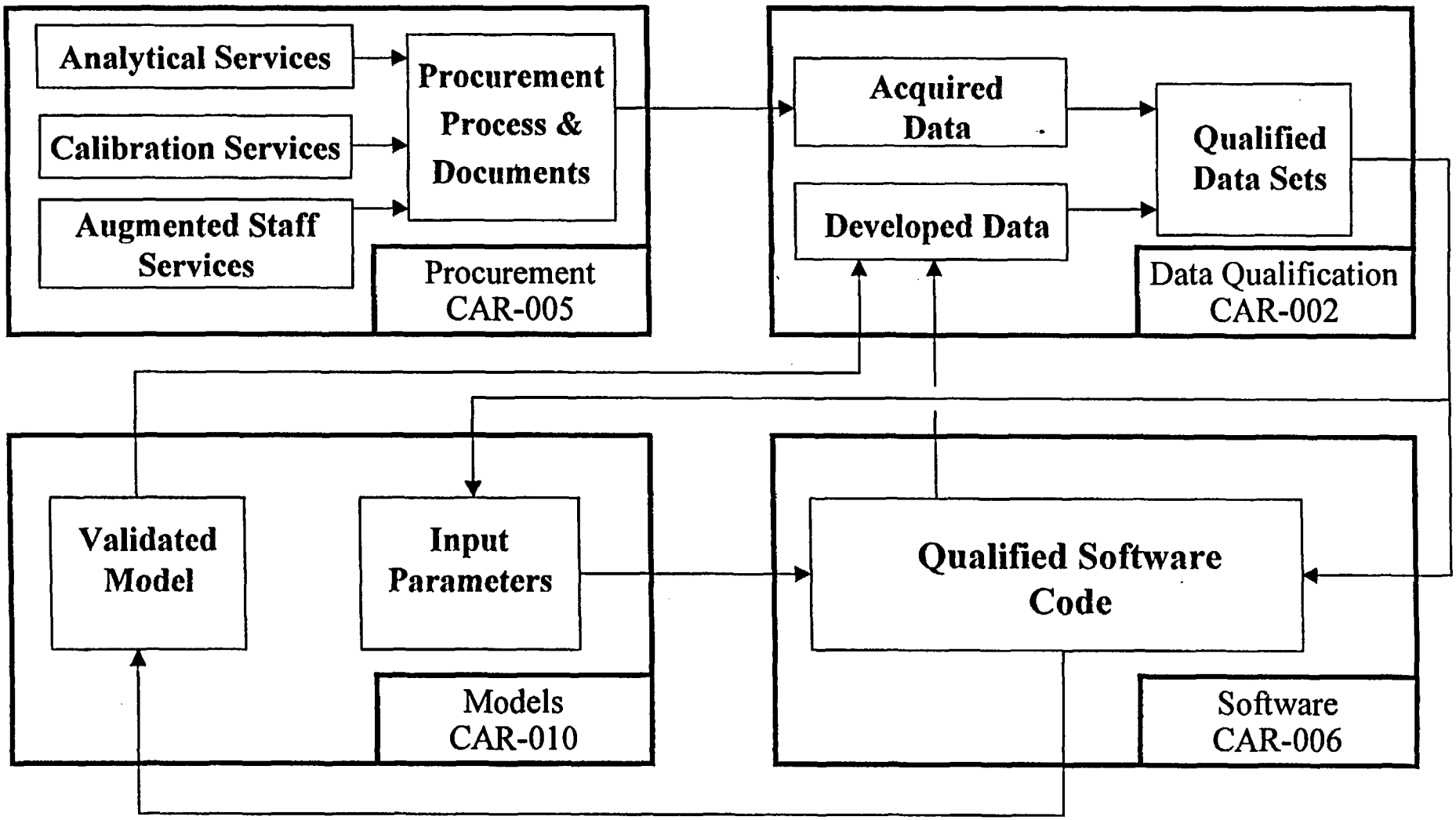
April 22, 1999

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

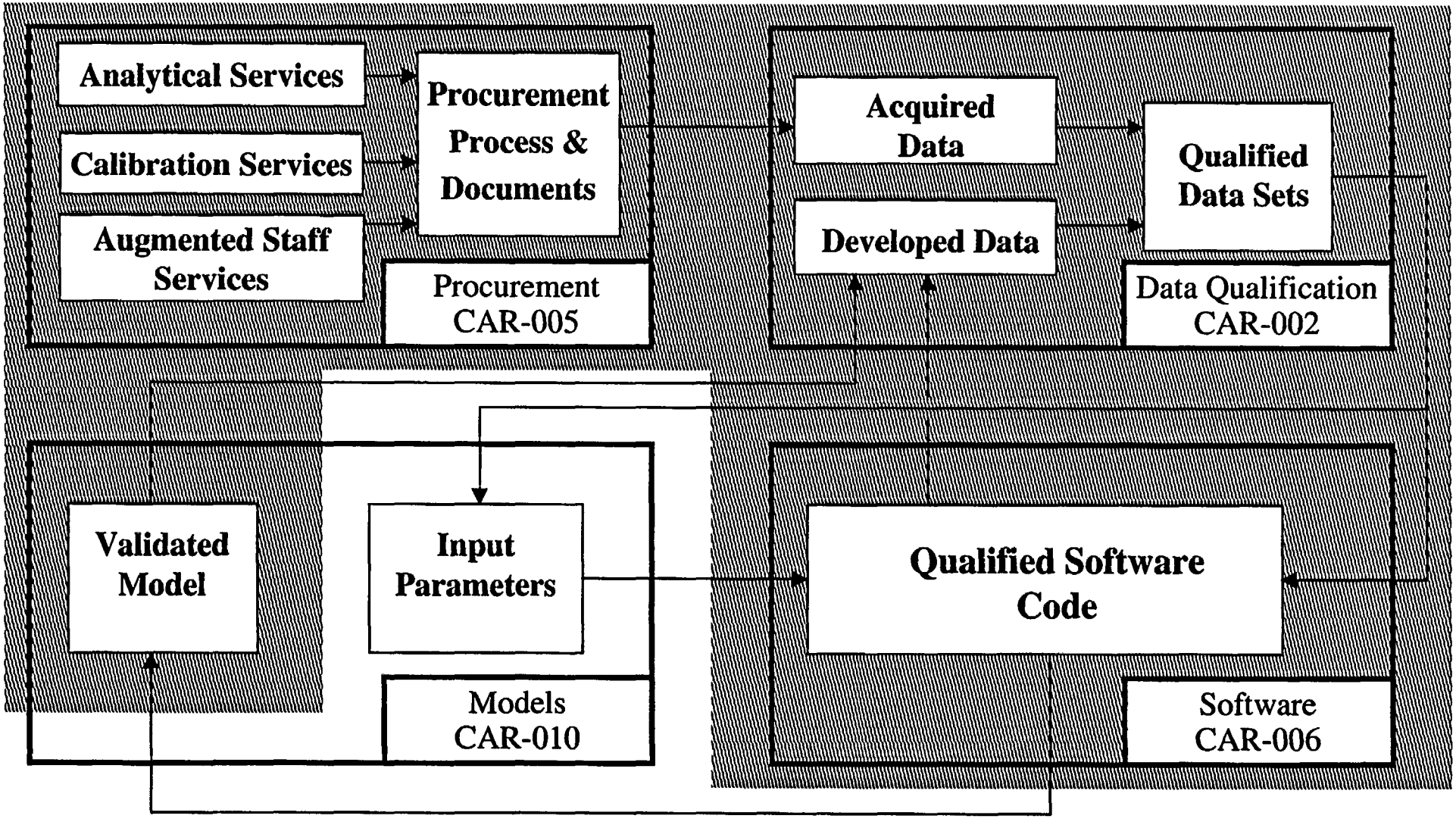
Overview

- Integrated CAR Relationships
- CAR Management Plan
- Completed Actions
- Actions in Process
- Qualification Strategy
- Qualification Status
  - Data
  - Software
  - Models
- Summary

Integrated CAR Relationships

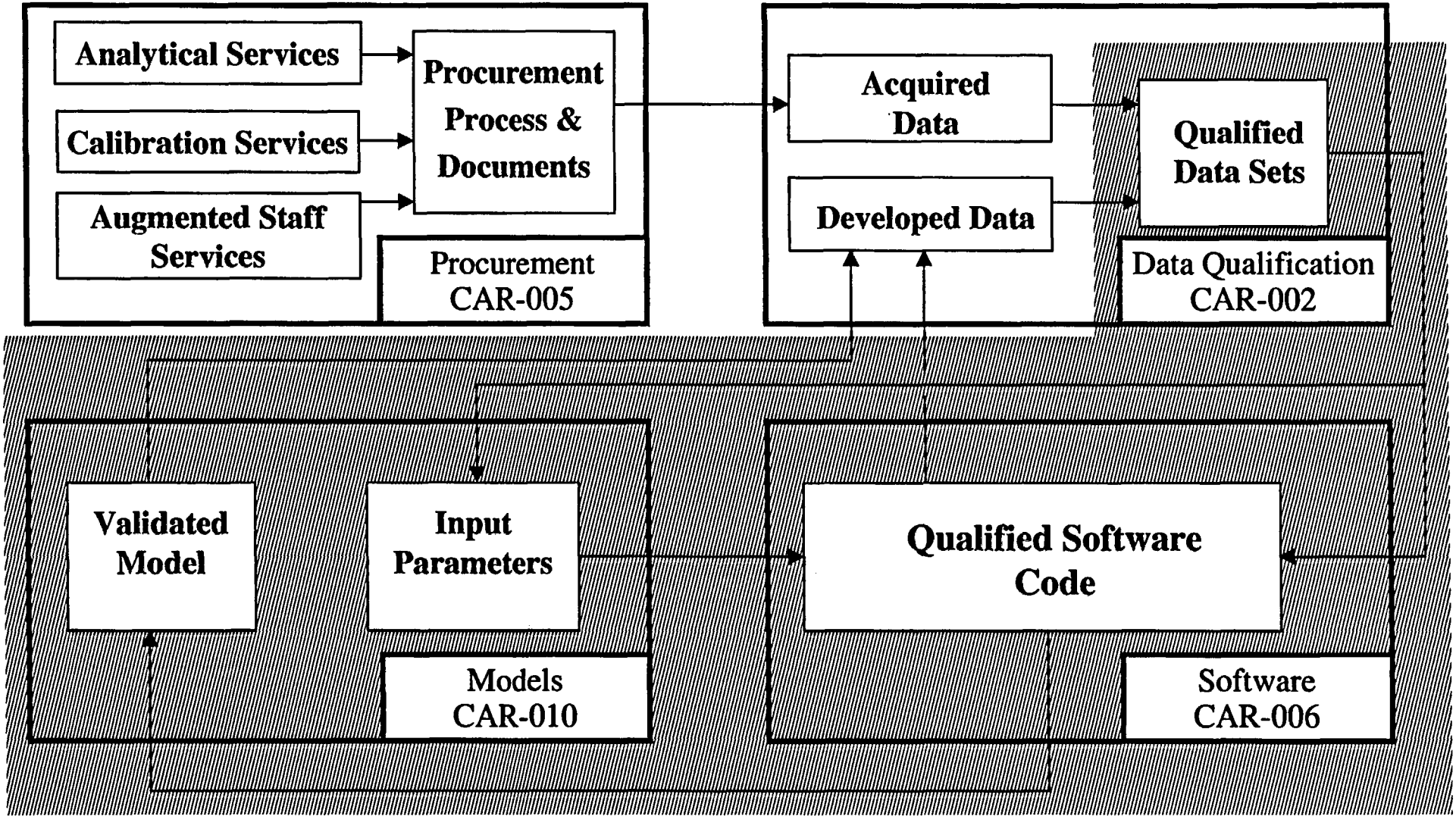


Integrated CAR Relationships



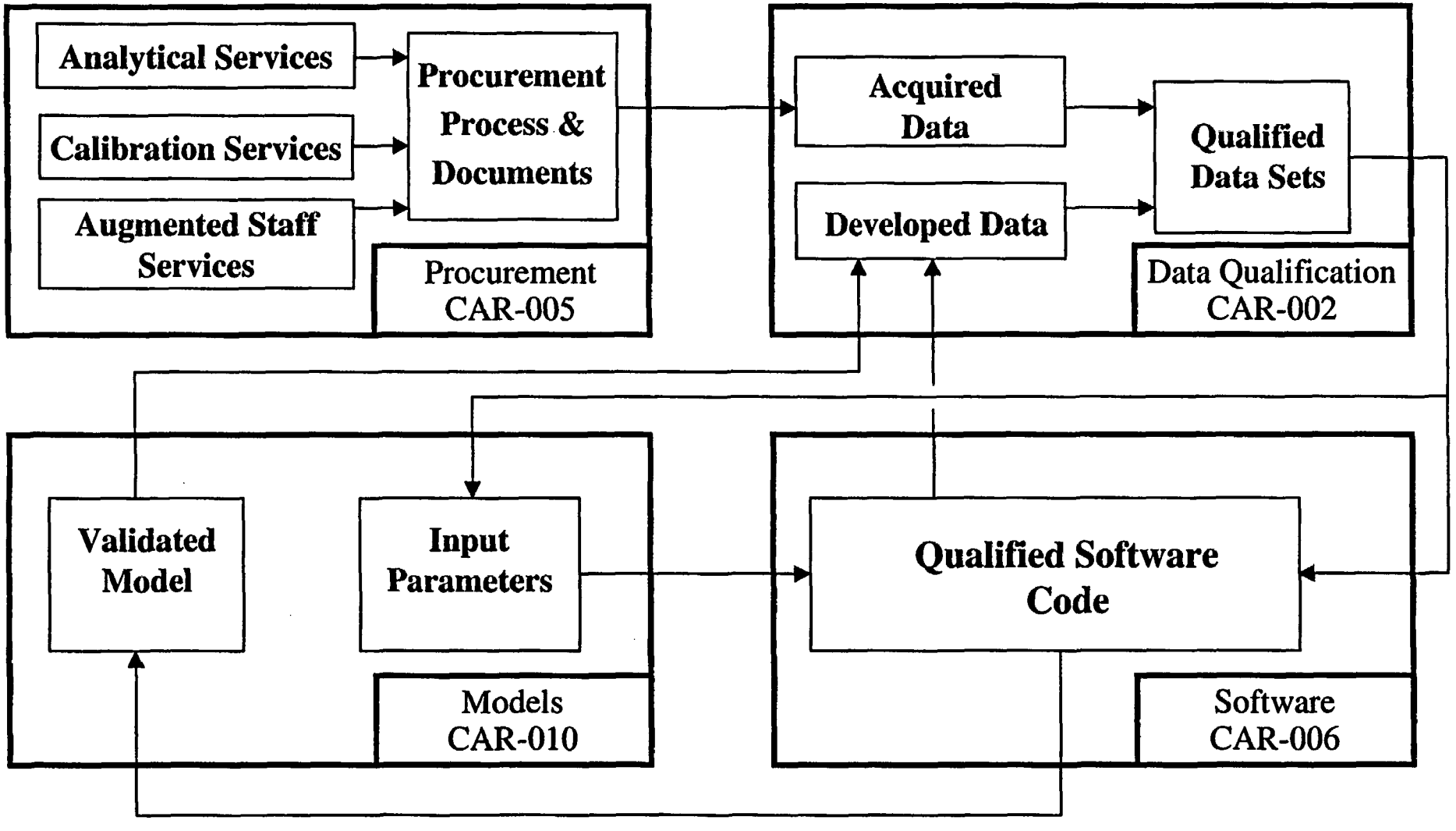
Scope of Remediation for CAR-002, Data Qualification

Integrated CAR Relationships



Scope of Remediation for CAR-010, Models

Integrated CAR Relationships



Scope of Remediation for CAR-99-001, Traceability

CAR Management Plan

- As accepted on January 20, 1999, the Plan did a good job of:
  - Identifying apparent causes and actions to preclude them
  - Identifying actions to get back into compliance
  - Identifying remediation actions from a VA to SR/LA standpoint
- A Plan revision will correct mistakes and reflect increased understanding of needs/priorities (i.e., Process Model Reports) and process

Completed Actions

- CAR 98-C-002, Data Qualification
  - Interim direction to only use data from TDMS for SR/LA was issued via DOE letter dated 12/05/97 - ICN-2 to YAP-SIII.3Q, *Data Processing*, issued 2/15/99 provided procedural direction
  - Existing data in TDMS identified as "Q" flagged with global "TBV" on 9/30/98
  - Root Cause Determination (Due 3/5/99. Submitted 3/26/99, accepted by OQA on 4/9/99)
  - Revised YAP-SIII.1Q, *Qualification of Unqualified Data*, to improve the process - revision 3 effective 11/18/98

Completed Actions
(Continued)

- CAR 98-C-005, Procurement
  - M&O and National Laboratory procurements were centralized at the M&O via letter effective 10/1/98
  - Procurement Engineer Position was established at M&O on 9/30/98
  - QAP-7-3Q, *Procurement Process* became effective 2/8/99
    - Provided detailed "Q" determination guidance
    - Implemented centralization of purchasing
    - Streamlined procurement process

Completed Actions
(Continued)

- CAR 98-C-005, Procurement (Continued)
  - DOE was to issue written direction to cease credit card purchases (Due 12/21/98. Because of Federal policies permitting credit card purchases, this action was voided)
  - Review of open Q procurements for adequate requirements was completed 1/22/99
    - None determined inadequate

Completed Actions
(Continued)

- CAR 98-C-005, Procurement (Continued)
  - Review of open non-Q procurements for proper classification (Due 1/31/99. Review completed 1/31/99 to current procedures, but documentation of the reviews is inadequate)
    - None required re-classification
  - Verification of the current Qualified Suppliers List was completed 2/6/98

Completed Actions
(Continued)

- CAR 98-C-005, Procurement (Continued)
  - Root Cause Determination (Due 3/5/99. Submitted 4/2/99, accepted by OQA on 4/9/99)
  - Revised QAP-7-3Q, *Procurement Process* - was effective 2/8/99
  - Revised QAP-7-5Q, *Acceptance of Items and Services* (Due 2/15/99. Effective 3/10/99)
    - QAP-7-5Q established detailed method for acceptance of services

Completed Actions
(Continued)

- CAR 98-C-006, Software
  - Software inventory was completed 9/30/98
    - 461 software codes
  - Flagging of software as "TBV" was completed in the inventory database on 9/30/98
  - Baseline requests were submitted for software to be used for SR/LA (Due 4/2/99. Completed 4/14/99)
    - 136 software codes
  - AP-SI.1Q, Rev. 0, *Software Configuration Management*, was effective 2/15/99
    - Centralized software configuration management

Completed Actions
(Continued)

- CAR 98-C-006, Software (Continued)
  - Automated software configuration management tracking for base-lined software (Due date 4/2/99, this phase expected completion 4/30/99)
  - Root Cause Determination (Due 2/19/99. Submitted 3/25/99, accepted by OQA on 4/9/99)

Completed Actions
(Continued)

- CAR 98-C-010, Models
  - Inventory completed 10/30/98
  - Model index completed 3/12/99
  - Root Cause Determination (Due 2/19/99. Submitted 3/26/99, accepted by OQA on 4/9/99)
  - AP-3.10Q, *Analyses and Models* (Due 12/22/98. Approved on 12/4/98; effective 2/15/99)
    - Consolidated science, performance assessment, and engineering analysis
    - Training for PA and necessary science and engineering staff in February and March, 1999

Completed Actions
(Continued)

- CAR 99-C-001, Traceability
  - Interim document quality checking process was put in place:
    - M&O General Manager letter dated 7/2/98 - made line managers responsible for checking function
    - M&O General Manager letter dated 10/7/98 - increased original scope of documents to be checked and assigned checking function to independent organizations

Completed Actions
(Continued)

- CAR 99-C-001, Traceability (Continued)
  - A formal quality checking process was put in place with:
    - AP-3.10Q, *Analyses and Models*, became effective on 2/15/99 for design and non-design documents
    - 5 other M&O QAPs applicable to design included a document checking function prior to 7/2/98

Actions In Process

- CAR 98-C-002, Data Qualification
  - Change YAP SIII.3Q, *Processing of Technical Data on the Yucca Mountain Site Characterization Project* (Due 2/15/99. An initial Interim Change Notice issued on 2/15/99 was not adequate to meet the intent. A new Interim Change Notice is expected to be complete 4/26/99)
    - Ensures traceability of new data to primary QA records that substantiate "from origin" qualification - ensures data traceability
  - Verifying flagged data is due for completion 10/29/99 (shown incorrectly as 5/3/99 in 1/25/99 letter)

Actions In Process
(Continued)

- CAR 98-C-005, Procurement

  Note: A different approach is being considered for the following two actions. Due dates will be revised, if necessary, when approach is finalized and accepted by OQA.

  - Identify prior procurements (Due 3/31/99. Some organizations have limited record retention periods for non-Q procurements; expect to complete 5/10/99)
  - Verify prior non-Q procurements for proper classification (Due 4/15/99. Original estimate for number of procurements was too conservative - expect to complete by 5/30/99)
    - Estimated at more than 8,000 non-Q procurements

Actions In Process
(Continued)

- CAR 98-C-005, Procurement (Continued)
  - Verify prior Q procurements for all other aspects (Due 5/30/99. Expect to complete 7/31/99)
  - Complete impact analysis for findings from re-verification of prior procurements (Due 6/15/99. The action will be revised or deleted because data impacts cannot be determined based on review of procurement documents, data impacts will be determined through working CAR-002, Data Qualification)

Actions In Process
(Continued)

- CAR 98-C-006, Software
  - Software determination/verification is due to complete 10/29/99
    - 2 have been completed
    - 11 are in process
    - 123 remaining
  - Develop automated software configuration control system (Due 4/9/99. Phase I expected to be completed by 4/30/99. A following slide discusses Phase II)
  - Issue AP-SI.1Q, Rev. 1, *Software Management* (Due 4/16/99. Expected to be approved by 4/26/99 and effective 5/5/99.)

Actions In Process
(Continued)

- CAR 98-C-006, Software (Continued)
  - Software lifecycle management training (Due 3/12/99. Training is expected to complete at the same time as the effectivity of Rev.1 of AP-SI.1Q on 5/5/99. Status: Lesson plan is being finalized)

Actions In Process
(Continued)

- CAR 98-C-006, Software (Continued)
  - Automated software configuration control system implementation (Due 4/9/99. Delays in the code development necessitated two phases. Phase I - automated configuration management, and Phase II - automated life cycle controls. Phase I expected to be implemented 4/30/99. Phase II expected to be implemented 7/16/99. Manual life cycle controls in Rev. 1 of AP-SI.1Q are fully adequate to meet QARD requirements without the automated controls)

Actions In Process
(Continued)

- CAR 98-C-010, Models
  - Identification of model consolidations is due to complete by 5/3/99
  - Preparation of family trees for models is due to complete by 10/29/99
    - Tiger teams/PMR Leads are defining the minimal necessary and sufficient set of analyses and models for TSPA-SR

Actions In Process
(Continued)

- CAR 99-C-001, Traceability

  Note: A different approach using PMR prioritization is being considered for the following actions. Due dates will be revised if necessary when approach is finalized and accepted by OQA.

  - Quality check review of completed, un-submitted, Level 3 deliverables (Due 3/26/99)

  - List existing reports to be used for SR/LA and schedule for review using the quality checking process (Due 2/19/99)

Qualification Strategy

- Identify
  - Initially identify specific data sets, models, and software needed for VA and then for SR/LA
- Qualify
  - Focus qualification efforts on directly relied upon data, establish traceability
- Control
  - Maintain data under management controls for storage, retrieval and use

Qualification Status

Qualification Status Data

- 372 data sets identified (identified in VA, VA-Technical Basis Document, and Site Description Report and will likely be needed for SR/LA)
- Evaluation checklists developed
- Initial training on use of checklist completed
- Evaluations underway
- Completion targeted for 10/29/99

Qualification Status
Software

- 461 codes inventoried
- 136 identified for SR/LA, will be verified
- Revision 0 of AP-SI.1Q, *Software Configuration Management,* has been completed and became effective on 2/15/99

Qualification Status
Models

- 185 models inventoried
- Model consolidation is on-going
- About 200 models/analyses identified to support TSPA-SR

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PROJECT

OQA Interim Verification Status

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Bob Clark
Acting Director, Office of Quality Assurance

April 22, 1999

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

OQA Interim Verification of Corrective Actions

Corrective Action Request	Actions Verified	Actions Complete	Actions Incomplete
CAR 98-C-002 (Data Qualification)	11	6	5
CAR 98-C-005 (Procurement)	29	22	7
CAR 98-C-006 (Software)	10	7	3
CAR 98-C-010 (Models)	5	5	0

OQA Interim Verification of Corrective Actions
(Continued)

OQA Recommendations:

- Assess impact of USGS being assigned approximately 63% of the Data Tracking Numbers for CAR 98-C-002 reverification activities, and allocate appropriate resources
- Improve communication and direction from Las Vegas M&O management relative to CAR implementation activities
- Provide to DOE impact (schedule/technical) of not completing interim activities on time

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Root Cause Determinations

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Ronald Stevens, Supervisor
Regulatory and Licensing, M&O

April 22, 1999

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

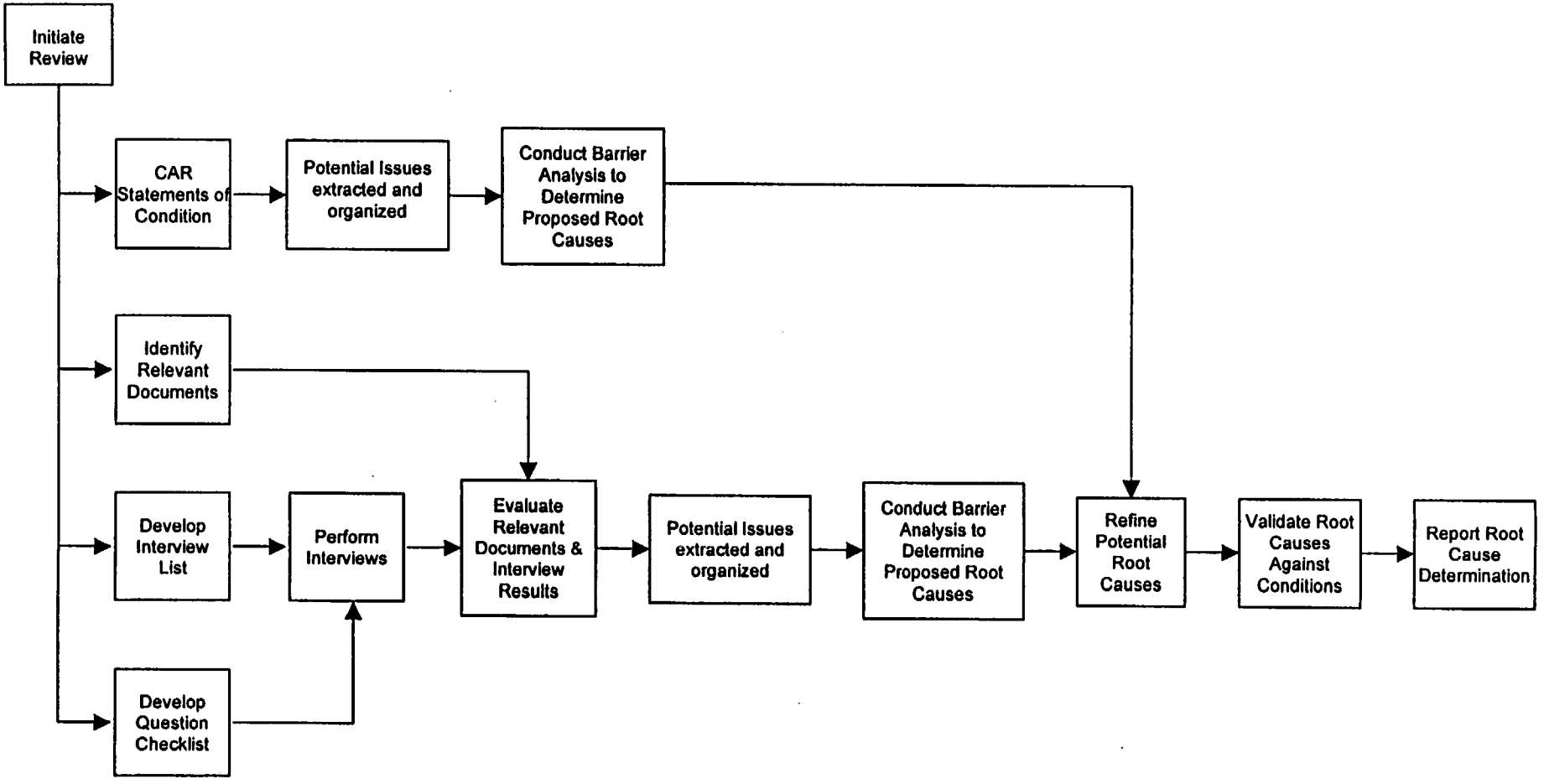
Overview

- Team Composition
- Methodology
- Interviews
- Barrier Analysis
- Results
- Path Forward

Team Composition

- Regulatory & Licensing - One (Team Lead)
- Engineering Assurance - Two
- Outside Consultants - Three

Methodology
Root Cause Determination



Interviews

- Interviewed 37 individuals (included M&O, DOE-OQA, USGS, and the laboratories)
- Selected identifiers, implementers, managers, and oversight/verification individuals, relative to area of concern
- Evaluated over 400 interview responses
- Responses categorized using "symptom classification" to synthesize statements of condition

Barrier Analysis

- Systematic process, very effective in determining the root cause(s) of problems that appear to be programmatic
- Identifies physical, administrative, procedural controls, and other controls or barriers that should have prevented an undesirable condition from existing
- Used to assess why existing barriers, both physical and administrative, failed

Results

- Several Root Causes were identified for each CAR
- Most of the Root Causes were applicable to each CAR
- Root Causes validated apparent causes

Results

(AP-16.4Q Cause Code Statements)

Root Causes	CAR			
	002	005	006	010
Situation/Process requirements not covered	X	X	X	X
Individuals not qualified	X	X	X	X
No standards, policies, or administrative controls (SPAC)	X	X	X	X
Inadequate communication of SPAC	X	X	X	X
Less than adequate accountability	X	X	X	X
Inadequate corrective action		X	X	
Inadequate job/task analysis	X	X	X	X
Knowledge based decision required	X			

Path Forward

- Remedial actions that have been implemented are appropriate
- Additional corrective actions to prevent recurrence may be necessary

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Corrective Actions to Address Root Causes

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Jean Younker
Deputy Assistant General Manager, Technical

April 22, 1999

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

Corrective Actions to Address Root Causes

- Root Cause Determinations are being evaluated to identify additional corrective actions necessary to preclude recurrence
- Following matrices show relationship between root causes, consolidated conditions, and corrective actions
- Corrective actions to preclude recurrence are preliminary and do not have DOE OQA acceptance

CAR-002

LEGEND

X - Shows relationship
A - Action to address apparent causes
B - Action initiated prior to Root Cause Determination
Ba - Nuclear Culture Initiative
C - Additional action to address root causes

Corrective Actions										Root Causes (AP-16.4Q)	Consolidated Conditions				
Consolidate Lab and M&O Procurement procedures	Performance Appraisal Program - Quality Focus	M&O Discipline Program	Centralize Lab and M&O procurements	Establish Procurement Engineer Position	AP-2.1Q, Indoctrination and Training of Personnel - PVAR	Qaulity Assurance Indoctrination	AP-2.15Q, Incorporation of QARD Planning Requirements into Planning Documents	AP-5.2Q, Testing Work Packages - PVAR	AP-2.13Q, Technical Product Development Planning - PVAR		Implementing documents did not adequately address process and QA requirements necessary for acquisition of Q data; resulting practices were inconsistent.	Individual performance failures were due to ignorance or misinterpretation of requirements and implementation needs.	The M&O and other contractors failed to effectively apply the Quality Assurance Program to the conduct of science activities.	The technical and administrative reviews of implementing documents and technical work products were less than adequate.	M&O and DOE managers' and supervisors' level of knowledge of the QA environment was less than adequate.
A			A	A						Situation/process requirements not covered				X	
A			A		Ba	Ba				Individuals not qualified		X		X	
A										No Standards, Policies, Administrative Controls (SPAC)	X	X	X		
					Ba	Ba	B	Ba	Ba	Inadequate communication of SPAC	X	X			
	Ba	Ba			Ba					Less than adequate accountability	X				
					Ba	Ba	B	Ba	Ba	Inadequate job/task analysis					X
							B	Ba	Ba	Knowledge based decision required		X			

CAR-005

LEGEND

X - Shows relationship
A - Action to address apparent causes
B - Action initiated prior to Root Cause Determination
Ba - Nuclear Culture Initiative
C - Additional action to address root causes

Root Causes (AP-16.4Q)	Corrective Actions																Consolidated Conditions						
	AP-2.15Q, Incorporation of QARD Planning Requirements into Planning Documents	AP-5.2Q, Testing Work Packages - PVAR	AP-2.13Q, Technical Product Development Planning - PVAR	Consolidate Lab and M&O Procurement Procedures	Enhance Tracking and Verification of Corrective Actions	Interim - Corrective Action Board	AP-16.1Q, Management of Corrective Actions	AP-16.4Q, Root Cause Determination	Issue M&O Lessons Learned	Issue QA Lessons Learned	Centralize Lab and M&O Procurements	Establish Procurement Engineer Position	M&O Discipline Program	AP-2.1Q, Indoctrination and Training of Personnel - PVAR	Performance Appraisal Program - Quality Focus	AP-5.1Q, Procedure Preparation, Review, and Approval - PVAR	Implementation of the CAP was inadequate	Individual performance failures	Failure to effectively apply QA program	Implementing documents inadequate	Technical and administrative reviews inadequate	Interface process control inadequate	Lack of needed QA knowledge
Situation/process requirements not covered	B	B		A							A	A				Ba					X		
Individuals not qualified				A							A			Ba		Ba					X		
No Standards, Policies, Administrative Controls (SPAC)			Ba	A	C												X	X	X	X		X	
Inadequate communication of SPAC	B	B	Ba											Ba				X		X		X	
Less than adequate accountability													Ba	Ba	Ba			X		X		X	
Inadequate corrective action						B	B	B	C	C							X	X					
Inadequate job/task analysis	B	B												B									X

CAR-006

LEGEND

X - Shows relationship
A - Action to address apparent causes
B - Action initiated prior to Root Cause Determination
Ba - Nuclear Culture Initiative
C - Additional action to address root causes

Corrective Actions												Root Causes (AP-16.4Q)	Consolidated Conditions						
Interim - Corrective Action Board	AP-16.1Q, Management of Corrective Actions	AP-16.4Q, Root Cause Determination	Issue M&O Lessons Learned	Issue QA Lessons Learned	AP-2.1Q, Indoctrination and Training of Personnel - PVAR	Performance Appraisal Program - Quality Focus	M&O Discipline Program	AP-5.1Q, Procedure Preparation, Review, and Approval - PVAR	AP-SI.1Q, Software Management	Software Configuration Control System (SCCS)	Workshop Training on AP-SI.1Q & SCCS		Implementing documents inadequate	Individual performance failures	Interface process control inadequate	Model ownership and CM inadequately controlled	Failure to effectively apply QA program	Technical and administrative reviews inadequate	Implementation of CAP was less than adequate
								Ba	A			Situation/process requirements not covered.			X		X		
					Ba				A		A	Individuals not qualified	X	X	X	X			
									A			No Standards, Policies, Administrative Controls (SPAC)	X	X	X				
					Ba				A		A	Inadequate communication of SPAC.	X						
						Ba	Ba					Less than adequate accountability.					X		
B	B	B	C	C								Inadequate Corrective Action						X	
									A			Inadequate job/task analysis.							X

CAR-010

LEGEND

- X - Shows relationship
- A - Action to address apparent causes
- B - Action initiated prior to Root Cause Determination
- Ba - Nuclear Culture Initiative
- C - Additional action to address root causes

Corrective Actions									Root Causes (AP-16.4Q)	Consolidated Conditions							
AP-2.15Q, Incorporation of QARD Planning Requirements into Planning Documents	Revise QARD Requirements on Modeling	AP-3.10Q, Analyses and Models	AP-2.1Q, Indoctrination and Training of Personnel - PVAR	Classromm training on nuclear culture and processes	AP-2.13Q, Technical Product Development Planning - PVAR	Performance Appraisal Program - Quality Focus	M&O Discipline Program	AP-3.4Q, Level 3 Change Control		QARD insufficiently prescriptive	Implementing documents inadequate	Individual performance failures	Interface process control inadequate	Model ownership and CM inadequately controlled	Failure to effectively apply QA program	Technical and administrative reviews inadequate	Lack of needed QA knowledge
		A							Situation/process requirements not covered							X	
	C	A		Ba					Individuals not qualified	X				X		X	
		A							No Standards, Policies, Administrative Controls (SPAC)		X	X	X	X	X		
B			Ba	Ba	Ba			B	Inadequate communication of SPAC		X	X	X	X			
			Ba	Ba		Ba	Ba		Less than adequate accountability		X		X	X			
		A			Ba			B	Inadequate job/task analysis								X

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Process Validation and Re-engineering (PVAR)

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Jerry Koll
PVAR Management

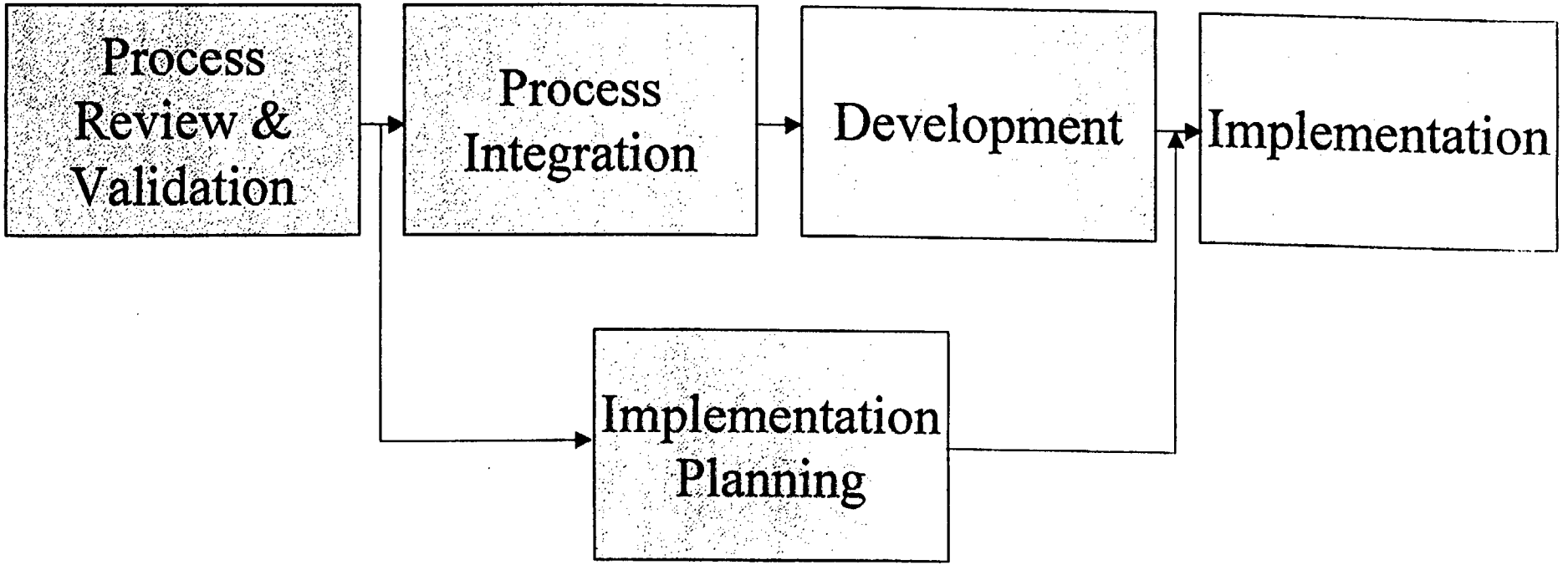
April 22, 1999

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

PVAR Objective

- Implement sound nuclear culture infrastructure based on performance and compliance
  - Standardize procedures for program participants
  - Eliminate procedure redundancy
  - Provide clear, concise guidance to end-users
  - Establish ownership
  - Establish effective, formal training program

PVAR Status


Process Review & Validation
Process Integration
Development
Implementation
Implementation Planning

Standardized for all Participants

PVAR Process	New/Revised Number	New/Revised Administrative Procedure (AP)	Responsible Manager(s)
Procedures Control	AP-5.1Q	Preparation and Review of Procedures	Director, Office of Project Control (OPC)
Training, Indoctrination, Qualification and Certification	AP-2.1Q AP-2.2Q	Indoctrination and Training Confirmation of Education and Experience of Personnel	Manager, Office of Project Support (OPS) and Manager, Office of Program Management and Administration (OPMA)
Model Control	AP-3.10Q	Analyses and Modeling	M&O AGM, MGR
Reviews Control	AP-2.14Q	Review of Technical Products	M&O AGM, MGR
Configuration Management	AP-3.4Q	Level 3 Change Control	M&O AGM, MGR
Software Control	AP-SI.1Q	Software Configuration Management	M&O AGM, MGR
Managing Document Inputs	AP-3.15Q	Managing Document Inputs	M&O AGM, MGR
Technical Data Control	AP-SV.1Q AP-SIII.2Q AP-SIII.3Q	Control of the Electronic Management of Data Qualification of Unqualified Data Processing Technical Data on the YMP	Manager, Office of Project Execution (OPE) Manager, OPE M&O AGM, MGR
Records Control	AP-17.1Q	Records Source Responsibilities for Inclusionary Records	
Scientific Notebook Control	AP-SIII.1Q	Scientific Notebooks	
Technical Report Control			

27 new Administrative Procedures (APs)

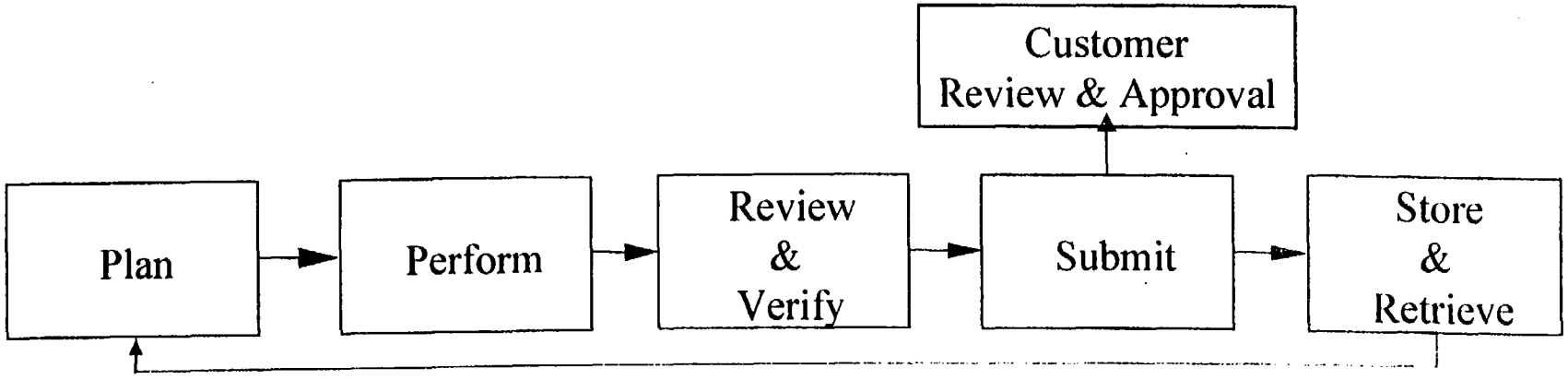
Apply to:

- **DOE**
- **USGS**
- **M&O, including Laboratories**

Eliminate Procedure Redundancy

- First tier results
  - 27 APs
  - 49 cancellations at effective date
    - USGS
    - NLPs
    - YAPs
    - PROs
    - HLPs
    - Laboratory Procedures
- Second and third tier implementation and cancellations expected for next eighteen months

Clear Concise Guidance to Users



AP-2.13Q Technical Product Development Planning
AP-3.13Q Design Control
AP-5.2Q Testing Work Packages

AP-AC.1Q Expert Elicitation
AP-5.2Q Testing Work Packages
AP-SIII.1Q Scientific Notebooks
AP-3.15Q Managing Document Inputs
AP-3.10Q Analyses & Models
AP-3.11Q Technical Reports
AP-3.12Q Calculations
AP-3.19Q Specifications/Drawings
AP-SI.1Q Software Management
AP-3.14Q Transmittal of Design Input

AP-2.14Q Review of Technical Products
AP-2.12Q Peer Review
AP-3.12Q Calculations
AP-3.19Q Specifications/ Drawings
AP-3.20Q Technical/Design Verification
AP-SI.1Q Software Management
AP-5.1Q Procedure Preparation, Review, and Approval

AP-17.1Q Record Source Responsibilities for Inclusionary Records
AP-3.4Q Level 3 Change Control
AP-6.1Q Controlled Documents
AP-SIII.3Q Data Coordinators' Identification and Submittal of Data to the Technical Data Management System

AP-3.15Q Managing Document Inputs
AP-6.1Q Controlled Documents
AP-17.1Q Records Source Responsibilities for Inclusionary Records
AP-SI.1Q Software Management
AP-SIII.3Q Data Coordinators' Identification and Submittal of Data to the Technical Data Management System

<u>Infrastructure Support</u>

1. AP-5.1Q Procedure Preparation, Review, and Approval
2. AP-2.1Q Indoctrination 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

Ownership by End-Users

- Subject Matter Experts (SME) used as authors were end-users
- Appropriate program participants involved in reviews, comments and resolutions
- End-users will conduct validation reviews
- End-users will be ongoing process owners
- SMEs and other end-users involved in training and implementation

Effective, Formal Training Program

- Introduction and process training planned for May and June
- SMEs and professional trainers preparing packages
- SMEs, management and trainers will present

PVAR Next Steps

- Conduct user walkthrough/talkthrough procedure validation reviews
- Conduct independent assessment (QAMA) and self-assessments to determine success of implementation
- Continued management commitment to 2nd and 3rd tier implementation

PVAR Conclusion

- Maintained focus on nuclear culture infrastructure for 1st tier PVAR procedures
  - Standardized procedures for program participants
  - Eliminated procedure redundancy
  - Improved guidance to end-users
  - Focused on end-user ownership during development and validation
  - Established formal training program for implementation
- Maintaining focus and management commitment to 2nd and 3rd tier implementation

PVAR Implementation Matrix
Working Paper: April 19, 1999

Procedure	Improved Business Practice	Deficiency Addressed
AP-2.1Q, Indoctrination and Training	Consolidates the training process for OCRWM including subcontractors and direct support organizations Defines the controls used for achieving and maintaining proficiency of personnel qualifications	
[illegible]	Consolidates the verification of personnel education and experience process for OCRWM Defines responsibilities and process methods used for evaluation, selection and verification of qualifications	
AP-2.12Q, Peer Review	Provides single peer review process Consolidates consensus and individual peer review tracts	LVMO-99-D-027 -- Strengthens verification of qualifications of expert panel members
[illegible]	[illegible]	LVMO-99-D-027 -- Identified and accounted for areas where planning process was not used
AP-2-14Q, Review Control	Incorporated the review process of three procedures into one Streamlined the Review Coordinator position Simplified review process by reducing section five processes from four to three Eliminated forms, i.e.. "Review Team Selection Worksheet" and "Review Team List" Incorporated electronic comment documentation for quicker resolution of comments	
[illegible]	[illegible]	LVMO-98-C-002, LVMO-98-C-008, LVMO-98-C-010 Proceduralized and strengthened change control and configuration management process
AP-3.10Q, Analyses and Modeling	Standardizes documentation requirements for analyses and models across the program Applies to analyses prepared by science, performance assessment and engineering Explicitly requires data submittal to the technical data management system	LVMO-98-C-002, LVMO-98-C-010, LVMO-99-C-001 Proceduralized process for model development Specifies requirements for model preparation, review, approval and controlled distribution Requires explicit documentation of assumptions Requires specific documentation of software used
[illegible]	[illegible]	LVMO-98-D-141, LVMO-98-C-001, LVMO-99-D-031 Defines roles and responsibilities for technical report author, checker, and [illegible] Establishes requirements for technical report version control
AP-3.12Q, Calculations	Applied proven calculation process program wide	
[illegible]	[illegible]	[illegible]
AP-3.14Q, Transmittal of Design Input	Implements process for single point of contact for tracking and distribution of forms and inputs	
[illegible]	[illegible]	LVMO-98-C-002, LVMO-99-C-001 Strengthens management of inputs and references Strengthens management of inputs and references
AP-3.17Q, Impact Reviews	Implements process for tracking affected organizations for impact reviews Implements use of DIRS database to track affected documents for impact reviews	

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Technical Program Status of QA Implementation

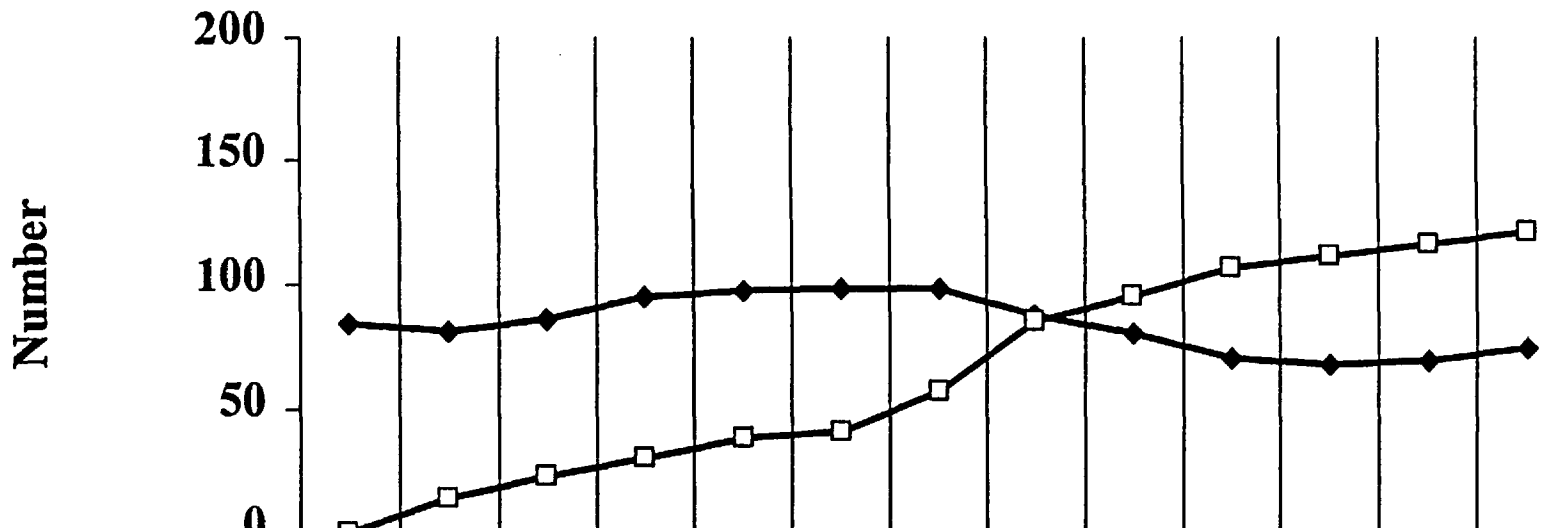
Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Richard E. Spence
Acting Assistant Manager, Project Execution

April 22, 1999

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

Progress of Deficiencies Since April '98
DR/CAR Chart



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Open	84	81	86	95	97	98	98	87	80	70	68	69	74
Closed	0	14	23	30	38	41	57	85	95	106	111	116	121

Month '98-'99

(Chart does not include DRs/CARs issued to EM, HDQTR, or OQA)

DR/CAR Chart

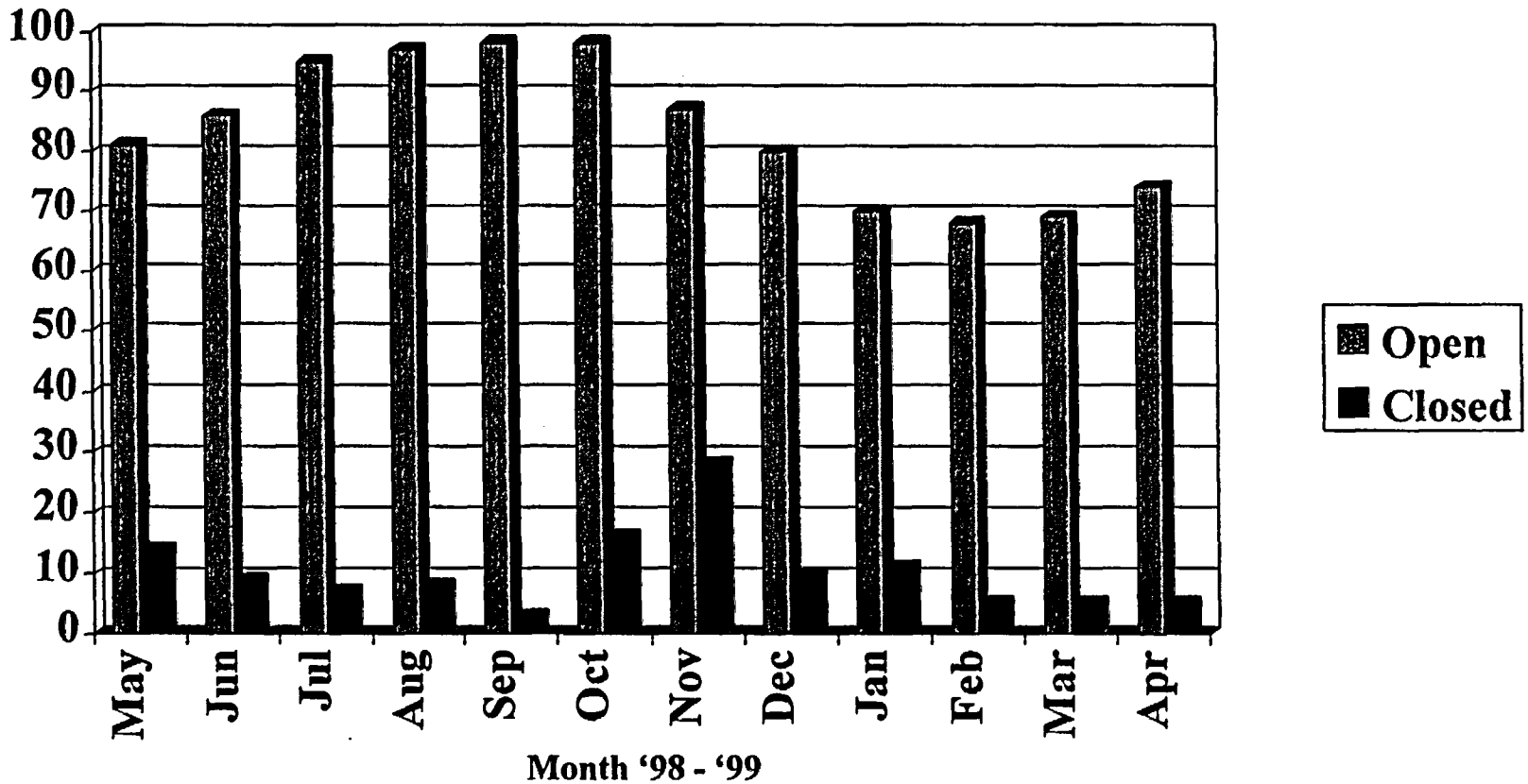


Chart does not include DRs/CARs issued to EM, HDQTR, or OQA

Qualification of Data Sets

- Volcanism data qualification is complete
- The following data sets will be completed in the future:
  - Mineralogy-Petrology Data
  - SNL Rock Characteristics Data
  - Selected Borehole Data prior to NRC acceptance of Quality Assurance Program
  - U.S. Geological Survey Out-crop Section Data
  - Selected Thermochemical Data for GEMBOCHS
  - Dose Conversion Factor Data

Deficiency on Volcanism Data YM-96-D-107

- Current scheduled completion date is 5/31/99
- Remaining action is to cross-reference the qualification report to the earlier reports

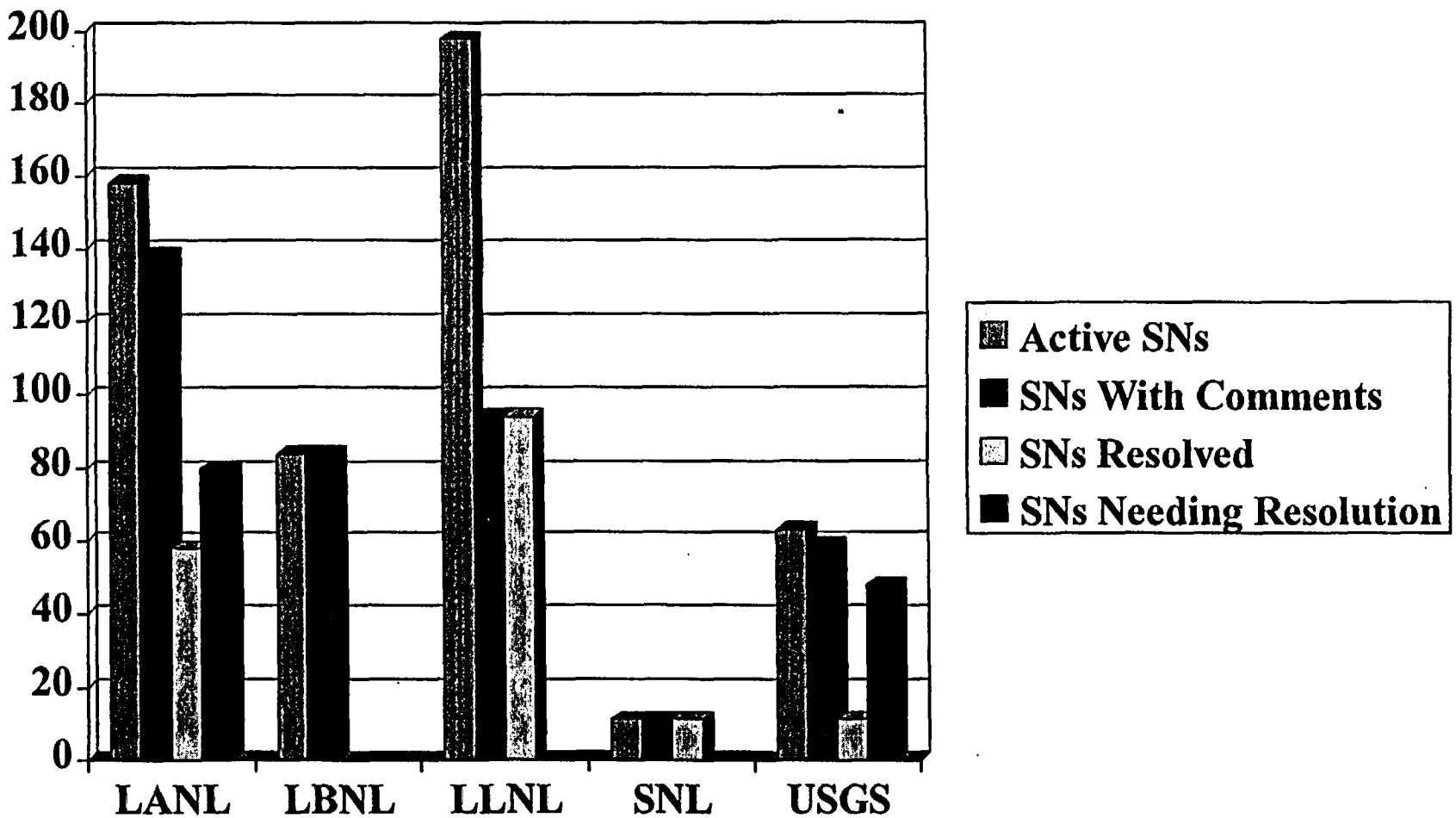
Qualification of Data Sets
Cost

- The cost to perform these qualifications and other costs that may result from future initiatives is expected to be minimal and estimated to be less than one percent of the Yucca Mountain Site Characterization Project annual budget

Scientific Notebooks

- As scheduled, all open SNs were reviewed as of 3/31/99

Scientific Notebooks
(Continued)



All Comments are to be resolved by 7/30/99

Open Deficiencies by Organization

AO	OPEN DEFICIENCIES		
	DR	CAR	TOTAL
K/PB	2	0	2
LANL	3	0	3
LBNL	1	0	1
LLNL	8	0	8
LVMO	35	6	41
SNL	4	0	4
USGS	7	2	9
VAMO	2	1	3
YMSCO	3	0	3
TOTALS	65	9	74

Material Testing at LLNL

- Letters to E. Von Tiesenhausen (Clark County) on 1/27/99 and 3/11/99, answered the concerns addressed in his letters of 9/8/98 and 2/8/99

- Deficiency Report YM-D-97-038 is in the process of being closed

USGS Corrective Action Request 99-02

- CAR was a result of the continued use of an unqualified supplier
- An amended response was accepted by OQA on 3/3/99
- Only remaining significant action is to qualify the process for the vendor sample standards development
- Closure is targeted for 5/17/99

YUCCA
MOUNTAIN
PROJECT

Corrective Action Program Revisions

Presented to:
NRC/DOE Management/Quality Assurance Meeting

Presented by:
Bob Clark
Acting Director, Office of Quality Assurance

April 22, 1999

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

Corrective Action Program Revisions

- Revising AP-16.1Q, *Performance/Deficiency Reporting*
  - New Title, *Management of Conditions Adverse to Quality*
  - Incorporates AP-16.2Q, *Corrective Action and Stop Work*
  - Single procedure for conditions adverse to quality
- Deleting AP-16.2Q, *Corrective Action and Stop Work*

Corrective Action Program Revisions
(Continued)

- Key elements:
  - Increased management involvement
  - Normal Processing - 100 calendar day "GOAL" for closure of conditions adverse to quality (CAQ)
  - Extended Processing - Required when a CAQ cannot be closed within 100 days
    - Closure up to 365 days requires approval by appropriate DOE line management (Project Manager for YM deficiencies) and Director, OQA
    - Closure for over 365 days requires Director, OCRWM approval
    - Documents DOE management acceptance of organization's plans to fully address and close CAQs

Corrective Action Program Revisions
(Continued)

- Key elements: (Continued)
  - Requires "early on" identification of the date by which future activities similar to the identified deficiency will meet requirements
  - Provides for reporting of "Over-Due Action Items" related to Extended Processing
    - Sent to Director, OQA
    - Reported weekly until complete
    - Assessment of Impacts to be provided
  - Weekly reviews to status timeliness of actions

Corrective Action Program Revisions
(Continued)

- Status:
  - Review comments being resolved
  - Training being developed
  - Goal to issue and be effective by June 1, 1999
  - Existing open deficiencies to be transitioned to new procedure

YUCCA MOUNTAIN DESIGN SELECTION FOR SUITABILITY/LICENSING

April 22, 1999

Lake Barrett, Acting Director
Office of Civilian Radioactive Waste Management

Site Recommendation/License Application Design Evolution

- Assessing the the long-term performance of a repository involves evaluating the complex interrelationship of the natural system as it interacts with the man-induced engineered system.
- Oversight groups have focused on the issue of greater reliance on either the engineered or natural systems:
  - Technical Review Board suggests engineering design features to lower temperatures in the emplacement drifts to deal with natural system variation and uncertainties.
  - State of Nevada emphasizes that the repository design should have greater reliance on natural barriers to protect the environment rather than "engineering the site."
- Regardless of the choice of emphasis, DOE will have to demonstrate that the site can meet the applicable EPA/NRC standards in a rigorous NRC licensing environment.
  - The applicable standard is expected to be less than 15 mr/yr for 10,000 years for an all pathways dose (air, water, agriculture, etc.)

Site Recommendation/License Application Design Evolution

- The study of the man-induced system (engineered barriers) has not received as much emphasis as the natural system until relatively recently (past 2-3 years).
- Viability Assessment (VA) brought together an integrated status report of our understanding of both the natural and engineered systems.
- VA did not attempt to optimize the engineered barrier design to address natural coupled processes.
- VA stated that design evaluations were underway and that the design concept for any subsequent suitability evaluation and potential site recommendation was forthcoming.
- DOE believes an appropriate balance of both natural and engineered systems is needed in the suitability/licensing case.

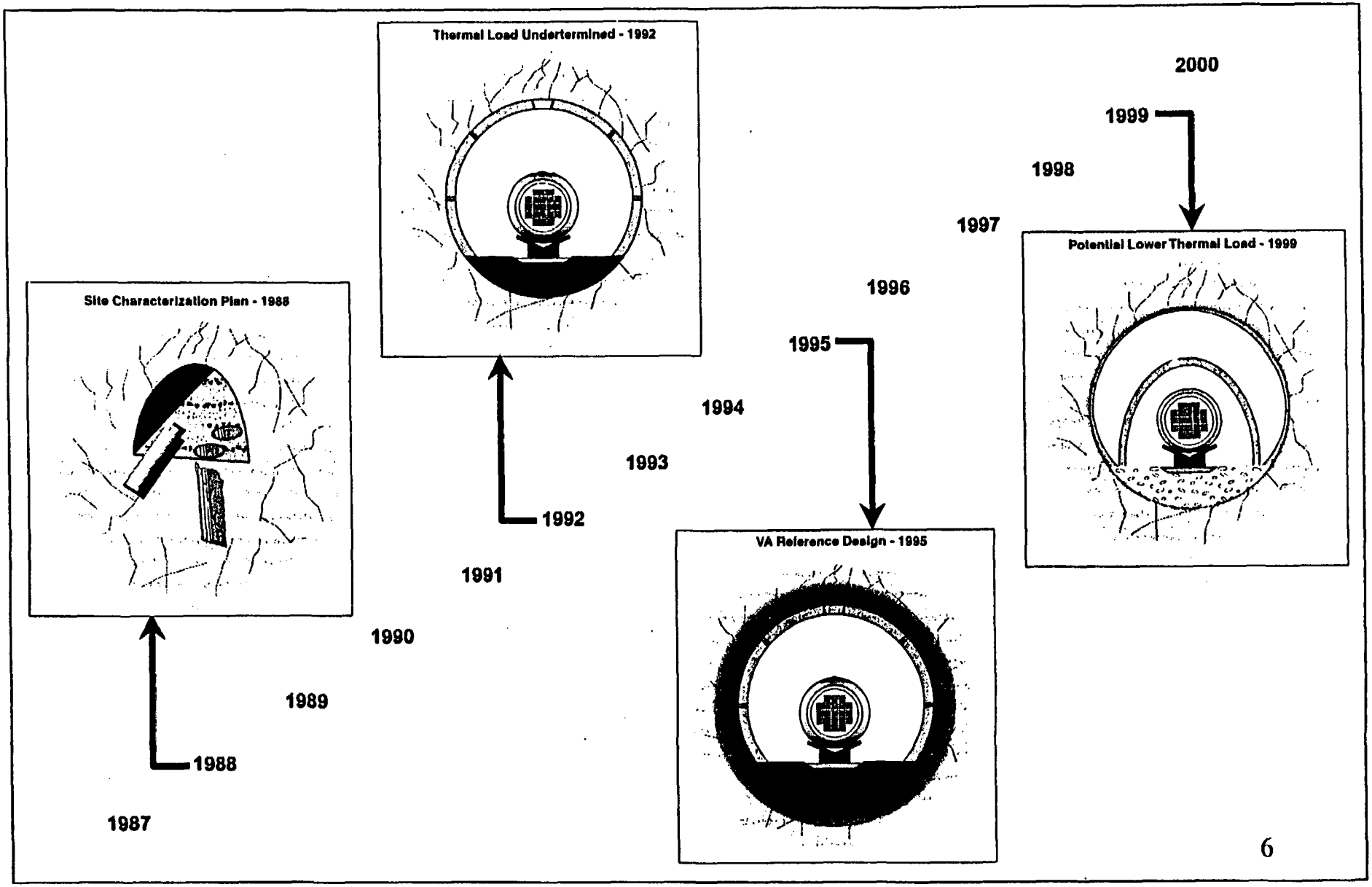
Site Recommendation/License Application Design Evolution

- There is no single "silver bullet" design. The SR/LA design is a complex trade-off of competing factors such as overall performance, demonstrability, flexibility, cost, etc.
- Our goal is to maintain the Administration's schedule of a potential Presidential site recommendation including an evaluation of the scientific and technical suitability of the site in 7/01.
  - Following statutory process, this would require the release of the draft scientific bases for a potential site recommendation for public comments and hearings in late 2000.
- To prepare these complex scientific and technical reports (within constrained budget requirements), DOE needs to select an SR/LA design approach in the next two months.

Site Recommendation/License Application Design Evolution

- On 4/15/99, the Board released its latest report - "Moving Beyond the Yucca Mountain Viability Assessment" in which the Board stated:
  - "...DOE should give serious consideration to alternatives to the VA reference design, including changing from a high-temperature design to a ventilated low-temperature design (e.g., below the local boiling point of water).
- TRW has just recommended a cooler, ventilated SR/LA repository design approach.
- DOE is now considering this recommendation.

Evolution of Repository and Waste Package Design



Evolution of the Repository Design: M&O Recommendation

April 22, 1999

Jean L. Younker

Background

- Hydrologic understanding for Yucca Mountain has improved
  - Unsaturated zone flux appears to be larger than previously thought
  - Substantial spatial variability in flux has been observed and temporal variability is expected
  - Some rapid focused flow is suggested by isotope evidence
- Ongoing testing is addressing uncertainties about seepage into drifts and transport processes in the unsaturated and saturated zones

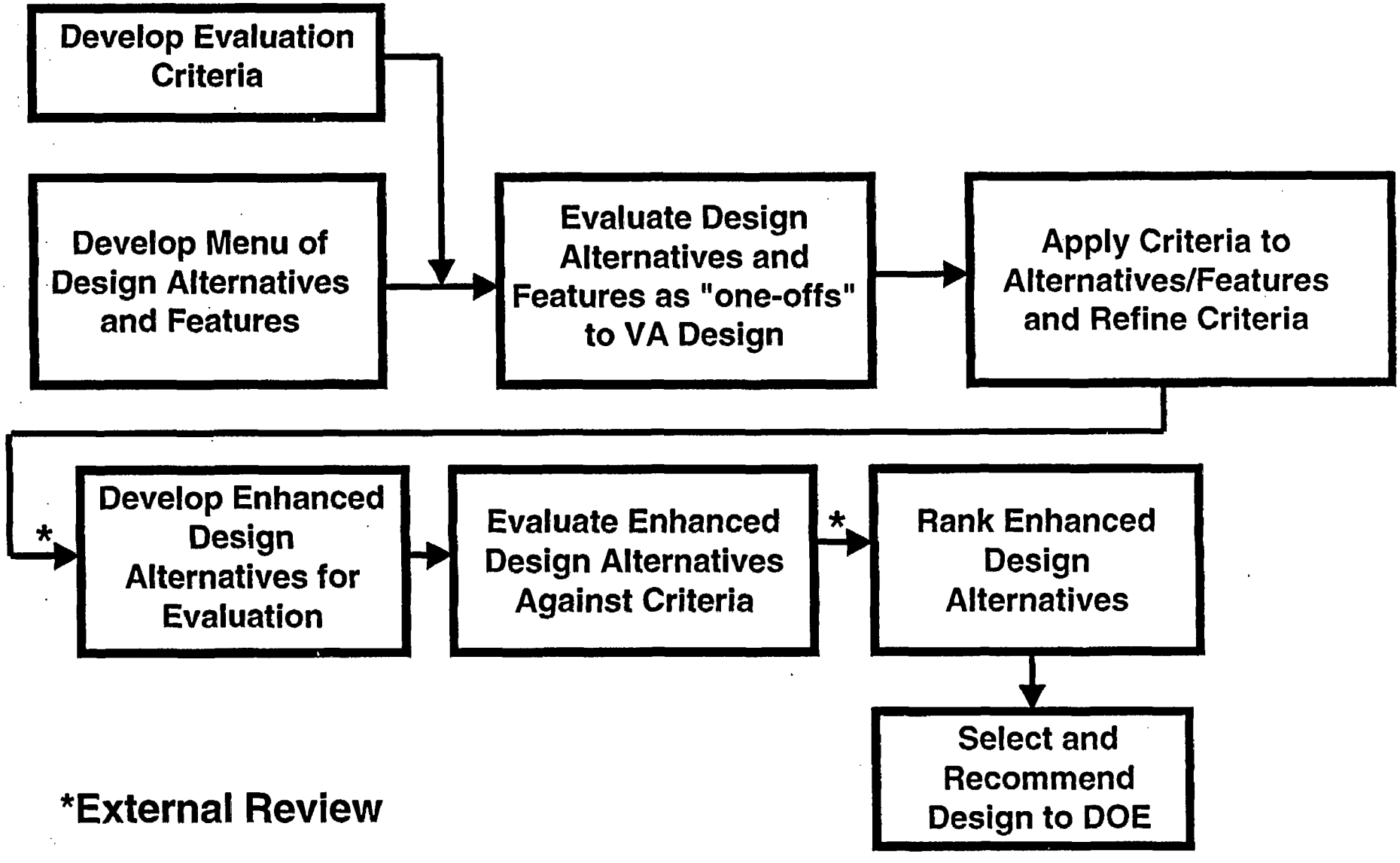
Background
(continued)

- The potential to improve overall system performance was discussed in the Viability Assessment
- VA reference design included engineered barrier options that complement the natural barriers
  - Emplacement drift backfill
  - Drip shield with backfill
  - Ceramic coating for waste package with backfill

Background
(continued)

- The list of design options was expanded to evaluate a wide range of potential design enhancements in this study

Process Used to Evaluate Alternative Designs



*External Review

Criteria Used for Evaluation of Enhanced Design Alternatives

Criterion	Main Relevant Factors
Screening: meets regulatory requirements	• Peak dose within 10,000 years of 25 mrem/yr to the average member of a critical group at 20 km from the repository
Safety/Licensing demonstrability	• Time to 25 mrem/yr dose • Level and timing of peak dose in 1 million years • Performance margin (ratio of 25 mrem/yr to peak dose in 10,000 years) • Degree of defense-in-depth • Uncertainties in postclosure performance and the ability to reduce them by the LA • Engineering acceptance • Environmental considerations
Construction/Operations/ Maintenance	• Worker safety • Constructability • Operations • Maintainability • Handling logistics • Performance confirmation • Off-Normal cooling • Shielding
Flexibility	• Increased disposal capacity (87,000; 105,000 MTU) • Preclosure period (10 yr after emplacement; 100 yr; 300 yr) • Receipt of 5-yr old CSNF • Design changes (Hot—cold; blending; backfill) • Unanticipated natural features or findings
Cost/Schedule	• Time and costs (total and net present value) required for site characterization and licensing, construction, operations, monitoring, and closure

Features Common to All Enhanced Design Concepts

- Emplace drip shield at closure
- Maintain cladding temperature below 350°C
- Can close 50 years after first waste package emplacement
  - Preclosure ventilation (2-10 m^3/sec per drift) removes 50% of heat generated by waste packages
- Assume one juvenile waste package failure at 1,000 years (same as VA)
- Use steel ground support and invert to eliminate uncertainties caused by concrete

Range of Thermal Goals for Final Five Enhanced Design Alternatives

EDA I: Maintain drift wall temperature below boiling (96°C)

EDA II: Keep centers of pillars below boiling

EDA III: Cool waste package surface to 80°C before humidity reaches 90%

EDA IV: Keep drifts dry for thousands of years

EDA V: Keep drifts dry for thousands of years

Enhanced Design Alternatives Evaluated

	EDA I	EDA II	EDA III *	EDA IV	EDA V
Areal Mass Loading (MTU/acre)	45	60	85	85	150
Area (acres) for 70,000 MTU	1,555	1,064	746	746	420
Line/Point Load	Point	Line	Line	Line	Line
Waste Package Size (PWR)	12	21	21	21	21
Drift Diameter (m)	5.5	5.5	5.5	5.5	5.5
Drift Spacing (m)	43	81	56	56	32
Preclosure Ventilation	50 years @ 2-10 m^3/sec	50 years @ 2-10 m^3/sec	50 years @ 2-10 m^3/sec	50 years @ 2-10 m^3/sec	50 years @ 2-10 m^3/sec
Waste package heat output at emplacement Maximum Average (PWR fuel)	20% blending used to reduce maximum 6.7 kW 5.6 kW	20% blending used to reduce maximum 11.8 kW 9.8 kW	Limited blending 18 kW 9.5 kW	Limited blending 18 kW 9.5 kW	20% blending used to reduce maximum 11.8 kW 9.8 kW
Waste Package Material	2-cm Alloy 22 over 5-cm stainless steel	2-cm Alloy 22 over 5-cm stainless steel	a) 2-cm Alloy 22 over 5-cm stainless steel b) 2-cm Alloy 22 over 1.5-cm titanium over 4-cm stainless steel	30-cm carbon steel	2-cm Alloy 22 over 5-cm stainless steel
Fillers	No	No	No	Integral filler	No
Backfill	No	Yes	No	Yes	No
Drip Shield	Yes	Yes	Yes	Yes	Yes
Total Waste Packages	15,903	10,039	10,213	10,213	10,039

*Most similar to VA design

Pair-Wise Comparison of Enhanced Design Alternatives

SAFETY/LICENSE DEMONSTRABILITY	FLEXIBILITY	CONSTRUCTION/ OPERATIONS/ MAINTENANCE	COST
I	IIIa, IIIb	V	II, IIIa, IIIb, IV, V
II	V	IIIa	I
IIIb	II	II	
IIIa	IV	IIIIb	
V	I	I	
IV		IV	

- EDA I highest ranked in safety/license demonstrability, but relatively inflexible, difficulties in operations, and higher cost
- EDA II ranked highly in safety/license demonstrability and provides reasonable flexibility, operability, and cost
- EDAs IIIa and V provide reasonable flexibility, operability, and cost, but are not highly ranked on safety/license demonstrability
- EDA IV consistently lower ranking, except cost

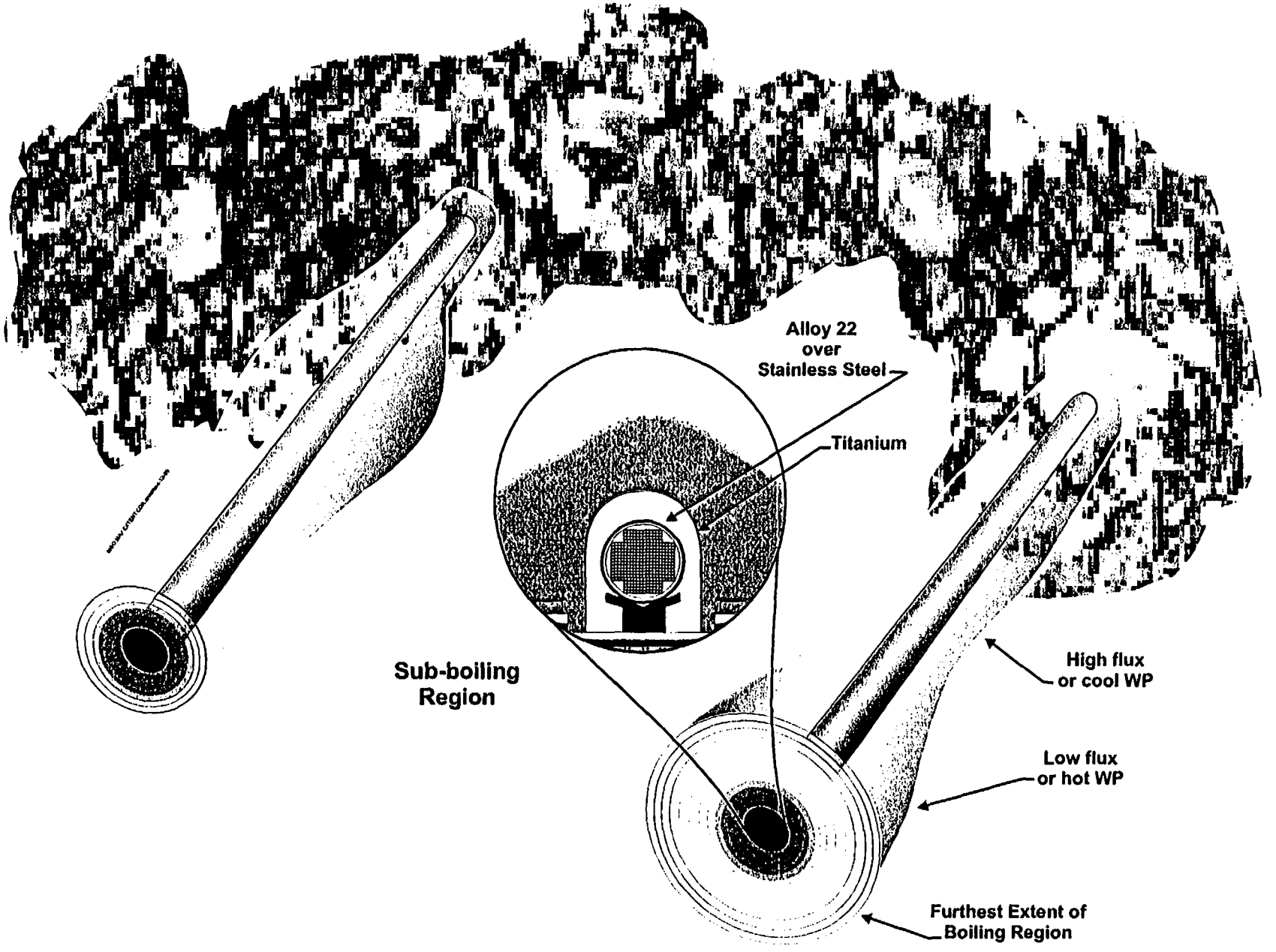
Cost Summary

(Discount Rate = 2.3%)

Total in $Billions 1998 (rounded to $100m)							
	EDA 1	EDA II	EDA III-a	EDA III-b	EDA IV	EDA V	VA*
MGR LADS Total	25.0	20.5	20.0	21.2	21.6	19.9	16.8
Net Present Value for MGR LADS	13.4	10.9	10.7	11.4	11.2	10.7	10.1

*Adjusted for 50-year operation

Enhanced Design Alternative II at 800 Years



M&O Recommended Design Concept: Enhanced Design Alternative II

Demonstrability of Safety-Licensability	• Reduces thermohydrologic uncertainties >80% pillar rock below boiling • Drift scale heater test adequate to validate models • Drip shield protects waste package while surface >85°C
Flexibility	• Accommodates up to 105,000 MTU in characterized area • Can be modified to higher or lower temperature goals if needed
Construction/Operations/ Maintenance	• Total emplacement drift length less than EDA I by using larger waste packages and line load • Fewer waste packages than EDA I improves worker safety
Cost	• Cost is comparable to EDAs III-V and VA

Comparison of Enhanced Design Alternative II to VA Design

Design Characteristics	EDA II	Viability Assessment Design
Areal Mass Loading	60 MTU/acre	85 MTU/acre
Drift Spacing	81 m	28 m
Drift Diameter	5.5 m	5.5 m
Invert	Steel with sand or gravel ballast	Concrete lining
Number of waste packages	10,039	10,500
Length of emplacement drifts	54 km	107 km
Waste Package Materials	2 cm Alloy-22 over 5 cm stainless steel 316L	10 cm carbon steel over 2 cm Alloy-22
Maximum Waste Package	21 PWR assemblies	21 PWR assemblies
Peak Waste Package Power (blending)	20% above average PWR waste package power	95% above average PWR waste package power
Drip Shield	2 cm Ti-7	None
Backfill	Yes (may become an option)	None
Preclosure period	50 yrs	50 yrs
Preclosure ventilation rate	2-10 m^3/s	0.1 m^3/s

Comparison of Enhanced Design Alternative II with VA Reference Design (continued)

Criteria	EDA II	Viability Assessment
Performance		
10,000 yr dose	0.02 mrem/yr	0.04 mrem/yr
Time to 25 mrem/yr	305,000 yrs	150,000 yrs
Peak dose	85 mrem/yr	350 mrem/yr
Time of peak dose	630,000 yrs	320,000 years
First/Median Drip Shield Failure	9,000/52,000 yrs	N/A
First/Median Waste Package Failure	100,000/320,000 yrs	3,000/165,000 yrs
Demonstrability of Safety/Licensing		
Performance Uncertainty		
10,000 yrs	Much better than VA	
100,000 yrs	Much better than VA	
1,000,000 yrs	~Same as VA	
Defense in Depth	4 or 5 independent barriers	3 independent barriers
Flexibility	Much better than VA	
Construction/Operations/ Maintenance	Same or slightly < VA	
Cost – Net Present Value	$10.9B	$10.1B

Key Features of Enhanced Design Alternative II

- Reduced uncertainties in natural and engineered barriers
  - Coupled processes
  - Alteration of natural system
  - Transport
  - Localized corrosion
- Improved defense in depth and margin
  - Good balance in natural and engineered systems
- Flexible thermal strategy
  - Drift scale thermal testing directly supports modeling and analysis
  - EDA II provides flexibility to adjust thermal load after testing, if required