

U. S. NUCLEAR REGULATORY COMMISSION
OBSERVATION SURVEILLANCE REPORT NO. 92-S1
FOR THE OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
SURVEILLANCE NO. HQ-SR-92-10 OF OAK RIDGE NATIONAL LABORATORY

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OBSERVATION SURVEILLANCE REPORT NO. 92-S1

1.0 INTRODUCTION

On August 26 and September 1, 1992, the U.S. Department of Energy (DOE)/Office of Civilian Radioactive Waste Management (OCRWM) conducted Quality Assurance (QA) Surveillance No. HQ-SR-92-10 of the Oak Ridge National Laboratory (ORNL) QA program. The surveillance team conducted interviews with staff from E. R. Johnson Associates, Inc. (JAI) in Oakton, VA on August 26, 1992, and ORNL in Oak Ridge, TN on September 1, 1992. A member of the NRC staff participated as an observer on this surveillance.

2.0 PURPOSE

The NRC staff observed and evaluated the DOE/OCRWM QA surveillance to gain confidence that OCRWM and ORNL are properly implementing the requirements of their QA programs by assessing the effectiveness of the OCRWM surveillance and determining the adequacy of the ORNL QA program in the areas observed. The staff's evaluation is based on direct observations of the surveillance process, discussions with the OCRWM surveillance team leader (STL) and technical specialists, and reviews of pertinent ORNL records.

3.0 SCOPE

The scope of this surveillance was limited to evaluating the procedural controls and implementation associated with 1) Computer Code Verification Plan for Waste Stream Analysis (WSA), Ver. 2, and 2) Peer Review Plan for Revision 1 of DOE/RW-0184, "Characteristics of Potential Repository Wastes."

4.0 SURVEILLANCE PARTICIPANTS

4.1 NRC

John Buckley Observer

4.2 DOE/OCRWM

R. Dennis Brown	Surveillance Team Leader (STL)	CER Corporation
Elliot Bogart	Technical Specialist	TRW Environmental Safety Systems, Inc. (TRW)
Camille Kerrigan	Technical Specialist	TRW

5.0 SURVEILLANCE SUMMARY RESULTS

The surveillance team developed the checklist questions based on the requirements found in the surveillance controlling documents identified in Section 3.0 above (see Attachments 1 & 2). In evaluating the Computer Code Verification Plan for WSA, the technical specialist began by reviewing the technical qualifications of the JAI staff members working on the verification

of the WSA code. The technical specialist then systematically addressed each of the checklist questions to verify that the requirements in the verification plan were technically adequate to assure quality results and to verify that the requirements were being effectively implemented.

Based on the evidence examined, the technical specialist developed several recommendations for improving implementation of the verification plan. The recommendations are as follows:

1. Several errors or omissions in the draft verification report should be addressed in the final report. Examples include tracing "spill year" back to "large/small capacity" in plants and errors in PWR/BWR labelling of test reactors.
2. It is necessary to complete the "selection of Hottest Fuel First" test case. The pointer problem appears to be fixed; however, the case needs to be run in a controlled version.
3. Final verification report needs to reflect that the test case for "overflow fuel going to dry storage" has been modified.
4. A report should be run to show that the oldest fuel remaining in pool has been picked up. This is already a requirement of the verification plan.
5. For Task 8 it will be necessary to run allocation rights slightly modified (eg. by hand editing a small number of values) and verify that the changes are reflected in the resulting selection. It is strongly recommended that Item 1 be rerun at the same time to establish both no and correct changes for the same time period.
6. An indexing error in the run for the "case of averaged cask design curves using piecewise linear functions" needs to be fixed.
7. The hard copy run of report NUMCASK (listed in verification plan) needs to be located. This report is used to verify correctness of reduced heat at repository (also increased fuel age) as referenced in Test Case 3 criteria of verification plan.
8. The verification report should include a discussion of the interpolation methods used for the hard-coded values. The significance, if any, of changes in results due to interpolation should be discussed.

Although in some cases these recommendations represent deficiencies in the program, corrective action requests (CARs) were not issued because verification of the WSA code is not yet complete. Interviews with the JAI staff indicate that the final report is approximately 90-95% complete. The STL committed to a follow-up visit to assure that each recommendation has been addressed prior to completion of the final report.

The second area evaluated by the surveillance team was the peer review of Revision 1 of "Characteristics of Potential Repository Wastes." The surveillance team evaluated the effectivity of the peer review process by interviewing ORNL staff members and reviewing pertinent QA records. No CARs or recommendations were developed by the surveillance team as a result of this portion of surveillance.

6.0 PERSONS CONTACTED DURING THE SURVEILLANCE

N. Barrie McLeod	(JAI)
Ronald R. McDonald	(JAI)
David Joy	(ORNL)
R. Scott Moore	Automated Science Group (ASG)
Ronald B. Pope	(ORNL)
Karl Notz	(ORNL)
Glen Cowart	(ASG)

7.0 NRC CONCLUSIONS

The NRC staff has determined that the DOE/OCRWM surveillance of the ORNL QA program was useful and effective. The STL and technical specialists were very familiar with the ORNL QA procedures in the areas being surveilled. In addition, the technical specialists had a thorough knowledge of the work products which were examined. The surveillance team effectively used the checklists in conducting their interviews.

The NRC staff agrees with the OCRWM surveillance teams preliminary conclusion that ORNL is adequately implementing the requirements of Computer Code Verification Plan for WSA, Version 2 and Peer Review Plan for Revision 1 of DOE/RW-0184 "Characteristics of Potential Repository Wastes" at this time. In addition, the NRC staff supports the surveillance team committment to follow-up on the recommendations presented during the surveillance, prior to completion of the report on verification of the WSA code.

An NRC technical specialist did not observe the surveillance, and therefore, the staff is not able to make any conclusions regarding the technical quality of the work.

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QUALITY ASSURANCE CHECKLIST

ORGANIZATION EVALUATED ORNL		<input checked="" type="checkbox"/> EXTERNAL <input type="checkbox"/> INTERNAL	<input type="checkbox"/> AUDIT <input checked="" type="checkbox"/> SURVEILLANCE	PREPARED BY <u>ELLIOT BOCART</u> DATE <u>8/15/92</u>
DATES OF EVALUATION 8/26/92				
CONTROLLING DOCUMENT (Title, Number, Revision) COMPUTER CODE VERIFICATION PLAN FOR WSA, VERS. 2.0			ACTIVITY EVALUATED VERIFICATION OF THE WASTE STREAM ANALYSIS CODE	
ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted		RESULTS
T-1	Confirm that the background, experience, and education of the personnel performing the verification of the WSA program are technically adequate, and are consistent with the position descriptions for this Quality Affecting work.			
T-2	Confirm that the subset of reactors chosen for the largest part of the test is adequate to verify the correctness of the computer code.			

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

ATTACHMENT 1

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
T-4	Explain the verification that the code correctly processes the following case: overflow fuel going to dry storage, on the basis of oldest fuel first, and the fuel remaining in the pool is also selected by oldest fuel first (no change in allocation rights).		
T-5	For the case of priority pickup from decommissioned reactors, describe the verification that the selection from such reactors was done correctly. Also, since the WSA code does consider this a case of priority pickup, determine whether the Computer Code Verification Plan is correct in stating, in the description of Test Case 6, that the modification is to acceptance rights (rather than selection rights).		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
T-6	For the option of user-input acceptance rights, explain the verification that the user-input values were in fact used for fuel allocation (instead of the automatic, oldest fuel first values).		
T-7	Describe the verification that casks were loaded correctly for the option of cask rounding up (selecting fuel from the next year's allocation to fill a cask).		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
T-8	<p>Explain the verification of the derating of casks the use of a lower priority cask when the preferred casks have too high a dose rate: this should be done for the case of averaged cask design curves using piecewise linear functions.</p>		
T-9	<p>For the case of an MRS in the system with First In First Out (FIFO) and no unit train, describe the verification that the from-MRS loadings and reduced repository heat values are correct.</p>		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
T-10	Heat is calculated by WSA as a function of reactor type, burnup, and age since discharge, using heat values given in a table for each year of age; the heat table is actually part of the code (in a FORTRAN block data routine). Explain the verification of these heat values (e.g., checking the source of the values), and include calculations of values for ages missing in the original source data.		
T-11	Describe the verifications done ^{with} the complete RW-859 reactor databases.		

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ORGANIZATION EVALUATED ORNL	<input checked="" type="checkbox"/> EXTERNAL <input type="checkbox"/> INTERNAL	<input type="checkbox"/> AUDIT <input checked="" type="checkbox"/> SURVEILLANCE	PREPARED BY <u>C. Kerrigan</u> DATE <u>8/28/92</u>
DATES OF EVALUATION Sept. 1, 1992			

CONTROLLING DOCUMENT (Title, Number, Revision) Doc. No. SI-PR-001 Peer Review Plan for Revision 1 of DOE/RW-0184 "Characteristics of Potential Repository Wastes"	ACTIVITY EVALUATED Peer Review
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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1.	Discuss the process used to select the peer review team? What method was used to ensure that the right technical expertise was applied to each topic to be reviewed?		
2.	Was the number of reviewers allocated to a topic based on complexity? availability of reviewers? What method was used to decide how many reviewers should review a topic?		

* INDICATE RESULTS: SATISFACTORY (SAT), UNSATISFACTORY (UNSAT), NOT APPLICABLE (N/A)

ATTACHMENT 2

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3.	Does the method described above provide confidence that a sufficient number of reviewers with the right kinds of technical background reviewed the report? Please expand.		
4.	Are the credentials of the peer reviewers documented and available?		
5.	What process was used to resolve issues raised by the peer reviewers? For example, if one reviewer raised an issue, was this discussed with other reviewers to reach consensus on a resolution?		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
6.	Did the peer reviewers have an opportunity to see the changes in the report that resulted from the issues raised - before the report was finalized? Discuss process used.		
7.	PC DATABASES How did the peer reviewers "review" the data in the PC databases?		
8.	Was this method of review extensive enough to validate the data in the databases? Give examples.		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
9.	Describe the process used to acquire data for the PC Radiological Database.		
10.	Was there a validation process for this data outside of the Peer Review? If so, please describe.		
11.	Discuss questions 9 and 10 for the Quantities DB.		

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ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
12.	Discuss questions 9 and 10 for the Serial Numbers DB.		
13.	Discuss questions 9 and 10 for the High-Level Waste DB.		
14.	Discuss questions 9 and 10 for the Fuel Assemblies DB.		

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QUALITY ASSURANCE CHECKLIST (continuation sheet)

ITEM NO.	CHARACTERISTIC TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
15.	Discuss questions 9 and 10 for the Non-Fuel Assemblies DB.		
16.	Are there any recommendations that should be made for future activity relating to the PC databases and/or the Report.		