



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 17, 2001

Mr. Robert Clark
Acting Director
Office of Quality Assurance
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

SUBJECT: MINUTES OF THE JUNE 13, 2001, QUALITY ASSURANCE AND KEY
TECHNICAL ISSUE STATUS MANAGEMENT MEETING

Dear Mr. Clark:

Enclosed are the minutes of the June 13, 2001, Quality Assurance and Key Technical Issue Status Management Meeting between the staff of the U.S. Nuclear Regulatory Commission (NRC) and representatives of the U.S. Department of Energy (DOE) (Enclosure 1). Also enclosed is the agenda (Enclosure 2); attendance list (Enclosure 3); and briefing materials (Enclosure 4).

The purpose of the June 13, 2001, meeting was to discuss items of mutual interest about Quality Assurance (QA) and those areas contributing to the resolution of QA problems. The Key Technical Issues (KTI) portion of the meeting was to discuss issues related to KTI agreements and associated activities. The meeting was held at NRC headquarters in Rockville, Maryland, and via video conference to the NRC Region IV office in Arlington, Texas, and the DOE office in Las Vegas, Nevada and via telecon with the Center for Nuclear Waste Regulatory Analyses in San Antonio, Texas.

If you have any questions regarding this letter, please contact Kien Chang of my staff at (301) 415-6612.

Sincerely,

A handwritten signature in black ink, which appears to read "C. William Reamer".

C. William Reamer, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: 1. Meeting minutes
2. Agenda
3. Attendance list
4. Briefing materials

cc: See attached list

Letter to R. Clark from C. W. Reamer dated August 17, 2001.

cc:

R. Loux, State of Nevada	R. Massey, Lander County, NV
S. Frishman, State of Nevada	J. Pitts, Lincoln County, NV
L. Barrett, DOE/Washington, DC	M. Baughman, Lincoln County, NV
A. Brownstein, DOE/Washington, DC	A. Funk, Mineral County, NV
S. Hanauer, DOE/Washington, DC	J. Shankle, Mineral County, NV
C. Einberg, DOE/Washington, DC	L. Bradshaw, Nye County, NV
J. Carlson, DOE/Washington, DC	M. Murphy, Nye County, NV
N. Slater, DOE/Washington, DC	J. McKnight, Nye County, NV
A. Gil, YMPO	D. Weigel, GAO
R. Dyer, YMPO	W. Barnard, NWTRB
S. Brocoum, YMPO	R. Holden, NCAI
R. Clark, YMPO	A. Collins, NIEC
S. Mellington, YMPO	R. Arnold, Pahrump County, NV
C. Hanlon, YMPO	J. Larson, White Pine County
T. Gunter, YMPO	R. Clark, EPA
K. Hess, BSC	F. Marcinowski, EPA
D. Krisha, BSC	R. Anderson, NEI
S. Cereghina, BSC	R. McCullum, NEI
N. Williams, BSC	R. Henning, BSC
M. Voegele, BSC/SAIC	S. Kraft, NEI
S. Echols, Winston & Strawn	J. Kessler, EPRI
B. Price, Nevada Legislative Committee	D. Duncan, USGS
J. Meder, Nevada Legislative Counsel Bureau	R. Craig, USGS
D. Bechtel, Clark County, NV	W. Booth, Engineering Svcs, LTD
E. von Tiesenhausen, Clark County, NV	J. Curtiss, Winston & Strawn
A. Kalt, Churchill County, NV	N. Rice, NV Congressional Delegation
G. McCorkell, Esmeralda County, NV	T. Story, NV Congressional Delegation
L. Fiorenzi, Eureka County, NV	J. Reynoldson, NV Congressional Delegation
A. Johnson, Eureka County, NV	S. Joya, NV Congressional Delegation
A. Remus, Inyo County, CA	J. Pegues, City of Las Vegas, NV
M. Yarbrow, Lander County, NV	L. Lehman, T-REG, Inc.
I. Zabarte, W.S.N.C.	

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.

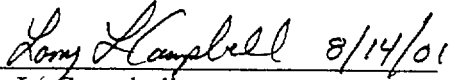
William Watson (BSC, Science and Analysis Department) discussed the status of Model Validation deficiency documents and noted that concerns identified to date involve documentation and not model suitability and results. He further stated that the independent review, to be initiated per the TSPA-SR management 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.

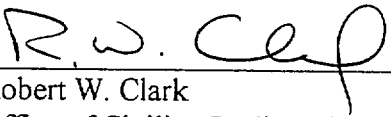
Robert Wemheuer (BSC, Integrated Management of Technical Product Input Department) discussed data qualification status, describing the qualification goals and objectives, data verification/qualification status by Process Model Report (PMR), and an overview of the results.


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


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


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)
9960 Covington Cross
Room 915
Las Vegas, NV

U.S. NRC
Region IV
611 Ryan Place Drive
Arlington, TX

U.S. DOE
490 L'Enfant Plaza
Suite 7200
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 Keome	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
Guy Ibrahim	NRC	301-415-1651
BOB MACDOUGALL	BSC	202-479-2122
Nick DiNunzio	DOE	202-586-8953
Jim Curtis	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
KISS GRISHAM	DOE/EM-42	301 903 8478
TIM GUNTER	DOE/YM3CO	702-794-1343
TIM Sullivan	DOE/YM3CO	" " 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
Jandra WASTLER	NRC	301-415-8733
DAVID SIEFKEN	BSC	(202) 479-2104

**DOE/NRC QA Meeting
June 13, 2001
Washington DC**

Sign-In Sheet

[illegible]

6/13/01

R IV

Charles Hackney

RSL O NRC Region IV

Vincent Everett

, Inspector

D. BLAIR SPITZBERG, CHIEF, FCDB

**CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
MEETING ATTENDANCE**

SUBJECT OF MEETING

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

[illegible]

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 McKinnon	MTS/BAH	7027945420
William Mehrhoff	NRC	702-794-5053
B. BECKE	NRC	702-794-5047
Bob Clark	DOE-OIA	702-794-5583
DON KRISHA	BSC-QA	702-295-6242
Frank Kratzman	MTS	702-794-5057
Jim Baylock	DOE/OQA	-794-1420
Susan Zimmerman	State of Nevada	775-682-3744
Wm Boyle	DOE	7027945506
Claudia Newbury	DOE	702-794-1361
ROBB KEELE	BSC-QA	702-295-2805
F. HANNEY DOVE	OQA/NQS	702-794-2505
DON BECKMAN	BSC-LAP	702-295-4392
E. VON TIESSEN HANUSSEN	CLARK COUNTY	702 455-5189
Wm Murphy	Nye County	360 943-5610
Mykel Rice	InterTech/Lincoln Co	702 363 6583
CH. LATH	US NRC	(702) 794-5048
ALEXA BOONE	DOE/OIM	(702) 794-1453
MICHAEL ESHLEMAN	DOE/OIM	702 794-1360
STEVE HANAUER	DOE-ILC	202-586-6850
LEW ROBERTSON	MTS/OIM	702 794-507
Norman Henderson	BSC/LAP	702-295-5253
ROBERT HANSON	OQA/NQS	702-794-5023
Kristi Hodges	OQA/NQS	702-794-1464
DONALD HORTON	DOE/YMSCD	702-294-1301
ROBERT TAIT	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)

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.)

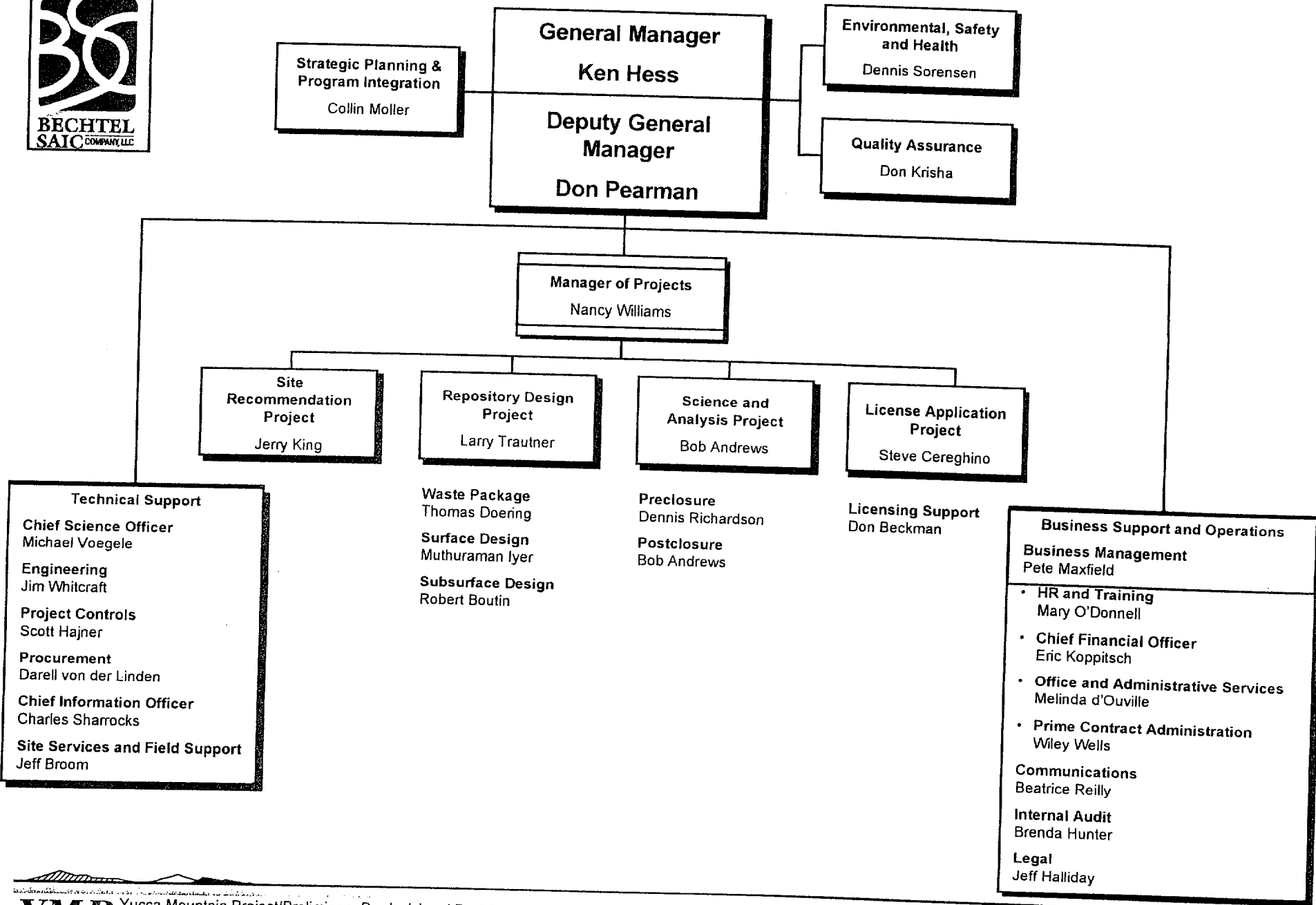
- **Suspect Trending Investigation Report (STIR) BSC-01-004 was initiated on March 15, 2001**
 - Review of AMRs issued between December 1999 through April 2001
 - Repetitive deficient conditions and examples of inadequate documentation
 - Planned revisions to AP-3.10Q have not been timely
 - STIR recommendation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



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

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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

	<u>Total*</u>	<u>Completed</u>	<u>To-Go</u>	
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	<u>310</u>	<u>254</u>	<u>56</u>	
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

<u>ORG</u>	<u>Completed Checklists</u>	<u>Verified Q</u>	<u>Verified UQ</u>	<u>Reject Rate**</u>
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

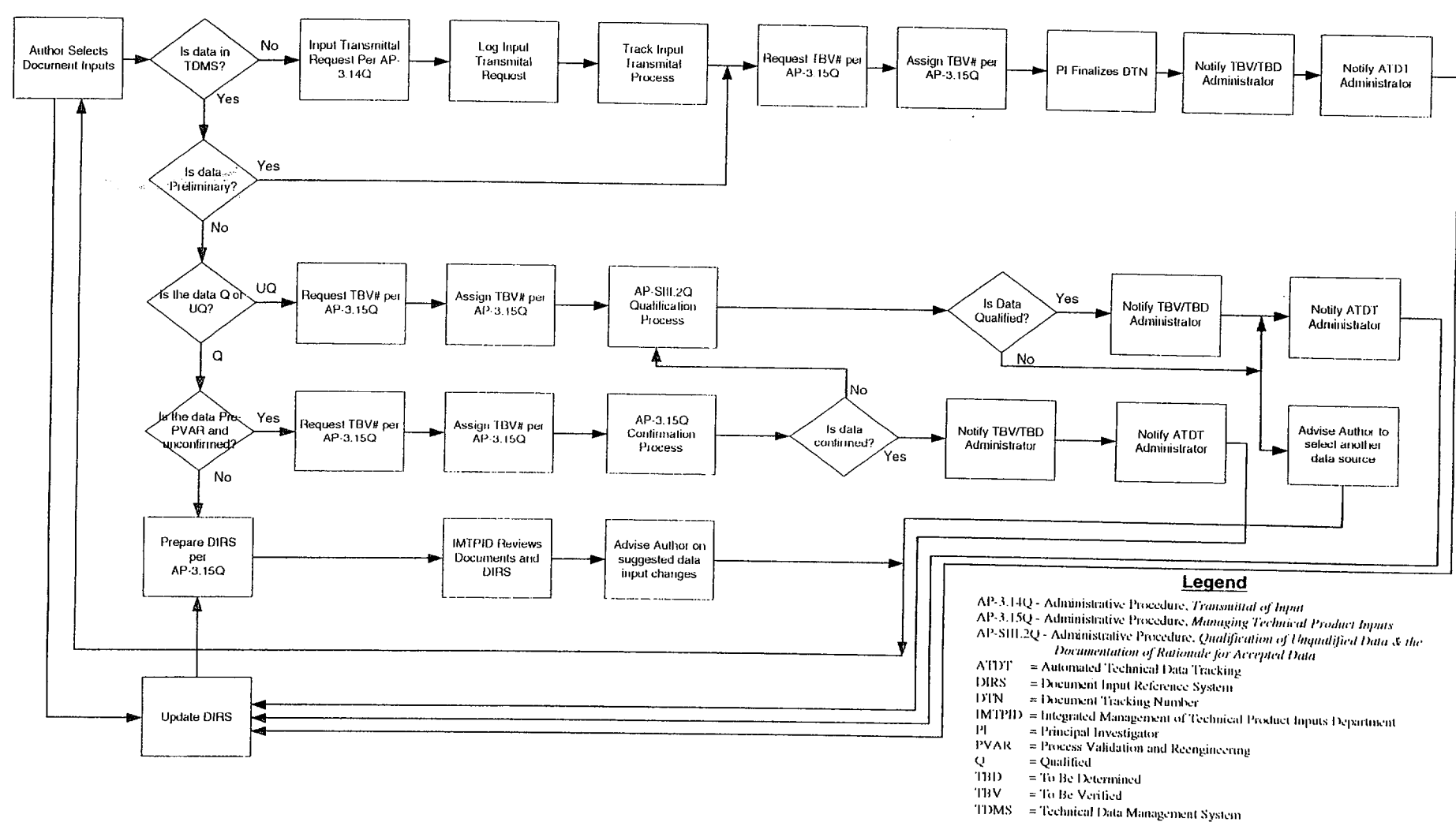
- **The goal to qualify 80% of the data in the Rev 0 PMRs and supporting AMRs (and ICNs) used in TSPA Rev 0, ICN 1 has been met**
- **Based on the current set of TSPA-SR Rev 0, ICN 1 AMRs, the status is:**
 - **96% of data verified**
 - **89% of data qualified**

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





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

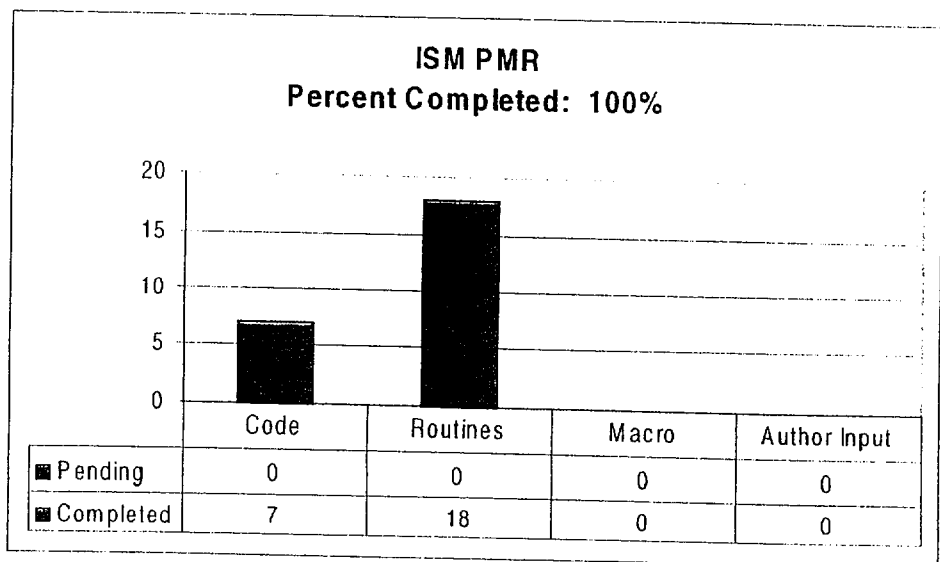
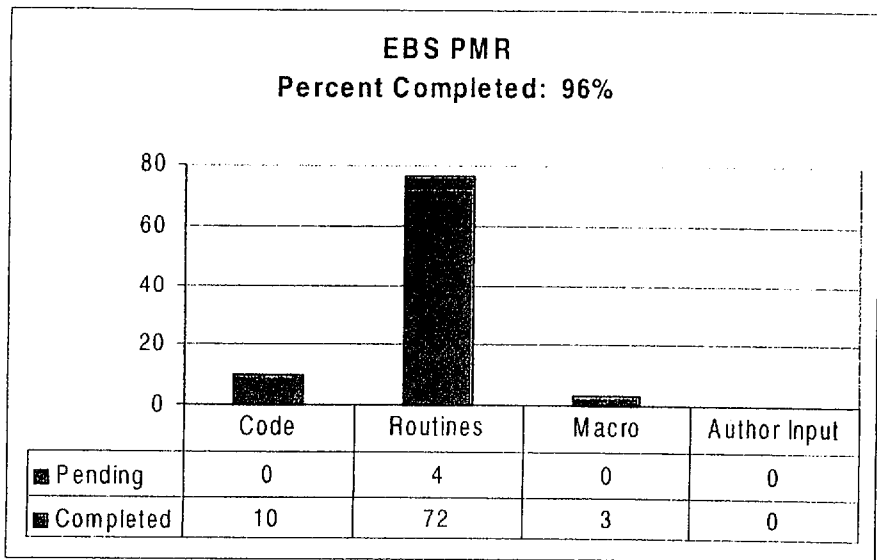
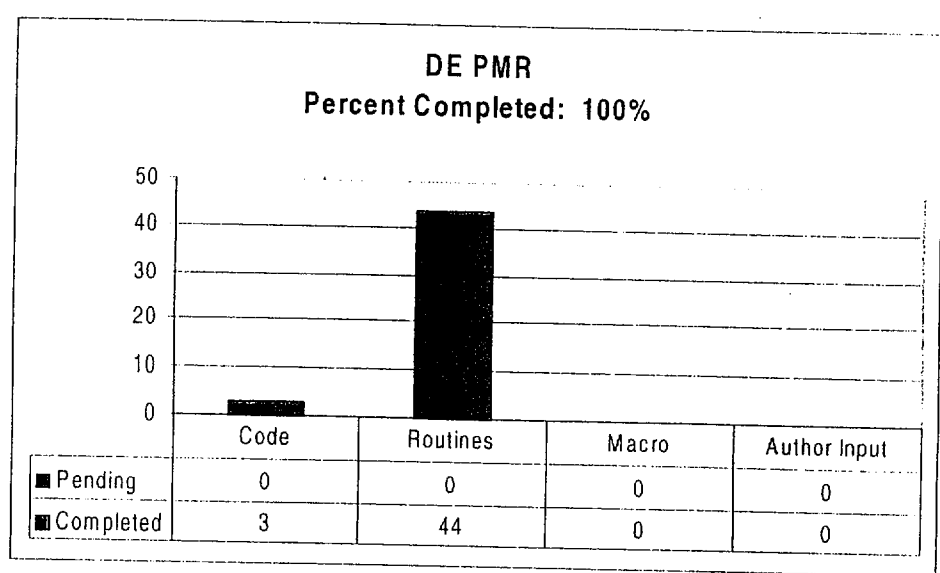
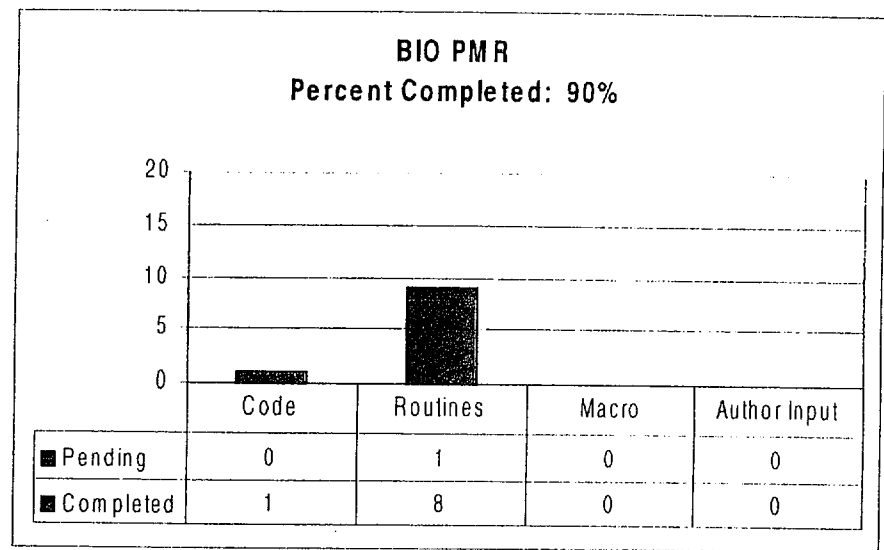
- **Software Qualification Applicability**
 - **Software supporting PMRs and related AMRs for TSPA-SR**
- **Software Qualification Percentage by PMR**
- **Software Qualified by PMR**
- **Unique Unqualified Software Codes**
- **LMVO-00-D-039 on Software Routines**

Software Qualification Percent By PMR and Associated AMRs

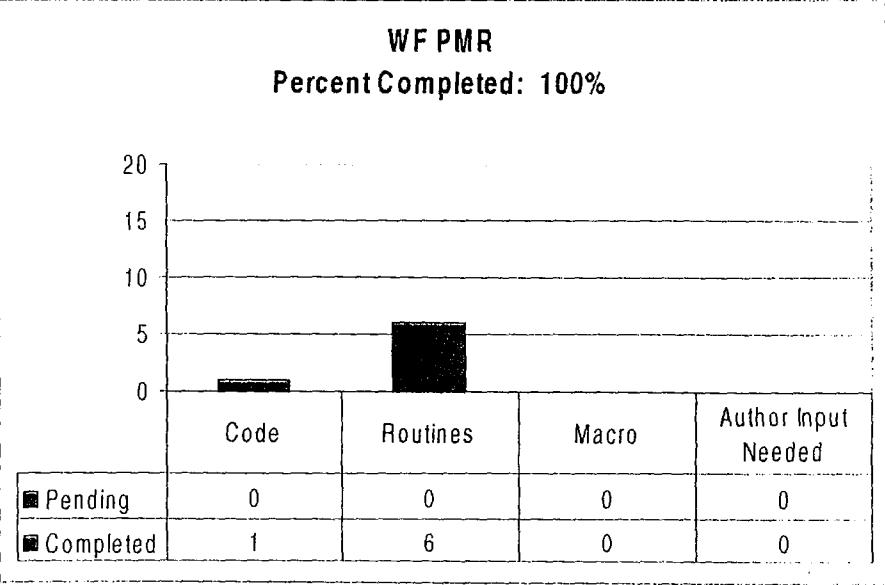
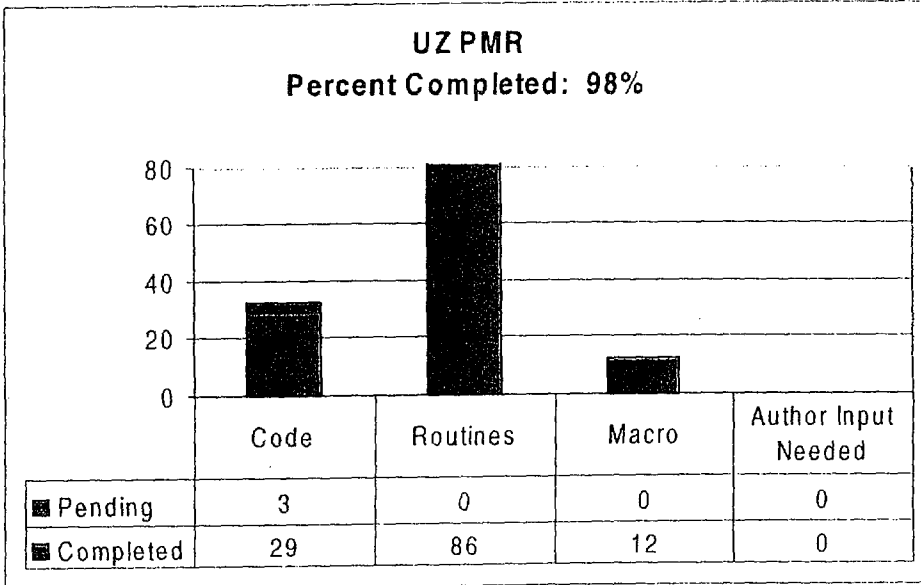
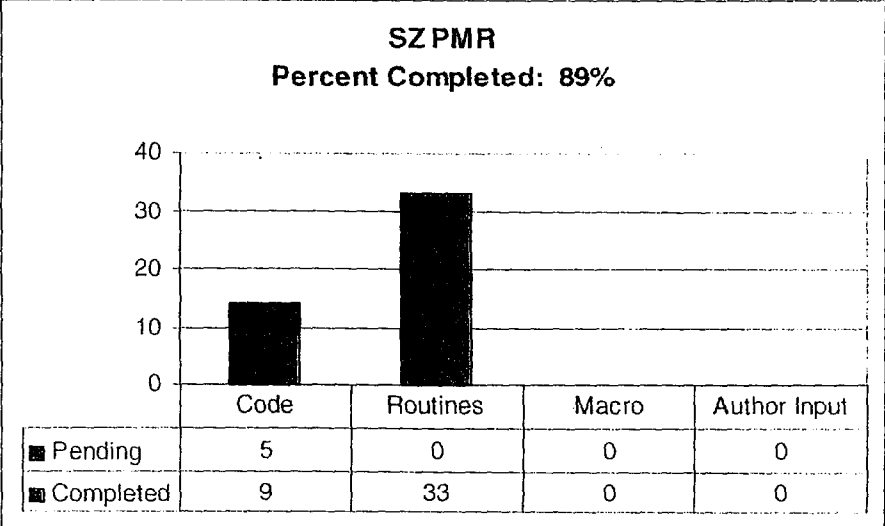
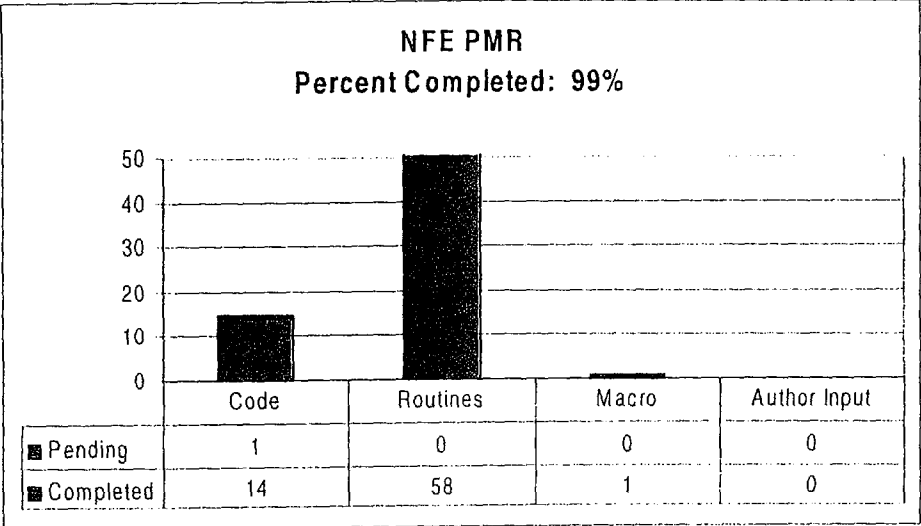
- BIO 90%
- DE 100%
- EBS 96%
- ISM 100%
- NFE 99%
- SZ 89%
- UZ 98%
- WF 100%
- WP 100%

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

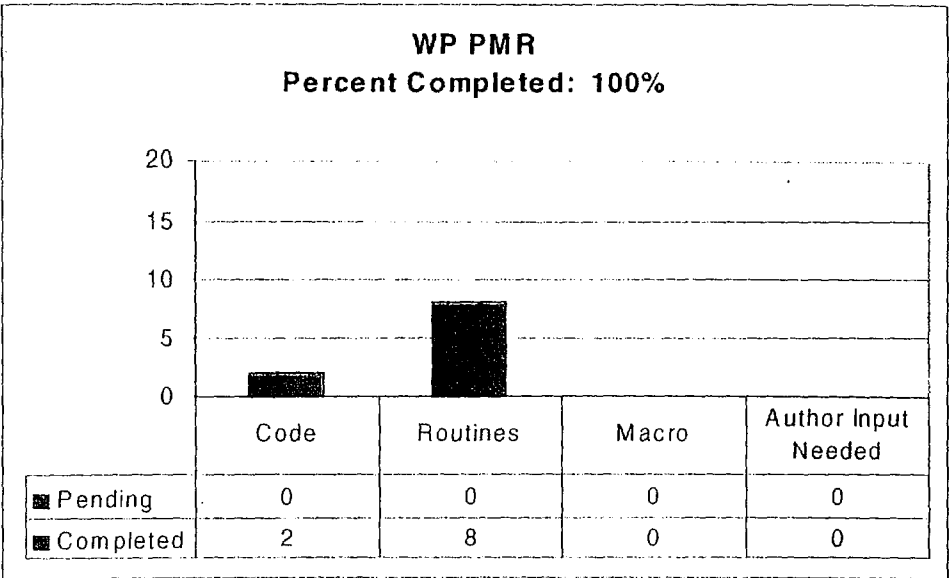
Software Qualified by PMR



Software Qualified by PMR (Continued)



Software Qualified by PMR (Continued)



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**