

YUCCA MOUNTAIN PROJECT OFFICE

QUALITY ASSURANCE SURVEILLANCE REPORT

SURVEILLANCE YMP-SR-90-019

CONDUCTED FEBRUARY 20 THROUGH FEBRUARY 23, 1990

ACTIVITIES SURVEILLED:

IMPLEMENTATION OF PROCEDURES

YMP-USGS-QMP-3.03, REVISION 1

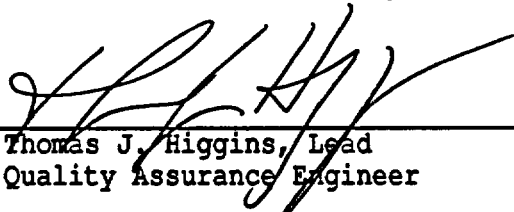
AND

YMP-USGS-QMP-3.14, REVISION 2

BY THE

UNITED STATES GEOLOGICAL SURVEY


Prepared By:


Thomas J. Higgins, Lead
Quality Assurance Engineer

Date:

3-22-90

Approved By:


Donald G. Horton, Director
Quality Assurance Division

Date:

3/22/90

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1.0 EXECUTIVE SUMMARY

The purpose of this surveillance was to verify the implementation by the United States Geological Survey (USGS) of its procedures YMP-USGS-QMP-3.03, "Software Quality Assurance," and YMP-USGS-QMP-3.14, "Software Configuration Management System." The implementation of both procedures was judged to be adequate. Five observations were issued, but no standard deficiency reports (SDRs) resulted from the surveillance.

2.0 INTRODUCTION

The Yucca Mountain Project Office (Project Office) Quality Assurance (QA) staff conducted this surveillance at the USGS facility in Denver, Colorado, February 20 through 23, 1990. The surveillance was conducted in accordance with the Project Office Quality Management Procedure QMP-18-02, "Surveillance," Revision 1.

John Gilray and Tilak Verma of the U.S. Nuclear Regulatory Commission (NRC) and Susan Zimmerman of the State of Nevada were present as observers.

3.0 BACKGROUND, PURPOSE, AND SCOPE

3.1 BACKGROUND

The Project Office approved the USGS Software Quality Assurance Plan (SQAP) for implementation on August 8, 1989. The procedures that implement the SQAP are YMP-USGS-QMP-3.03, "Software Quality Assurance," and YMP-USGS-QMP-3.14, "Software Configuration Management System." In June 1989, the Project Office performed Surveillance YMP-SR-89-110, which evaluated YMP-USGS-QMP-3.03, Revision 1, and YMP-USGS-QMP-3.14, Revision 0, "against the requirements of the Project Office QA Plan, NNWSI QAP/88-9, Revision 2, and the quality related Administrative Procedures as applicable." At the conclusion of that surveillance, the single identified deficiency had been corrected.

3.2 PURPOSE

This surveillance evaluated the implementation of YMP-USGS-QMP-3.03, Revision 1, and YMP-USGS-QMP-3.14, Revision 2, by the USGS.

3.3 SCOPE

The USGS Software Configuration Status Accounting (CSA) Log lists 75 computer codes in the Software Configuration Management (SCM) System. Of these 75, 9 have a complete set of lifecycle documentation, although document reviews are not complete; 10 have one or more baselined lifecycle documents, and the remaining 56 are merely registered with the SCM System. These have no baselined documentation beyond the Configuration Identification Request Form that registers the software with the SCM System. The surveillance team selected four of the nine software products for which a complete set of lifecycle documentation was available. (Two of the remaining five had been previously examined in Audit 89-4.) The surveillance team also selected five of the ten software products that have some portion of the lifecycle process completed for verification of procedural implementation.

4.0 SURVEILLANCE PERSONNEL

T. J. Higgins, QA Engineer, Project Office QA, Las Vegas, Nevada
S. D. Harris, QA Engineer, Project Office QA, Las Vegas, Nevada
R. L. Maudlin, QA Specialist, Project Office QA, Las Vegas, Nevada
N. D. Cox, QA Engineer, Project Office QA, Las Vegas, Nevada

5.0 SUMMARY OF SURVEILLANCE RESULTS

The surveillance team examined the existing records, logs, and meeting minutes of the SCM Management System to assess compliance with procedural steps and requirements. Interviews were held with Mr. D. T. Hoxie, Software QA Specialist, and Mr. M. A. Wallendorf, SCM Librarian, as an integral part of this process. The training and qualifications of these two individuals was also reviewed. Finally, two technical contacts who are responsible for the development of lifecycle documentation for their assigned software products were also interviewed to determine their understanding of the SCM System and its procedures.

The surveillance team examined the entire CSA Log and then requested that a random selection of individual baselined documents be retrieved from the SCM Library, which is maintained within the USGS Local Records Center (LRC). The surveillance team also requested complete records packages for four software products having a complete set of documentation and the record packages of five products for which the preparation of lifecycle documentation is in progress.

The selected software products with complete lifecycle documentation were:

Configuration Identification No.	Code Name
GDD0004	SEISMIC.CMD
GDD0014	FORUV.FOR
GDD0027	TARVAX.FOR
GDD0034	LOTUS 123

The selected software products with more than one baselined lifecycle document were:

Configuration Identification No.	Code Name
GDD0023	EVENTDATABASE
GDD0026	UTILITIESDATABASE
NHP0009	RTM
NHP0010	RTRC
NHP0011	WAVSEP

The surveillance team concluded that the implementation of both procedures is adequate. Specific results for each of the individual procedures are provided in the following sections.

5.1 IMPLEMENTATION OF SOFTWARE CONFIGURATION MANAGEMENT SYSTEM

The surveillance team determined that implementation of YMP-USGS-QMP-3.14, Revision 2, "Software Configuration Management System," is adequate. The areas assessed were:

- o Configuration identification
- o Submission of software configuration items
- o Changes and revisions
- o Configuration Control Committee
- o Configuration status accounting
- o SCM System Library

The following facts and conditions were noted:

1. Of the 198 SQA Document Acknowledgment Forms examined in the CSA Log, 15 had incomplete sections, but were filed in the CSA Log as complete nonetheless. These are mostly among the earlier entries in the CSA Log.

2. The term "software user" as employed by the USGS is significantly different from that which the Surveillance Team would expect. Neither the SQAP, nor its implementing procedures, provides an adequate definition that reflects USGS usage. Consequently, a directory of "users" which the surveillance team requested to examine based on their reading of procedural requirements, did not exist because users refers to individuals other than the technical contact, actual developers of the software, and possibly the principal investigator.

NOTE: The USGS is currently revising QMP-3.03 and will address this concern.

3. A software requirements specification (CID:YMP-USGS/NHP0010/B01.01.02), received by the SCM Librarian on December 22, 1989, was amended and the changes were initialed and dated by the original author on the same day as the January 26, 1990, Configuration Control Committee (CCC) meeting. The changes occurred in Section 15, "Intended Application," Part A., Attributes 2) and 4). The changes were from "yes" to "no" in both cases and indicate that the intended application of the software will probably not be "critical," as defined by the USGS SQAP. This change is in the non-conservative direction. No justification for this change was provided as part of the identified record, nor was it included in the meeting minutes for the January 1990 CCC meeting.

5.2 IMPLEMENTATION OF SOFTWARE QUALITY ASSURANCE

The surveillance team examined the complete record packages obtained from the LRC for each of the nine codes identified in Section 5.0 of this report. It also interviewed two technical contacts to determine their knowledge and familiarity with the procedure. From this review, the Team determined that the implementation of procedure YMP-USGS-QMP-3.03, "Software Quality Assurance," Revision 1, is adequate. The following conditions and facts were noted:

1. The procedure provides no instructions for the completion of the many forms that it requires. While some forms are self-explanatory, others do need explicit instructions or a statement of criteria by which satisfactory completion may be judged. Among the latter are Software Verification Report, and Software Technical/Peer Review Plan.
2. Certain details related to the production of acceptable records require attention and emphasis. Among those observed were two entries in pencil, illegible handwriting, no table of contents for record packages, and incomplete pagination.

3. Software (CID: GDD0026) identified by the technical contact as "critical" was carried into the testing phase before the completion of all reviews of the submitted lifecycle documentation from the preceding design phase.
4. The point at which acquired software will enter the lifecycle is not well defined.
5. The procedure delays the determination of the software attribute "importance" until the Installation and Check-out Phase.

5.3 SOFTWARE IN USE IN SEISMIC MONITORING

The ongoing Seismic Monitoring Program makes use of software for which the reviews of all lifecycle documentation is not complete. The identified code is SEISMIC.CMD (GDD0004), which is used for data digitization and manipulation. This condition has been formally identified by the USGS and is affected by one of several corrective action requests issued by the USGS to promulgate a self-imposed stop work order. The surveillance team has interpreted this as a documented data verification hold-point per NNWSI/88-9, Section III, Paragraph 1.9.2, and concluded that the activity does not constitute a condition adverse to quality.

It is understood that the stop work order will be lifted in the near future, upon completion of corrective actions. The USGS should address the possibility that the need to continue control of the existing affected data might be overlooked when the stop work order is lifted. One or more of the following measures is suggested:

1. Institute specific formally documented hold-points for the usage of seismic data processed with unqualified software until such time as both the software and the software products are qualified. (NNWSI/88-9, Section III, Paragraph 1.9.2)
2. Complete the qualification of the software and software product at the earliest time possible. (NNWSI/88-9, Section III, Paragraph 3.1.6)
3. Place hold tags or other devices on every magnetic tape containing processed seismic data until such time as the software and software product are qualified. (NNWSI/88-9, Section XV, Paragraph 1.1.1)

6.0 PERSONNEL CONTACTED

L. R. Hayes, Technical Project Officer, USGS
Thomas Chaney, Acting QA Manager, USGS
D. T. Hoxie, Software QA Specialist, USGS
M. A. Wallendorf, SCM Librarian, SAIC (Golden)
P. A. Covington, Geologic Division QA, SAIC (Golden)
T. M. Mendez-Viga, Nuclear Hydrology Program QA, SAIC (Golden)
J. S. Gombert, Technical Contact, USGS
S. C. Harmsen, Technical Contact, USGS

7.0 SYNOPSIS OF NCRs/SDRs/OBSERVATIONS

No SDRs were written as a result of this surveillance. The following five Observations were issued:

- | | |
|------------------|---|
| YMP-SR-90-019-01 | States that YMP-USGS-QMP-3.03, Revision 1, lacks adequate direction for the completion of some of the forms completed during use of the procedure. |
| YMP-SR-90-019-02 | States that YMP-USGS-QMP-3.03, Revision 1, requires that lifecycle documentation of one phase be submitted before the next phase is initiated, while the SQAP requires that it will also be approved. The procedure is less restrictive than the requirement which it implements. |
| YMP-SR-90-019-03 | States that YMP-USGS-QMP-3.03, Revision 1, inadequately implements the SQAP requirement to provide stringent software lifecycle control of critical software because it does not determine a software's "importance" (i.e., whether it will be critical) until near the end of the lifecycle. |
| YMP-SR-90-019-04 | States that YMP-USGS-QMP-3.14, Revision 2, does not require that the User's List for a software product contain all developers and users, in particular the primary users. |
| YMP-SR-90-019-05 | States that YMP-USGS-QMP-3.14, Revision 2, does not address revisions to documents submitted to the SCM System in the interval between acceptance by the SCM Librarian and baselining. |

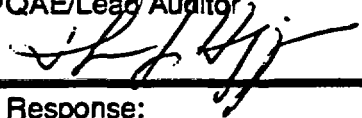
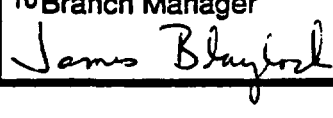
8.0 REQUIRED ACTIONS

Response to an Observation is required within 20 days from the date of its transmittal to the recipient.

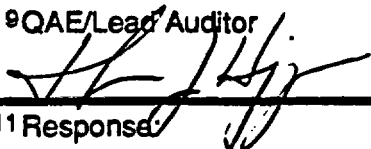
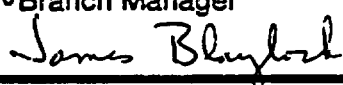
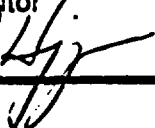
9.0 RECOMMENDATIONS

The following recommendations are to improve the implementation of the USGS program:

1. The USGS should distribute both the knowledge of, and the responsibility for, the SQAP over a number of individuals. Currently, both knowledge and responsibility are concentrated in D. T. Hoxie.
2. The USGS should emphasize the requirements for the completion of QA records and record packages.
3. The USGS should review the CSA Log and provide any missing historical information.

YUCCA MOUNTAIN PROJECT OFFICE				N-QA-012	
1 YMPO OBSERVATION NO. YMP-SR-90-019-01				4/89	
Completed by Originating Organization	2 Noted During: Surveillance YMP-SR-90-019		3 Identified By: T. J. Higgins		4 Date: 3-14-90
	5 Organization: USGS		6 Person(s) Contacted: L. R. Hayes, D. T. Hoxie		7 Response Due Date is 20 Days from Date of Transmittal
	8 Discussion: Procedure YMP-USGS-3.03, Rev. 1, "Software Quality Assurance", provides very few instructions for the completion of the 16 separate forms that may be required during the use of the procedure. Although some of the forms are self-explanatory, others are not and do require either explicit instructions or a statement of criteria by which their satisfactory completion may be determined. Among these are the Software Verification Report, Software Technical/Peer Review Plan etc.				
Completed by Respondee	9 QAE/Lead Auditor 		10 Branch Manager 		Date 3-22-90
	11 Response:				
Completed by QA Org.	12 Signature: _____ Date: _____				
	13 Response Receipt Acceptable <input type="checkbox"/>				
Completed by QA Org.	Initiator _____ Date _____		QA/Lead Auditor _____ Date _____		
	14 Remarks:				
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YUCCA MOUNTAIN PROJECT OFFICE
1 YMPO OBSERVATION NO. YMP-SR-019-02N-QA-012
4/89

Completed by Originating Organization	2 Noted During: Surveillance YMP-SR-90-019	3 Identified By: S. D. Harris	4 Date: 3/14/90
	5 Organization: USGS	6 Person(s) Contacted: L. R. Hayes, D. T. Hoxie	7 Response Due Date is 20 Days from Date of Transmittal
	8 Discussion: <p>The U. S. Geological Survey Software Quality Assurance Plan For The Yucca Mountain Project, YMP-USGS-SQAP-01, R0, requires that "... each document or set of documents produced at each software lifecycle development and testing phase will be reviewed for technical content and SQA adherence prior to proceeding to the next ... phase. These reviews will be performed as a part of the SCM function ..." (Section 6.2). However, procedure YMP-USGS-3.03, Rev. 1, "Software Quality Assurance", section 5.4.1 (a), Developed Software, states in part "... the responsible TC shall prepare ... documentation at the completion</p>		
Completed by Respondee	9 QAE/Lead Auditor 	Date 3-22-90	10 Branch Manager 
	11 Response: 		
Completed by QA Org.	12 Signature:		Date:
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14 Remarks:			
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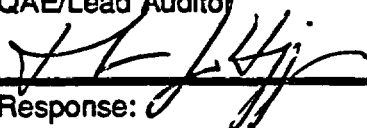

8 Discussion: (continued)

of each lifecycle phase and shall submit this documentation to the QA Office for technical and SQA review prior to proceeding to the next lifecycle phase." The procedural statement is less restrictive than that of the SQAP.

One example that illustrates the negative potential of the above condition is the initiation of the Testing phase for the code UTILITIESDATABASE (CID: GDD0026) before the completion of the review(s) associated with the Design phase. This code was described as "critical" by the Technical Contact.

YUCCA MOUNTAIN PROJECT OFFICE
1 YMPO OBSERVATION NO. YMP-SR-90-019-03

N-QA-012
4/89

Completed by Originating Organization	2 Noted During: Surveillance YMP-SR-90-019		3 Identified By: T. J. Higgins		4 Date: 3/14/90	
	5 Organization: USGS		6 Person(s) Contacted: L. R. Hayes, D. T. Hoxie		7 Response Due Date is 20 Days from Date of Transmittal	
	8 Discussion: <p>Procedure YMP-USGS-QMP-3.03, Rev. 1, "Software Quality Assurance", requires that the software attribute "importance" be determined during the approval process for the Software Summary Form (Attachment 6 to the procedure) which documents completion of the Installation and Checkout Phase (Section 5.3.1.6). This is near the end of the software lifecycle process and therefore does not effectively support the requirement that "Critical Software will be subject to stringent software lifecycle control to the extent both feasible and practical." as specified in section 6.2 of the U. S. Geological Survey Software</p>					
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	Date 3/22/90					
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	12 Signature: _____ Date: _____					
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8 Discussion: (continued)

Quality Assurance Program For The Yucca Mountain Project, YMP-USGS-SQAP-01, R0.

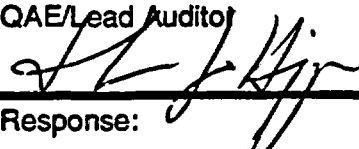
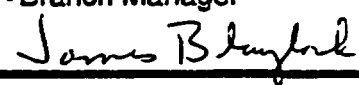
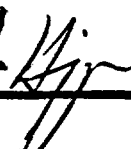
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8 Discussion: (continued)

This condition is in part due to the fact that there is no definition of "software user" in the USGS Software Quality Assurance Plan For The Yucca Mountain Project, YMP-USGS-SQAP-01, Rev. 0, or in its implementing procedures YMP-USGS-QMP-3.03, Rev. 1, , and YMP-USGS-QMP-3.14, Rev. 2. However QMP-3.03, section 4.8, does specify the responsibilities of software users which it states may include the Technical Contact, Principal Investigator or other YMP-USGS personnel. The lack of a definition of "user" coupled with the practice of the Librarian and Specialist is a programmatic defect. It should be corrected.

YUCCA MOUNTAIN PROJECT OFFICE
1 YMPO OBSERVATION NO. YMP-SR-90-019-05

N-QA-012
4/89

Completed by Originating Organization	2 Noted During: Surveillance YMP-SR-90-019		3 Identified By: T. J. Higgins		4 Date: 3/20/90	
	5 Organization: USGS		6 Person(s) Contacted: L. R. Hayes, D. T. Hoxie		7 Response Due Date is 20 Days from Date of Transmittal	
	8 Discussion: Procedures YMP-USGS-QMP-3.03, Rev. 1, and YMP-USGS-QMP-3.14, Rev. 2., which implement the USGS Software Quality Assurance Program, do not address the question of document amendment in the interval between the document's registry in the SCM System by the SCM Librarian, and the baselining of that document as a Software Configuration Item. This Observation is prompted by dated and initialled changes to a Software Specification Summary (CID: YMP-USGS-NHP0010/BO1.01.02) in section 15 of that					
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	12 Signature: _____ Date: _____					
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	Initiator _____	Date _____	QA/Lead Auditor _____		Date _____	
14 Remarks: 						
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1/89

8 Discussion: (continued)

form. The document was received by the SCM Librarian on December 22, 1989, and was altered on January 26, 1990. No explanation was attached to the document nor was there any found in the meeting minutes of the January 26, 1990, Configuration Control Committee.