ENCLOSURE 1

Summary Highlights
U. S. Nuclear Regulatory Commission/U. S. Department of Energy
Quarterly Quality Assurance Meeting
Rockville, Maryland
June 13, 2001

SUMMARY OF MEETING/ATTENDEES

The June 13, 2001, Quarterly Quality Assurance (QA) Meeting was held at the U. S. Nuclear Regulatory Commission (NRC) Headquarters in Rockville, Maryland, with participants from the NRC, Region IV; the U. S. Department of Energy (DOE) Headquarters in Washington, D. C.; the DOE Yucca Mountain Site Characterization Office in Las Vegas, Nevada; and the Center for Nuclear Waste Regulatory Analyses in San Antonio, Texas.

PRESENTATION/DISCUSSION SUMMARY

There were several key issues presented during the meeting. A presentation on Total System Performance Assessment-Site Recommendations (TSPA-SR) Issues/Management Plan was made by Nancy Williams. Other topics of interest to the NRC were Model Validation, Data Qualification, Software Qualification, and Key Technical Issues (KTI) Progress and Status.

Nancy Williams, Bechtel SAIC Company, LLC (BSC), Manager of Projects, discussed issues associated with the TSPA-SR and the management plan for addressing these issues. The presentation indicated that there is evidence of continuing problems in procedural compliance and implementation of quality program requirements. The NRC expressed disappointment with regard to Project performance and skepticism that the proposed management plan would be effectively implemented.

The Model Validation, Data Qualification, Software Qualification, and KTI Progress and Status presentations provided the NRC staff with the current status of these activities.

William Watson (BSC, Science and Analysis Department) discussed the status of Model Validation deficiency documents and noted that concerns identified to date involve documentation and not model suitability and results. He further stated that the independent review, to be initiated per the TSPA-SR management plan, will identify the adequacy of models. Also, improvements in process requirements and training are being implemented for future Analysis and Model Reports (AMR). In discussion of the formal root cause analyses, Larry Campbell (NRC) commented that the NRC had observed similar problems during observed audits conducted last year. He encouraged the Project to determine why former corrective actions were not effective

Robert Wemheuer (BSC, Integrated Management of Technical Product Input Department) discussed data qualification status, describing the qualification goals and objectives, data verification/qualification status by Process Model Report (PMR), and an overview of the results

to date. Dr. Wemheuer noted that the original goal was to qualify 80% of the data used in the Revision 1 of the PMRs and the associated AMRs. The NRC staff asked when 100% of the data will be qualified. The response was that data supporting the PMRs and AMRs associated with TSPA-SR, Rev. 0, ICN 1 would be completed by September 28, 2001.

William Watson (BSC) also discussed software qualification status. Mr. Watson noted that the original goal for software qualification was to qualify at least 80% of software used in Revision 1 of the PMRs and associated AMRs. The goal was met for Revision 0 of the PMRs as well as supporting AMRs for TSPA-SR, Revision 0, and ICN1. Bill Belke (NRC) commented that, considering all the software qualification difficulties, why the Project does not issue a stop-work order instead of a stand-down on further software development. Bob Clark (DOE) responded that the current situation does not meet the threshold for a stop-work order and there is no immediate threat to safety or waste isolation.

Timothy Gunter (DOE) provided an overview of the KTI's progress and status of the DOE/NRC agreement items. Mr. Gunter noted that some dates for the remaining agreement items scheduled for Fiscal Year 2001 will change due to replanning performed after the original agreements were made.

Larry Campbell 8/14/01

Larry L. Campbell
Division of Waste Management
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission

R. W. Clark

Robert W. Clark
Office of Civilian Radioactive
Waste Management
U.S. Department of Energy

April V. Gil

April V. Gil
Office of Licensing and
Regulatory Compliance
Yucca Mountain Site
Characterization Office
U.S. Department of Energy

ENCLOSURE 2

AGENDA
DOE/NRC Quarterly QA/KTI Meeting
June 13, 2001
8:00 AM - 10:30 AM (PT)
11:00 AM - 1:30 PM (ET)

U.S. NRC
T2B-5
11545 Rockville Pike
Rockville, MD
And via Videoconference to:

BSC (M&O Contractor)	U.S. NRC	U.S. DOE
9960 Covington Cross	Region IV	490 L'Enfant Plaza
Room 915	611 Ryan Place Drive	Suite 7200
Las Vegas, NV	Arlington, TX	Washington, DC 20024

11:00 AM	Introduction	ALL
11:10 AM	Status of Model Validation	DOE
11:25 AM	Progress Made in Qualifying Data	DOE
11:40 AM	Progress Made in Qualifying Software	DOE
12:05 PM	TSPA-SR Issues/Management Plans	DOE/NRC
1:15 PM`	Status of KTI Resolution	DOE/NRC
1:30 PM	Adjourn	

ENCLOSURE 3

DOE/NRC QA Meeting
June 13, 2001
Rockville, MD

Sign-In Sheet

NAME	ORGANIZATION	TELEPHONE
S. J. CEREGHINO	BSC	702-295-4251
W. W. WATSON	BSC	702-295-5550
N. H. WILLIAMS	BSC	702-295-5143
Bill Reamer	NRC	301-415-6537
LARRY Campbell	NRC	301 415-5000
Russ DYER	DOE	702 794-1300
April Gil	DOE/YMP	702 794-5578
King Stablein	NRC	(301)-415-7445
Bader Ibrahim	NRC	301-415-6651
ROB MacDOUGALL	BSC	202-479-2122
Nick DiNunzio	DOE	202-586-8953
Jim Curtiss	Winston & Strawn	202-371-5751
THOMAS MATULA	NRC	301-415-6602
Bob Murray	BAH (DOE-MTS)	702-794-5566
Kien Chang	NRC	301-415-6612
Kriss Grisham	DOE/EM-42	301 903 8478
TIM GUNTER	DOE/YMSCO	702-794-1343
Tim Sullivan	DOE/YMSCO	" " 5589
Edward Baker	NRR/NRC	301-415-8529
R. F. WEMHEUER	BSC	702-295-3966
Bob Toro	DOE/THA	301-987-2131
MANNY COMAR	NRC	301-415-6074
Sandra WASTLER	NRC	301-415-8733
DAVID SIEFKEN	BSC	(202) 479-2104

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DOE/NRC QA Meeting
June 13, 2001
Rockville, MD

Sign-In Sheet

NAME	ORGANIZATION	TELEPHONE
David Brooks	NRC/DLWM	415 7284 (301)

DOE/NRC QA Meeting
June 13, 2001
Washington DC

Sign-In Sheet

NAME	ORGANIZATION	TELEPHONE
PETER RIEHM	BSC/SAIC	202-479-2135
Carl Weber	RW-3/OQA	202-586-2111
Nancy Slater-Thompson	RW-52	202-586-9322
DAN FEHRINGER	NWTRB	703-235-9132
Larry Saraka	BSC	202-488-6745

6/13/01

R IV

Charles Hackney RSLO NRC Region IV

Vincent Everett, Inspector

D. BLAIR SPITZBERG, CHIEF, FCDB

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
MEETING ATTENDANCE

SUBJECT OF MEETING DOE/NRC Quarterly QA/KTI meeting

DATE: June 13, 2001 LOCATION: SwRI Bldg 189, Conference Rm A237

PERSON	ORGANIZATION	TITLE/FUNCTION	TELEPHONE NUMBER
BRUCE MABRITO	CNWRA	Dir QA DW 20	210-522-5149
Asad Chowdhury	CNWRA	Mgr - MGFE	210-522-5151
Gordon Wittmeyer	CNWRA	Mgr - PA	(210) 522-5082
Mack R. Ehrstrom	SwRI QA	Sr. Technologist	210-522-5580
Budhi Sagar	CNWRA	Tech. Director	210-522-5252
Bob Brient	SwRI QA	Sr QA Engr	210.522-5507
Don Dunavant	Sw RI QA	Mgr, QST	(210)522-2942
WES PATRICK	CNWRA	PRESIDENT	210-522-5158
Amos E. Holt	SwRI/IQS	V.P.	210-522-2076
Rob WEBER	SwRI QA	MGR	210-522-3161

List of Attendees
DOE/NRC Quarterly QA/KTI Meeting
June 13, 2001, Las Vegas
8:00 AM - 10:30 AM (PT)
11:00 AM - 1:30 PM (ET)

Name	Organization	Telephone
Barbara McKinney	MTS/BAH	7027945420
Lisa Wehrhoff	NRC	702-794-5053
B. Bell	NRC	702-794-5047
Bob Clark	DOE-ORR	702-794-5583
Don Kalsha	BSC-QA	702-295-6242
Frank Gratziani	MTS	702-794-5057
Jim Blaylock	DOE/ORA	-794-1420
Susan Zimmerman	State of Nevada	775-687-3744
Wm Boyle	DOE	7027945506
Claudia Newbury	DOE	702-794-1361
Robb Keele	BSC-QA	702-295-2805
F. Harley Dove	ORA/NQS	702-794-2505
Don Beckman	BSC-LAP	702-295-4352
E. von Tiesenhausen	Clark County	702 455-5184
Mark Wright	Nye County	360 903-5610
Myrle Rice	Intertech/Lincoln Co.	7073636583
Carl Lamm	US NRC	(702) 794-5048
Alexia Boone	DOE/OTM	(702) 794-1453
Michael Eshleman	DOE/OTM	702 794-1360
Steve Hanauer	DOE-HQ	202-586-6850
Lee Robertson	M+S/OTM	702 794-5077
Norman Henderson	BSC/LAP	702-295-5253
Robert Hasson	ORA/NQS	702-794-5023
Kristi Hodges	ORA/NQS	702-794-1464
Donald Horton	DOE/YMSCO	702-794-1301
Robert Taft	BSC	702-295-6473
Bob Gamble	MTS/BAH	702-794-1440

List of Attendees
DOE/NRC Quarterly QA/KTI Meeting
June 13, 2001, Las Vegas
8:00 AM - 10:30 AM (PT)
11:00 AM - 1:30 PM (ET)

Name	Organization	Telephone
MICHAEL A. JAEGER	IMTPID	702-295-4245
ROM B. MURRAY	DOE	702-794-5569
ROBERT FISH	MTS/BAH	702-794-5444
SAM HUBBS	BSC/BAA	702-295-6620
Robert Andrews	BSC/SAIC	702 295 5549
DAVID LANIER	BSC/LAP	702 295-5331
George Hellstrom	DOE	702-794-5519
M.A. HAGHI	BSC/DUKE	702-295-5318

ENCLOSURE 4

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

Status of Model Validation

Presented to:
DOE/NRC Quarterly QA Meeting

Presented by:
Bill Watson, Integration Manager
Science and Analysis
Bechtel SAIC Company, LLC

June 13, 2001

YUCCA
MOUNTAIN
PROJECT

Outline

- Background
- Historical Perspective
- Provide current information on model validation status
- Model validation documentation issues
- Summary of causes and path to resolution
- Summary

Background: Models at YMP

- Analysis Model Reports (AMRs)
- AMRs describe the development, testing, and use of models
- Model requirements, including validation, are procedurally controlled
- Models are not software, although implementation of the model may be through software

Historical Perspective

- Prior to 1998, models and modeling were not explicitly procedurally controlled
- A Corrective Action Request (CAR) (LVMO-98-C-010) was initiated to place procedural controls on models and modeling
- Procedure AP-3.10Q, *Analyses and Models*, was developed and implemented in 1999
- Initial products (AMRs) were produced using AP-3.10Q in 1999
- Audits performed in 1999 indicated deficiencies in implementation of AP-3.10Q with respect to the distinction between modeling and analysis
- AP-3.10Q was revised and training conducted in early 2000

Historical Perspective (cont.)

- AMR production continued with the completion of 122 AMRs
- Further audits indicated model validation was being inadequately documented and resulted in five Deficiency Reports (DRs)
  - LVMO-00-D-046 (closed by incorporation into D-119)
  - LVMO-00-D-119 (open - commitment to revise AP-3.10Q)
  - LVMO-00-D-151 (closed)
  - LVMO-01-D-007 (open)
  - BSC-01-D-050 (open)

Historical Perspective (cont.)

- **Suspect Trending Investigation Report (STIR) BSC-01-004 was initiated on March 15, 2001**
  - **Review of AMRs issued between December 1999 through April 2001**
  - **Repetitive deficient conditions and examples of inadequate documentation**
  - **Planned revisions to AP-3.10Q have not been timely**
  - **STIR recommendation that a CAR be issued**

Historical Perspective (cont.)

- **CAR BSC-01-C-001 issued on May 3, 2001**
  - **"Based on the lack of progress to resolve this deficient condition through various Deficiency Reports, the area of model validation is considered to be a significant condition adverse to quality"**
  - **Recommended Actions**
    - **Identify all model AMRs**
    - **Uniquely identify and total all models**
    - **Revise AP-3.10Q to clarify Section 5.3 "Validation of Models"**

BSC Response to DRs and STIR

- **Systematic review of AMRs containing models by an independent team under Chief Science Office (CSO) oversight to be completed by August 8, 2001**
  - **Unique identification of each model**
  - **Binning of models to determine technical adequacy**
  - **Bin 1 - AMR document meets AP-3.10Q, Rev2, ICN 3**
  - **Bin 2 - Model validation does not meet specific criteria in AP-3.10Q but additional project documentation exists to demonstrate adequate confidence in use of model (documentation problem only)**
  - **Bin 3 - Documentation does not exist that provides adequate confidence in model**
- **Any Bin 3 models identified will result in immediate impact assessment / additional validation documentation**

BECHTEL SAIC COMPANY, LLC

General Manager
Ken Hess

Deputy General Manager
Don Pearman

Strategic Planning & Program Integration
Collin Moller

Environmental, Safety and Health
Dennis Sorensen

Quality Assurance
Don Krisha

Manager of Projects
Nancy Williams

Site Recommendation Project
Jerry King

Repository Design Project
Larry Trautner

Science and Analysis Project
Bob Andrews

License Application Project
Steve Cereghino

Technical Support

Chief Science Officer
Michael Voegele

Engineering
Jim Whitcraft

Project Controls
Scott Hajner

Procurement
Darell von der Linden

Chief Information Officer
Charles Sharrocks

Site Services and Field Support
Jeff Broom

Waste Package
Thomas Doering

Surface Design
Muthuraman Iyer

Subsurface Design
Robert Boutin

Preclosure
Dennis Richardson

Postclosure
Bob Andrews

Licensing Support
Don Beckman

Business Support and Operations

Business Management
Pete Maxfield

- **HR and Training**
  Mary O'Donnell
- **Chief Financial Officer**
  Eric Koppitsch
- **Office and Administrative Services**
  Melinda d'Ouville
- **Prime Contract Administration**
  Wiley Wells

Communications
Beatrice Reilly

Internal Audit
Brenda Hunter

Legal
Jeff Halliday

BSC Response to DRs and STIR (cont.)

- **AP-3.10Q revision underway**
  - **Simplification / clarification of model validation requirements**
  - **Removal of any overly prescriptive requirements**
  - **Requirement for stand-alone section in AMR for discussion of model validation**
  - **Requirement that BSC Quality Engineering be mandatory reviewers of any model validations**
- **Preparation of Scientific Processes Guidance Manual underway by Chief Science Office**
  - **Provide additional guidance on model validation techniques**

BSC Response to DRs and STIR (cont.)

- Training on AP-3.10Q Revision and Guidance Manual under development
  - Following revision of AP-3.10Q and issue of Guidance Manual
  - Given to all personnel performing scientific activities involving model development and validation
  - Will include information on assistance in model validation methods and techniques available through CSO
- CSO to provide assistance to personnel performing scientific activities involving model development and validation
  - Senior scientist(s) available through CSO who are not involved with development of subject model(s)
  - Includes, as appropriate, meetings with AMR authors and review of in-process work on model validation

Corrective Action Requests

- **Formal Root Cause Analyses**
  - **Single Team Will Conduct Both Root Cause Analyses to Ensure Integration of Common Causes**
    - **Model Validation**
    - **Software Verification**
  - **Utilize TapRoot Process (Mandated by Project Procedures)**

Model Validation Documentation Issues

- Documentation issues include:
  - No requirement for a single specific section of the report that contains consolidated model validation information (i.e., information spread across a number of sections) making it difficult to understand how validation was conducted
  - Some AMR validation discussion is unclear or lacking
  - Some model validations were based on methods that were not specifically recognized by the procedure
  - Some model validations are subjective and lack specific validation criteria
  - Some AMRs contain purely conceptual models which do not require validation

Apparent Causes of Deficiencies

- Model validation is possible with the current AP-3.10Q for some models, but not all models
- AP-3.10Q does not clearly describe the process of validation ("as applicable / as appropriate")
- AP-3.10Q does not distinguish between validation of different types of models (conceptual, process, abstraction, system)
- Criteria for validation are unclear to AMR authors. When additional guidance / examples are provided, validation is greatly improved

Conclusions

- The model validation concerns identified to date involve documentation and not model suitability or results
- Independent review & binning will determine if any inadequate models exist
- Improvements in process requirements and additional training are being implemented for future AMRs

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

Data Qualification Status

Presented to:
DOE/NRC Quarterly QA Meeting

Presented by:
Dr. Robert F. Wemheuer
Integrated Management of Technical Product Input Department
Bechtel SAIC Company, LLC

June 13, 2001
Rockville, Maryland

YUCCA
MOUNTAIN
PROJECT

Qualification Goals and Objectives

- The original goal was to qualify at least 80% of the data used in the PMRs and their supporting AMRs at the time Rev 1 of the PMRs were submitted to DOE
- The 80% data qualification goal has been met for Rev 0 PMRs (and ICN updates) and supporting AMRs used in Total System Performance Assessment/Analysis (TSPA) Site Recommendation (SR) Rev 0, ICN 1
- Overall objective is to ensure and maintain confidence in the data verification and qualification processes, qualification status and continue to make process improvements

Data Qualification Status by PMR

PMR	03/31/01 Percent Data Qualified	03/31/01 Percent Data Verified	06/04/01 Percent Data Qualified	06/04/01 Percent Data Verified
Biosphere	94	100	97	100
Disruptive Events	91	100	91	100
EBS	87	100	90	100
ISM	83	100	85	100
Near Field	88	100	90	100
SZ F&T	81	91	82	90*
UZ F&T	88	94	91	96
Waste Form	93	95	95	100
Waste Package	91	100	91	100
Total	88	96	89	96

*Reduction in percent complete due to correction of Automated Technical Data Tracking system posting error

Note: Percent complete statistics reflect the multiple use of a DTN in different AMR/PMR products

Verification/Qualification Status as of 6/04/01

	Total*	Completed	To-Go	
VL1 DIRS (Verif. Checklists)	241	228	13	(Q-TBV) ("actual citations")
VL1 Sources (Verif. Checklists)	329	329	0	(Q-TBV) ("daughters")
VL2 (No Verification Checklists)	177	177	0	(Q-TBV)
Accepted Data (Fact)	105	105	0	(e.g., handbooks, textbooks)
Accepted Data approved by Assistant Manager, Office of Project Execution	23	13	10	(e.g., journal articles)
Qualified by procedures established after 6/30/99	23	23	0	
Unqualified DTNs	310	254	56	
Totals	1208	1129	79	
Percent of Total Data Citations		94%	6%	

*Above totals are based upon the unique number of DTNs for all AMRs/PMRs.

Note: Document Input Reference System VL1+VL2+AP-SIII.2Q+Accepted (879) + Source VL1 (329) = Total Data Citations (1208)

Data Verification Results as of 6/04/01

ORG	Completed Checklists	Verified Q	Verified UQ	Reject Rate**
USGS (U. S. Geological Survey)	282	269	13	4.6%
LANL (Los Alamos National Laboratory)	105	105	0	0%
LBNL (Lawrence Berkeley National Laboratory)	5	4	1	20%
LLNL (Lawrence Livermore National Laboratory)	33	33	0	0%
BSC* (Bechtel SAIC Company, LLC)	53	51	2	3.8%
SNL (Sandia National Laboratories)	79	78	1	1.3%
Total	557	540	17	3.1%

* Data generated by previous Yucca Mountain Site Characterization Project (YMP) organizations (i.e., Raytheon Services Nevada and Technical and Management Support Services) DTNs are now considered BSC data, and the results for these data are included in the BSC totals.

** Reject is defined as a determination that the data submitted under the associated DTN cannot be verified. There are two principal causes for rejection. Either the data acquisition/development process did not meet QARD requirements or data-/record-related issues discovered during checklist preparation could not be resolved.

Overview of Results to Date

- There have been 17 rejects out of 557 DTNs containing approximately 950,000 records with 17,000,000 data cells
- Individual rejects were either qualified per AP-SIII.2Q, Qualification of Unqualified Data and the Documentation of Rationale for Accepted Data, or replaced, having the authors rely on an alternative qualified data set(s)
- The 17 rejects were subsequently subjected to the qualification process which reduced the rejection rate to 1.4%
- Replacement of unqualified data with qualified data was used to address the remaining rejects
- To date, no AMR technical conclusions have been invalidated due to data rejections

Challenges

- Verification and Qualification production continues to be dependent on early identification of new or additional unqualified data requiring qualification
- There continues to be significant complexity in the remaining unqualified DTNs resulting in greater than average processing time
- Despite the challenges, there is commitment by BSC, Labs and U. S. Geological Survey (USGS) to improve integration of activities and timeliness of products to support data and qualification schedules

Summary

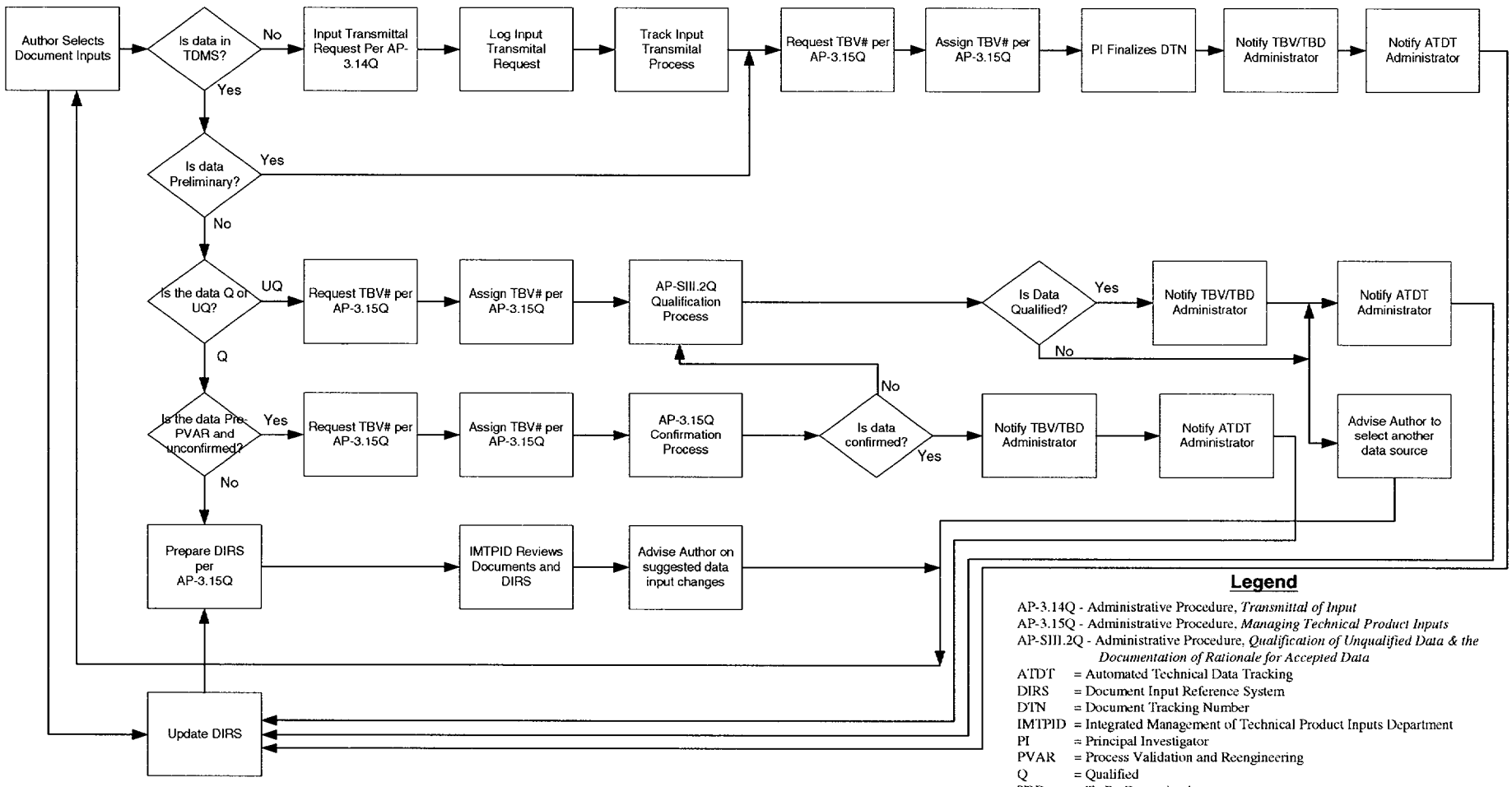
- The goal to qualify 80% of the data in the Rev 0 PMRs and supporting AMRs (and ICNs) used in TSPA Rev 0, ICN 1 has been met
- Based on the current set of TSPA-SR Rev 0, ICN 1 AMRs, the status is:
  - 96% of data verified
  - 89% of data qualified

Backup

Lawrence Berkeley National Laboratory (LBNL) Challenge

- LBNL DTNs are typically large and tend to be more complex by nature
- Traceability Evaluation thoroughly traces data from raw records to the TDMS
- Approximately 60% of LBNL DTNs have over 5,000 rows of data
- DTN LB960500834244.001 (Hydrological Data, Permeability in ESF Area)
  - 49 data tables
  - 10,929 rows of data
  - more than 45 pieces of Measuring and Test Equipment (M&TE)
  - 2 intermediate processing steps from raw records to final data
  - 7 scientific notebooks

Technical Product Input Process



Legend

AP-3.14Q - Administrative Procedure, *Transmittal of Input*
AP-3.15Q - Administrative Procedure, *Managing Technical Product Inputs*
AP-SIII.2Q - Administrative Procedure, *Qualification of Unqualified Data & the Documentation of Rationale for Accepted Data*

ATDT = Automated Technical Data Tracking
DIRS = Document Input Reference System
DTN = Document Tracking Number
IMTPID = Integrated Management of Technical Product Inputs Department
PI = Principal Investigator
PVAR = Process Validation and Reengineering
Q = Qualified
TBD = To Be Determined
TBV = To Be Verified
TDMS = Technical Data Management System

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

Software Qualification Status and Software Issues

Presented to:
DOE/NRC Quarterly QA Meeting

Presented by:
Bill Watson, Integration Manager
Science and Analysis
Bechtel SAIC Company, LLC

June 13, 2001

YUCCA MOUNTAIN PROJECT

Software Qualification Goal

- The original goal was to qualify at least 80% of software used in the PMRs and their supporting AMRs at the time Rev 1 of the PMRs was submitted to DOE.
- The goal was met for Rev 0 PMRs (and ICN updates) as well as supporting AMRs for TSPA-SR, Rev 0, ICN 1

Presentation Organization

- Current status of software qualification
- Software issues arising recently and in the past

Software Status Topics

- Software Qualification Applicability
  - Software supporting PMRs and related AMRs for TSPA-SR
- Software Qualification Percentage by PMR
- Software Qualified by PMR
- Unique Unqualified Software Codes
- LMVO-00-D-039 on Software Routines

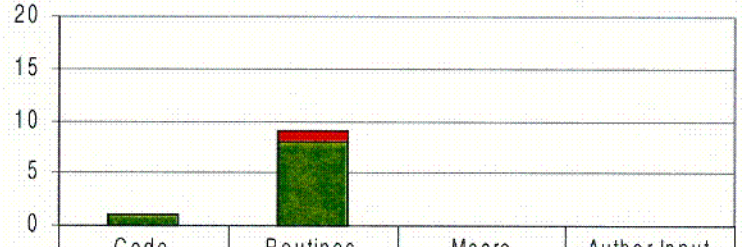
Software Qualification Percent By PMR and Associated AMRs

- BIO 90%
- DE 100%
- EBS 96%
- ISM 100%
- NFE 99%
- SZ 89%
- UZ 98%
- WF 100%
- WP 100%

Note: The number of software packages varies as analyses mature and are revised.

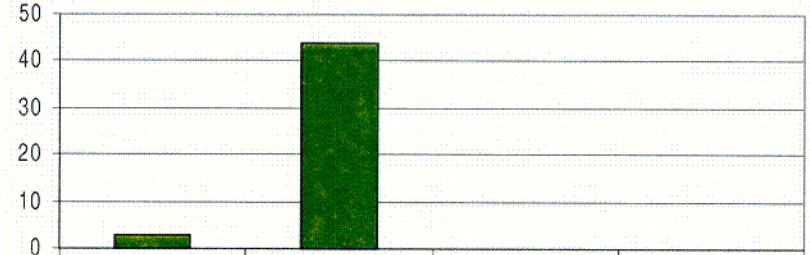
Software Qualified by PMR

BIO PMR
Percent Completed: 90%



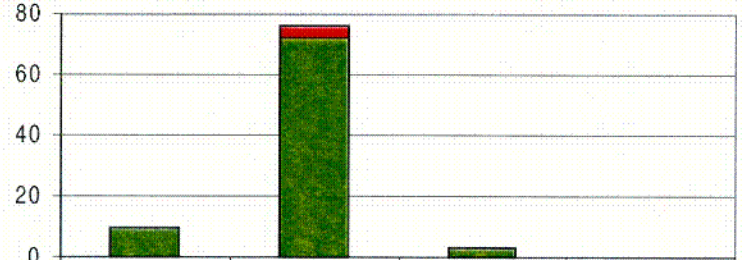
	Code	Routines	Macro	Author Input
Pending	0	1	0	0
Completed	1	8	0	0

DE PMR
Percent Completed: 100%



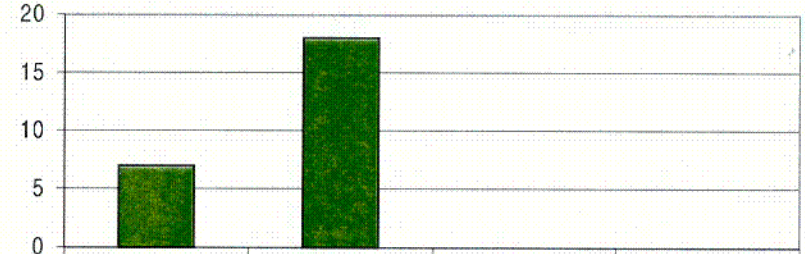
	Code	Routines	Macro	Author Input
Pending	0	0	0	0
Completed	3	44	0	0

EBS PMR
Percent Completed: 96%



	Code	Routines	Macro	Author Input
Pending	0	4	0	0
Completed	10	72	3	0

ISM PMR
Percent Completed: 100%

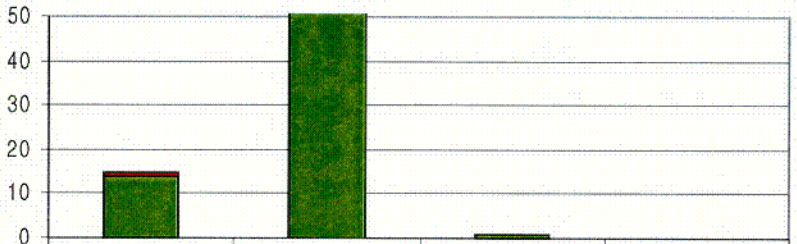


	Code	Routines	Macro	Author Input
Pending	0	0	0	0
Completed	7	18	0	0

C01

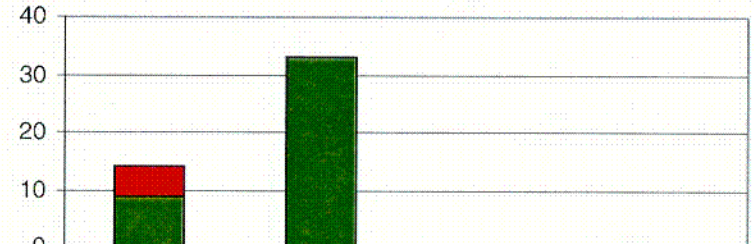
Software Qualified by PMR (Continued)

NFE PMR
Percent Completed: 99%



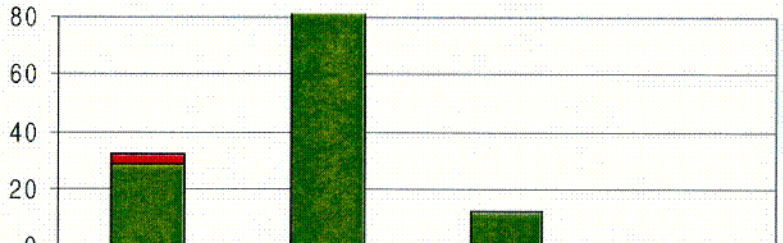
	Code	Routines	Macro	Author Input
Pending	1	0	0	0
Completed	14	58	1	0

SZ PMR
Percent Completed: 89%



	Code	Routines	Macro	Author Input
Pending	5	0	0	0
Completed	9	33	0	0

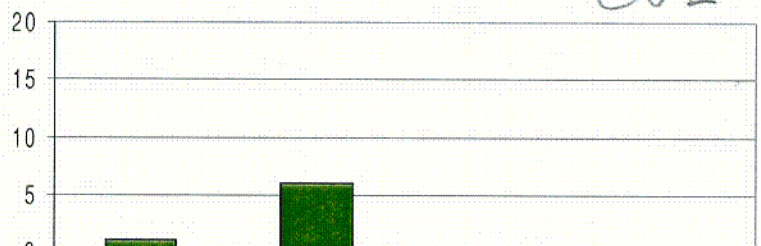
UZ PMR
Percent Completed: 98%



	Code	Routines	Macro	Author Input Needed
Pending	3	0	0	0
Completed	29	86	12	0

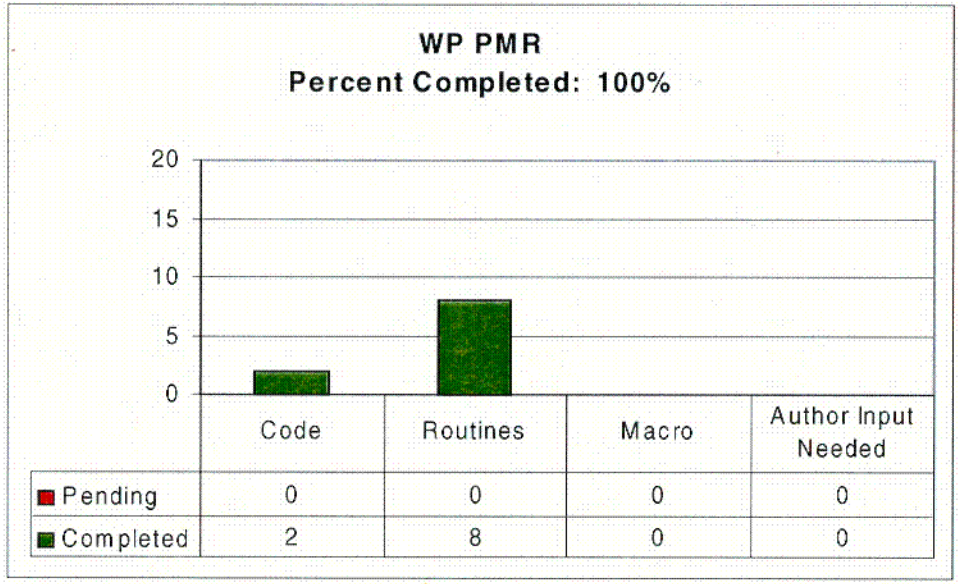
WF PMR
Percent Completed: 100%

C02



	Code	Routines	Macro	Author Input Needed
Pending	0	0	0	0
Completed	1	6	0	0

Software Qualified by PMR (Continued)



C03

Unique Unqualified Software Codes

- **There are currently fourteen codes being managed in accordance with AP-SI.1Q Revision 3, Section 5.10 "Interim Use of Unqualified Software…".**

ERMA SITEGEOLOGIST	Version 6.0.1
FEHM	Version 1.99
FEHM	Version 2.10
INFIL	Version 2.0
INFIL	Version A2.a1
LAGRIT	Version 1.0
NETPATH	Version 2.13
PEST	Version 2.0
PETROSYS	Version 7.60d
STO-UNSAT	Version 1.0LV
TOUGH2	Version 1.3
TOUGH2	Version 3.4.3
TOUGHREACT	Version 2.3
UDEC	Version 3.0

Open Deficiency Report - DR-039

- **LVMO-00-D-039: Issued 02/15/2000**
- **Brief Description:**
  - Inaccurate documentation and validation of software routines and macros
- **Issue:**
  - Some software routines documented as part of the Analysis Model Reports (AMRs) are not adequately documented per AP-SI.1Q. Issues include missing test information, missing source code, and lack of version control
- **Solution:**
  - Correct/Amend AMR documentation to ensure reproducibility and defensibility of software routines. AMRs that are not revised will have their record packages appended to include missing information
  - Issue new Software Management Procedure
  - Raise Management Awareness

DR 39 Status 05/30/01 - Software routines have been classified and placed in Bins

- **A comprehensive review of 123 AMRs that support the 9 PMRs was conducted. AMR software routine documentation classified into bins.**
- **Definition of Bins:**
  - Bin 1: No single use routines/macros developed in AMR (Current Status: 31 AMRs).
  - Bin 2: All software used in AMR were adequately documented in the AMR (Current Status: 31 AMRs).
  - Bin 3: Commercial software (i.e. Built in-functions, math operators, or formulas) were not adequately documented inside the AMR (Current Status: 41 AMRs).
  - Bin 4: Developed software (i.e. routines developed in C, FORTRAN, BASIC) including some use of commercial software were not adequately documented in the AMR (Current Status: 20 AMRs).
- **Working with authors/developers to resolve issues.**
- **Required corrections/additions are being made to AMRs or AMR Record Packages.**
- **Commitment to close DR on or before 9/18/01**

DR-039 Status 05/30/01
Current BSC Status

- **Total affected AMRs: 61, Bin 3: 41, Bin 4: 20 -- working with Author/Developer to resolve issues**
  - 38 Complete No issues (OQA has verified)
  - 23 working with Author/Developer to resolve issues
  - 61 Total AMRs
- **Multi-Use Software Routines and Macros**
  - Software Routine(s) Total 171 as of 6/04 Complete No issues 159
  - 12 Software Requirements Reviews have issues and will be resolved as Software Deficiency Notices with DR-099
  - 171 Total SRRs
- **Ongoing reviews for DIRS items supporting potential SR technical bases documents and SDDs**

SOFTWARE QUALIFICATION ISSUES

- Software CAR
- Software DRs Outstanding/Pending
- Extent of Documents Affected Currently Being Assessed

Software CAR Summary

- Procedural compliance difficulties as indicated by failed installation tests documented in DR-099
- Failure to withdraw and/or Use Codes from Software Configuration Management (SCM)
- Lack of effective software process control, particularly in software development
- Lack of training, management oversight and communication, again, primarily in software development

OUTSTANDING/PENDING DEFICIENCY REPORTS

- LVMO-00-D-099 (Open)
  - Qualified software added to software baseline failed to load during SCM installation verification
  - This is a reproducibility issue in Configuration Management.
- BSC-01-D-068 (Pending)
  - WAPDEG
  - FEHM
  - Version control issues

Actions Taken

- Assignment of Project Manager to facilitate resolution of issues
- BSC Management has requested a team of specialists from outside the project to assist in Root Cause Analysis and recovery
- Stand-Down of software development and modification during recovery
- Extent of Condition evaluation has begun
- Root Cause Analysis team has been formed
- Root Cause Analysis began on Monday, June 4, 2001

Actions Planned

- Recommendations to be developed and evaluated from Root Cause Analysis
- Actions to preclude recurrence will be developed to insure that deficiencies noted will not recur

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

TSPA-SR Issues Management Plan

Presented to:
DOE/NRC Quarterly QA Meeting

Presented by:
Donald G. Horton, Deputy Project Manager
Yucca Mountain Site Characterization Office

Nancy Williams, Manager of Projects
Bechtel SAIC Company, LLC

June 13, 2001

YUCCA MOUNTAIN PROJECT

Introduction

- **Recent Quality Concerns**
  - **2 CARs**
    - **Model Validation**
    - **Software**
  - **TSPA-SR Quality Concerns**
    - **NRC Telecons (May 4 and 9, 2001)**
    - **NRC Letter (May 17, 2001)**

Systematic Continuing Issues

- February 12, 2001 - BSC Assumed Prime Contractor Role on YMP
- Evidence of Continuing Quality Problems
- Initiated Management Plan to Correct Quality Problems

Quality Initiative Issues

- **Document Integrity**
  - Quality and traceability of documents and analytical models that will be subject to the public process
- **Root Cause Determination (2 CARs)**
  - Root cause assessment and action plan for
    - Model Validation
    - Software Verification

Chronology

- 5/4-17/2001 - Identification of errors by NRC and subsequent telephone calls / correspondence with NRC
- 5/18/2001 - BSC Board Meeting
- 5/22/2001 - Bechtel mobilizes executive management team
- 5/29/2001 - Bechtel mobilizes senior project management team from Oak Ridge and Denver to finalize action plan
- 6/4/2001 - Bechtel executive management approves Quality Initiative action plan
- 6/4/2001 - Mobilization to support plan

Quality Initiative Goals

- **Assure the quality/sustainability of technical reports/analyses supporting the YMP work**
- **Establish process improvements to improve project performance for continuing phases of work**

Overview

- Systematic Approach
- Regular Reporting on Progress and Results
- Immediate Corrective Actions
- Short Term Corrective Actions
- Longer Term Corrective Actions (Based on Quality Initiative Investigations)
- Highly Experienced Diverse Team

Action Plan Scope

- Immediate/Short Term Actions
- Short Term (through end of FY01)
  - Document Integrity
  - Management Stand-Down on Software Development
  - Root Cause Assessments
- Long Term and Ongoing Actions
  - Process Improvements
  - Responsibility/Accountability

Document Integrity Strategy

- **Horizontal review across key documents**
  - **assure consistency of inputs and conclusions**
- **Vertical reviews of the SSPA documents and supporting analysis (both volumes)**
  - **assure consistency and traceability**
- **Vertical review of TSPA Rev. 0, ICN 1**
  - **assure traceability, consistency, linkage to supporting models**

Document Integrity Strategy

- **Horizontal Reviews**
  - DEIS Supplement, S&ER, SSPA Volumes 1 & 2, and TSPA Rev. 0, ICN 1
  - Ensure consistency of technical inputs and conclusions
  - DEIS Supplement and S&ER will be pace setting documents since they are already issued
  - Duration:
    - 3 weeks review
    - 1 week comment incorporation

Document Integrity Strategy

- **Vertical reviews of the SSPA documents and supporting analysis**
  - **Assure consistency and traceability**
  - **Each volume**
    - **Staggered Overlapping Reviews**
    - **Duration:**
      - » **2 weeks review**
      - » **1 week comment resolution**

Document Integrity Approach

- **Prepare review guidance checklists**
  - **Reference checks**
  - **Consistency checks**
  - **Traceability checks**
  - **Error checks**
  - **Input and output checks**
- **Identify bins for collecting daily review results for management review**

Document Integrity Management

- **Weekly Review of Results**
- **Upon Completion of Horizontal and Vertical Reviews: Management Will Assess Need for Further Action**

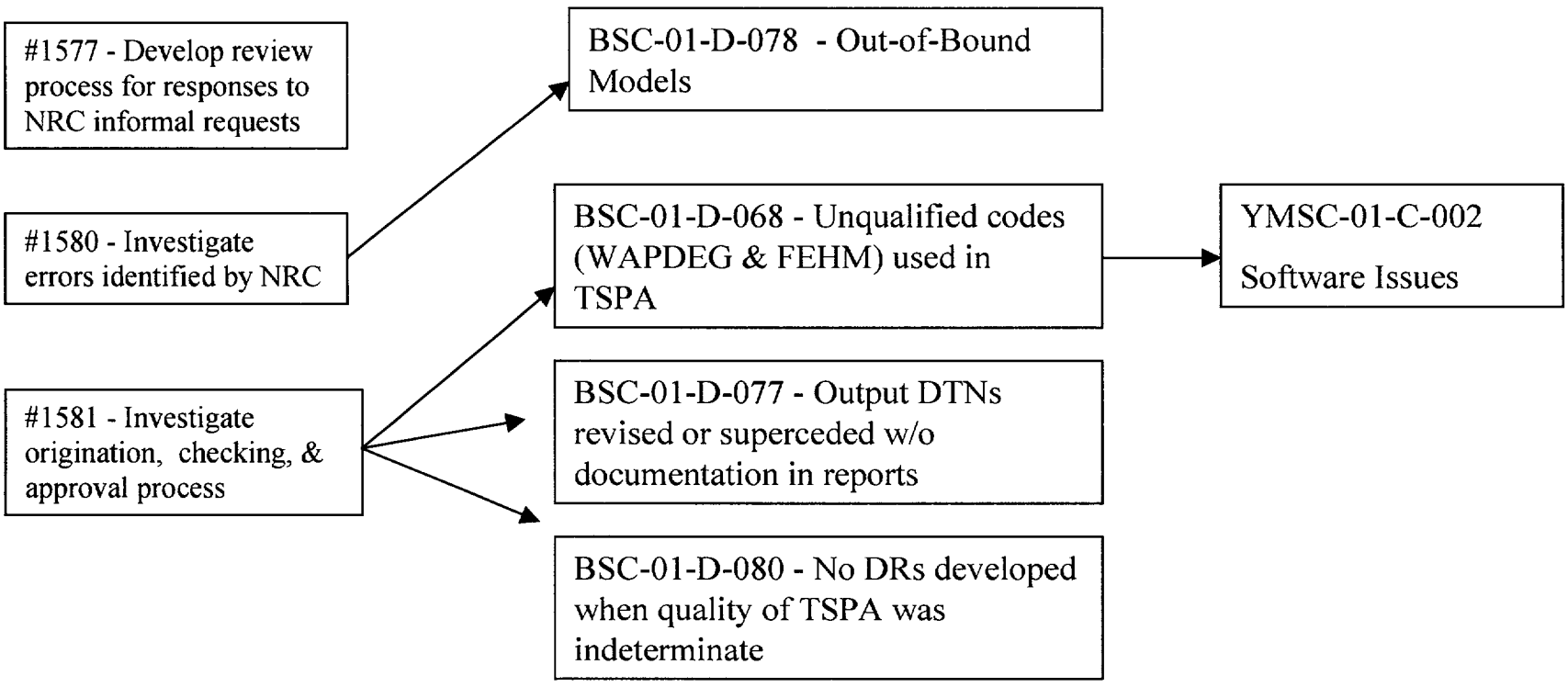
Document Integrity Strategy

- **Vertical review of TSPA Rev. 0, ICN 1**
  - **assure traceability, linkage to supporting models, and to identify errors**
  - **Duration:**
    - **4 weeks review**
    - **3 weeks comment resolution**

Quality Initiative
Results of Initial Investigation

- **Programmatic/Process Issues**
  - 4 Deficiency Reports
  - 3 CIRS Items
- **Technical Issues**
  - were mostly known to technical personnel
  - further assessments still in progress
  - all assessed to date have minimal or no impact

TSPA-SR Rev. 0, ICN 1



Corrective Action Requests

- **Institute Immediate Actions**
- **Conduct Root Cause Determinations**
  - **Model Validation (May 3, 2001)**
  - **Software Verification (June 2001)**

Corrective Action Requests

- **Initial Immediate Actions**
  - **BSC Management stand-down to control the further development of software (June 7, 2001)**
  - **Initiated teams to begin model validation and software verification actions immediately**
  - **Initiated formal root cause analysis in compliance with procedural requirements (June 4, 2001)**
  - **General Manager Meeting to Emphasize Expectations (June 11, 2001)**

Corrective Action Requests

- **Formal Root Cause Analyses**
  - **Single Team Will Conduct Both Root Cause Analyses to Ensure Integration of Common Causes**
    - **Model Validation**
    - **Software Verification**
  - **Utilize Tap Root Process (Mandated by Project Procedures)**

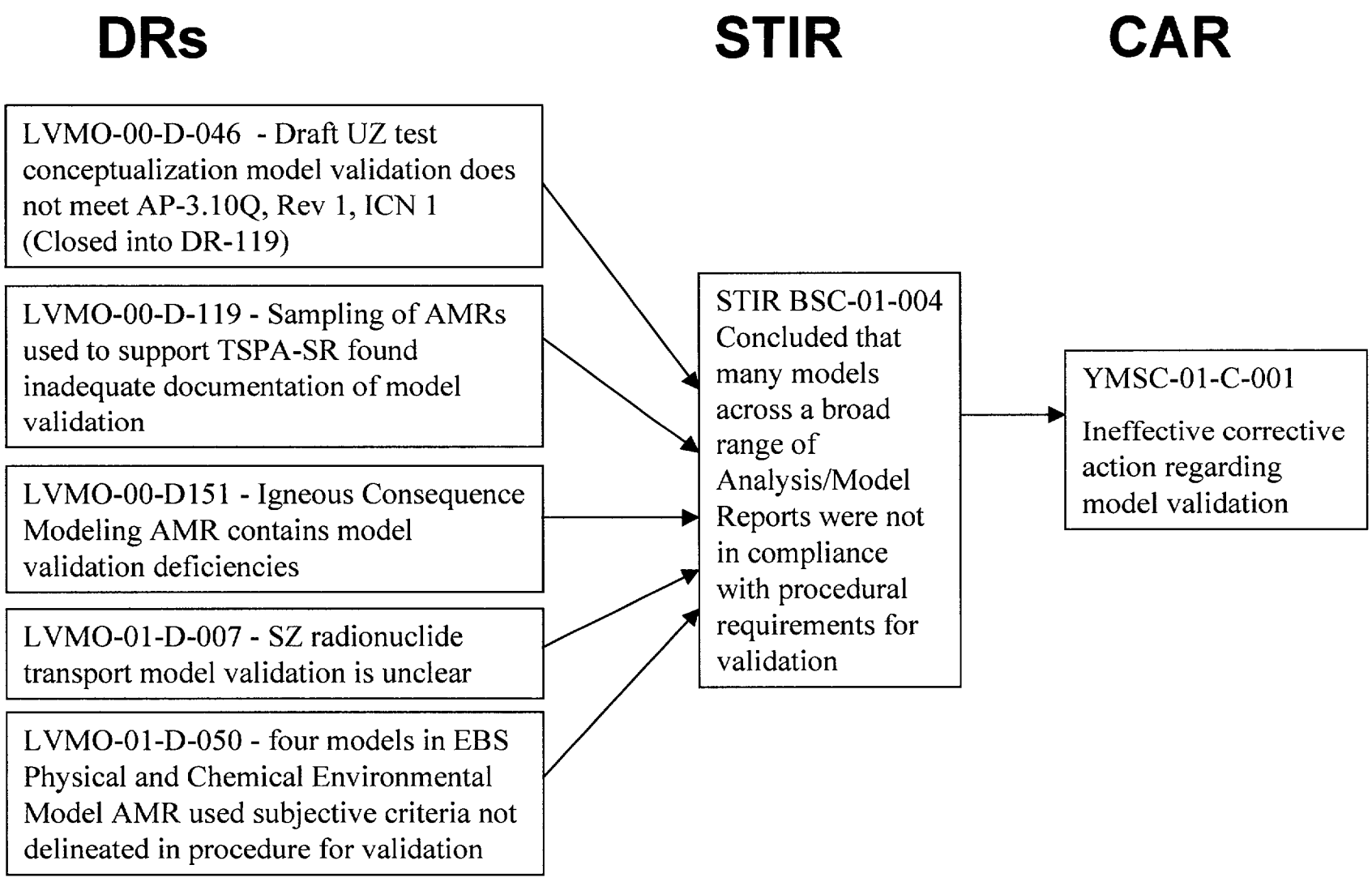
Corrective Action Requests

- **Root Cause Assessments**
  - **Team Composition**
    - **Team Leader**
    - **Technical Experts and Independent Outside Consultants**
    - **Project Liaison**
    - **Administrative Support**

Corrective Action Requests

- **Immediate Actions: Model Review**
  - **Initiate a review of the existing models that lack compliant validation and document the results of the review**
  - **Review will categorize:**
    - **adequate confidence for intended use in SR but requiring further documentation prior to LA**
    - **inadequate confidence in the use of the model for SR requiring immediate impact assessment or further validation**

Model Validation



Corrective Action Requests

- **Immediate Actions: Software**
  - **Software Review**
    - **Review existing software and prepare appropriate verification documentation**
    - **Initiate revisions to the software procedures to provide appropriate requirements and controls for software development and configuration control**

Longer Term Actions

- **Procedure Revisions/Enhancements**
- **Baseline Management/Controls**
- **Corrective Actions Identified by Root Cause Determination**

Impact of Unqualified Data and Software

- Compile unqualified/TBV inventory
- Identify information not needing qualification
- Conduct vertical trace from source to TSPA-SR input parameter
- Determine significance to TSPA-SR input parameter and results
- Prepare documentation of findings
- Prepare summary of conclusions
- Review prior to release

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

KEY TECHNICAL ISSUES PROGRESS AND STATUS OVERVIEW

Presented by:
Timothy Gunter
DOE, Yucca Mountain Site Characterization Project

June 13, 2001

YUCCA MOUNTAIN PROJECT

Outline

- Summary of KTI agreement status
- Schedule changes
- Future meetings

KTI AGREEMENT ITEM STATUS

KTI Title	Agreements Reached	All Documentation Received for Agreement by NRC as of April 16, 2001*	All Documentation Sent for Agreement Items after April 16, 2001	Documentation Partially Received for Agreement by NRC as of April 16, 2001*	Partial Documentation Sent for Agreement Items after April 16, 2001
USFIC	25	3	1	1	0
IA	12	4	0	3	0
CLST	58	20	0	0	0
SDS	10	6	0	1	0
RT	29	5	0	1	0
ENFE	41	13	0	6	1
TEF	15	3	1	3	0
RDTME	23	0	0	0	1
Totals*	213	54	2	15	2

*From J. Andersen presentation at the KTI Status Breakout Session on April 17, 2001

Remaining FY01 Agreement Items

- Some dates for remaining items currently scheduled for FY01 will change
- Changes due to replanning performed after original agreements made
- 35 agreement items originally scheduled to be fully or partially complete in the remainder of FY01
  - 18 will be submitted in FY01 (actual date will change for 9 items)
  - 2 partial items will be submitted after FY01

Remaining FY01 Agreement Items (cont.)

- 15 items will be completed after FY01
  - Documents will have been submitted in FY01 to partially satisfy many of these items
- Reasons for delay in completing the 15 items
  - 8 items - TSPA-SR Rev. 1 is no longer planned for FY01
  - 2 items - PMR revisions are no longer planned for FY01
  - 1 item - Date dependent on final issue of 10 CFR 63
  - 4 items - Other

Schedule for FY02 and Beyond

- Agreement items currently scheduled for FY02 and beyond subject to replanning currently in progress
- Results of replanning available early in FY02
- DOE will document results of replanning in letter to NRC

Future Meetings

- Igneous Activity - June 21-22, 2001 - Las Vegas
- TSPA and Integration - June 25-29, 2001 - Las Vegas
- Range of Operating Temperatures - July 10-12, 2001 (tentative) - Las Vegas
- Preclosure Issues - July 24-26, 2001 - Las Vegas
- Meetings subject to reschedule based on work flow