

U. S. NUCLEAR REGULATORY COMMISSION  
OBSERVATION AUDIT REPORT NO. 89-2  
FOR THE YUCCA MOUNTAIN PROJECT OFFICE  
AUDIT NO. 89-1 OF FENIX & SCISSON

John J. Peshel 5/17/89  
John J. Peshel  
Engineering Branch  
Division of High-Level  
Waste Management

James T. Conway 5/17/89  
for Michael Gonzalez (by telecon)  
Center for Nuclear Waste  
Regulatory Analyses

James T. Conway 5/17/89  
for John W. Gilray  
Repository Licensing and  
Quality Assurance Project  
Directorate  
Division of High-Level Waste  
Management

James E. Kennedy 5/17/89  
James E. Kennedy  
Repository Licensing and  
Quality Assurance Project  
Directorate  
Division of High-Level Waste  
Management

Summary

The Nuclear Regulatory Commission (NRC) staff concluded that the overall Department of Energy/Yucca Mountain Project Office (DOE/YMPO) QA audit No. 89-1 of Fenix and Scisson, Inc. (F&S) was meaningful and effective. The audit team was well qualified in the QA and technical disciplines, and their assignments and check list items were well described in the audit plan. Title II exploratory shaft facility (ESF) design activities had not yet begun, so it was not possible for the audit team to review the implementation of the QA program relating to technical products. However, a review and evaluation of the QA and technical procedures and personnel were performed to gain an appreciation of the acceptability of the overall QA and technical programs, including the capabilities of the QA and technical staff of F&S. In general, the NRC staff agrees with the YMPO audit team findings that F&S has an acceptable QA program for the areas that were audited and has qualified QA and technical personnel. F&S appears to meet the requirements contained in 10 CFR Part 50, Appendix B and NNWSI 88-9, Revision 2 (88-9) with the exception of the software QA program which is currently under review. Since F&S had not begun Title II work, the NRC staff will need to observe a DOE/YMPO surveillance and/or audit during program implementation in order to determine if F&S has a fully qualified QA program.

8905240446 890518  
FOR WASTE  
WM-11 PDC

## 1.0 INTRODUCTION

From April 10 through 14, 1989 the NRC staff participated as observers in the DOE/YMPO QA audit No. 89-1 of F&S conducted in Las Vegas, Nevada. This audit did not include implementation of the program elements concerning technical products since F&S was not performing any ESF Title II design work.

F&S is the ESF architect-engineer for drilling and mining for the Yucca Mountain Project (YMP). Other F&S responsibilities include the surveillance and inspection of drilling and mining, and subsurface facilities construction and testing. This report addresses the adequacy of the DOE/YMPO audit and, to a lesser extent, the F&S QA program.

## 2.0 OBJECTIVES

The objective of the DOE/YMPO audit was to determine the effectiveness of the F&S QA program in meeting the requirements of the 88-9 QA Plan for the YMP. The NRC staff's objective was to evaluate the effectiveness of the DOE/YMPO audit and to determine whether the F&S QA program is in accordance with the requirements of the 88-9 QA Plan and 10 CFR Part 50, Appendix B.

## 3.0 AUDIT PARTICIPANTS

### 3.1 NRC

John Peshel	Observer
John Gilray	Observer
Michael Gonzalez	Observer (Center for Nuclear Waste Regulatory Analyses)

### 3.2 DOE/YMPO

John Friend	Lead Auditor	SAIC, Las Vegas, Nevada
Steve Hans	Auditor	SAIC, Las Vegas, Nevada
Steve Dana	Auditor	SAIC, Las Vegas, Nevada
Sid Crawford	Auditor	SAIC, Las Vegas, Nevada
Jim Clark	Auditor	SAIC, Las Vegas, Nevada
Niel Cox	Auditor (in training)	SAIC, Las Vegas, Nevada
Tom Ricketts	Technical Specialist	SAIC, Las Vegas, Nevada
Tom Watson	Technical Specialist	HARZA, Las Vegas, Nevada
Arthur Watkins	Technical Specialist	SAIC, Las Vegas, Nevada
Gary Faust	Observer	DOE/HQ, Washington, D.C.
Vic Montenyohl	Observer	DOE/HQ, Washington, D.C.
Wendell Mansell	Observer	YMPO, Las Vegas, Nevada
Ram Murthy	Observer	YMPO, Las Vegas, Nevada

### 3.3 State of Nevada

Susan Zimmerman                      Observer

### 4.0 NRC STAFF OBSERVATIONS

The NRC staff evaluated the effectiveness of the audit team and the audit of F&S and to a lesser extent acceptability of the F&S QA program. The NRC staff evaluations are based on direct observation of the auditors; discussions with the audit team; and review of the audit plan, checklist, background material, and the F&S technical and QA procedures. The DOE audit was conducted in accordance with YMPO procedures QMP 18-01 "Audit System for the Waste Management Project Office" and QMP 16-03 "Standard Deficiency Reporting System".

#### 4.1 NRC staff observations are classified in accordance with the following guidelines:

##### (a) Level 1

##### 1. Failure of the audit team to independently identify:

- Flaws in completed and accepted work important to safety or waste isolation which renders the work unuseable for its intended purpose. Denotes failure of the QA program to assure quality and failure of the QA program to verify quality, or
- A breakdown in the QA program resulting in multiple examples of the same or similar significant deficiencies over an extended period of time in more than one work activity (technical area), or
- Multiple deficiencies of the same or similar significant deficiencies in a single work activity (technical area), or

##### 2. Failure of the audit team to adequately assess a significant area of the QA program or its implementation, such as technical products, applicable Appendix B criteria, or quality level classifications, without prior justification, such that the overall effectiveness of the QA program being audited is made indeterminate.

##### (b) Level 2

Failure of the audit team to independently identify an isolated significant deficiency.

##### (c) Level 3

Failure of the audit team to independently identify deficiencies that have minor significance.

(d) Level 4

An observation of a practice of the audit team or audited organization which is acceptable but which could be improved to enhance the effectiveness of the program or a deficiency in the program of the audited organization identified by DOE or its contractor for which the staff requests additional information. Level 4 observations may or may not require a formal DOE response, but they will be examined by the staff in future audits or observation audits.

4.2 Scope of Audit

(a) The QA portion of the audit utilized checklists which covered the QA program controls in the F&S QAPP and the 88-9 QA Plan for the following programmatic elements:

- 1.0 Organization
- 2.0 QA Program
- 3.0 Scientific Investigation & Design Control
- 4.0 Procurement Document Control
- 5.0 Instructions, Procedures, Plans and Drawings
- 6.0 Document Control
- 7.0 Control of Purchased Items and Services
- 10.0 Inspection
- 12.0 Control of Measuring and Test Equipment
- 15.0 Control of Non-conforming Items
- 16.0 Corrective Action
- 17.0 QA Records
- 18.0 Audits

The scope of the audit is acceptable in that it covered the pertinent criteria of Appendix B for which F&S has responsibility. These programmatic elements were found acceptable by the NRC staff in their review of the F&S QAPP (ref. Linehan/Stein letter dated March 22, 1989).

(b) The audit did not cover the following programmatic elements for which F&S does not have any responsibility.

- 8.0 Identification and Control of Items, Samples and Data
- 9.0 Control of Processes
- 11.0 Test Control
- 13.0 Handling, Shipping and Storage
- 14.0 Inspection, Test and Operating Status

(c) The technical portion of the audit covered:

- o Technical qualification of design personnel
- o F&S technical staff understanding of the design control process
- o F&S technical staff understanding of procedural requirements as they pertain to design

- ° Procedural adequacy from a technical standpoint

#### 4.3 Timing of the Audit

The NRC staff believes the timing of this QA audit was appropriate based on the near term start of ESF Title II design activities and previously identified concerns with the F&S QA program.

#### 4.4 Examination of Technical Products

In general, the technical portion of the audit was performed very well. The technical auditors were qualified and well trained as auditors. The technical checklist was well prepared, and the questions pertained to important technical design issues. The auditors made a representative selection of the F&S designers to be interviewed. Specific questions were asked focusing on the design items important for site characterization or waste isolation. The technical audit team concentrated on two general areas:

##### (a) Design Control Process (Criterion 3)

The audit team systematically questioned the F&S managers on the understanding of the technical procedures to be used in Title II design work. Detailed technical questions focused on design input and output control and design verification.

##### (b) Qualification and Training (Criterion 2)

The audit team randomly selected and interviewed a sample of 7 designers to assess their qualifications and knowledge of design procedures. General technical questions from the checklist were asked to assess the designers' knowledge of the project design control documents and technical procedures. Other questions addressed their knowledge of design verification, design interfaces, and configuration management.

The NRC staff agrees with the audit team finding that the F&S designers are technically qualified and have a good understanding of the design technical procedures. It appears that the F&S design team has the necessary capabilities to commence technical work on the Title II design when so directed by DOE.

The NRC staff noted the importance of the technical interface and exchange of information between design engineers responsible for drilling and blasting for the exploratory shafts and those responsible for the assessment of the damaged zones during drilling and blasting. The NRC staff emphasized the necessity for implementing the procedures which ensure that feedback of information occurs during the drilling and blasting process to allow for modifications of the measuring and blasting techniques prior to

the next blast. This is identified as a Level 4 observation in Section 4.8.

The DOE audit team documented this NRC observation in a formal report to F&S which in turn was acknowledged by F&S at the exit meeting.

Since the YMPO was directed by DOE/HQ not to engage in Title II design activities, the staff requested F&S to identify those F&S design activities that have recently taken place or are ongoing that will support ESF Title II design work and to identify any design/engineering activity (recent or ongoing) which was or is under the control of the F&S QA Program. After additional discussions with the audit team and F&S and a review of F&S's response, the NRC staff concludes that F&S has not participated in any ESF Title II design work.

#### 4.5 Conduct of Audit

The overall conduct of the QA and technical portions of the F&S audit was effective and productive. The audit team was well prepared and demonstrated a sound knowledge of the QA and technical aspects of the F&S program. The audit checklists included the important QA controls addressed in the 88-9 QA Plan that are applicable to F&S (see Section 4.1.1). The audit team used the comprehensive checklists effectively during the interviews with F&S personnel. The team was persistent in their interviews, challenging certain F&S responses when necessary. The audit team findings were clearly presented using good examples to the F&S management during daily briefings. In particular, the audit team identified F&S procedural weaknesses in the resolution of disputes. In addition, there was a lack of understanding by some individuals in the QA and engineering groups of the hierarchy of QA and engineering procedures and responsibilities for implementing certain procedures. Since the QA organization is completely separate from the engineering organization, this may have contributed to an ineffective interface between the two organizations relative to the understanding and use of their respective procedures. The staff acknowledges F&S's recent appointment of a QA Project Manager and staff solely dedicated to the YMP to alleviate this problem. This should promote a better interaction between the QA and engineering organizations throughout the design activities.

Section 2.4.2 of the 88-9 QA Plan states, in part, "In all cases, the verification shall be completed prior to relying on the component, system or structure to perform its function." The DOE audit team believes that this could allow the ESF to be constructed and not have any design verification until just prior to use of the ESF. The NRC staff agrees with the audit team's observation of the inappropriateness of the extended timeliness allowed for design verification and recommended that NRC and DOE evaluate the merits of revising this requirement. (Level 4)

Since the F&S computer software QA program is presently under development and review by YMPO, the NRC staff believes that YMPO and F&S should continue to take the necessary and proper precautions to preclude engaging in Title II activities which require an approved software program.

#### 4.6 Qualification of Auditors

The qualifications of the QA auditors on the team were previously accepted by the NRC staff (ref. NRC Observation Audit Report for USGS dated August 22, 1988) or were acceptable based on QMP-02-02, the DOE procedure for qualifying auditors.

The training and qualifications of the technical specialists were evaluated by the NRC staff and found acceptable. The technical specialists recently received a two day training course keyed to the methods on how to conduct effective technical audits.

#### 4.7 Audit Team Preparation

The QA and technical auditors were well prepared in the areas they were assigned to audit and knowledgeable in the QAPP and implementing procedures. The audit plan overall was complete and included: (1) the audit scope; (2) a list of audit personnel and observers; (3) a list of all the audit activities; (4) a copy of the notification letter; (5) copies of the F&S QAPP, procedures, and past audit reports; and (6) copies of the QA and technical checklists. Implementing procedures were audited for compliance and QA and technical adequacy.

#### 4.8 Implementation of Audit

The overall conduct of the preaudit and postaudit conference by the audit team was acceptable. The daily audit team caucuses were conducted in a satisfactory manner. The lead auditor coordinated the audit in an acceptable manner. The audit team members did not have prior responsibility for the activities they evaluated. Members of the team appeared to have sufficient independence to carry out their assigned functions in a correct manner without adverse pressure or influence from F&S personnel.

#### 4.9 Summary of NRC Staff Observations

- (a) A technical information exchange is needed between personnel responsible for drilling/blasting and those assessing the resultant damaged zones of the ESF. (see Section 4.4) (Level 4)
- (b) Consideration should be given to revising the requirement in the 88-9 QA Plan which allows design verification to take place just prior to relying on a component, system or structure to perform its function. (see Section 4.5) (Level 4)

- (c) YMPO and F&S should continue to take the necessary precautions to preclude engaging in Title II activities without an approved software program. DOE should provide a formal response to this observation. (see Section 4.5) (Level 4)

#### 5.0 Summary - DOE/YMPO Audit Team Findings

The preliminary finding of the audit team is that the F&S QA and technical organizations and programs appear to be adequate to support the initiation of Title II design work, with the exception of those design activities which are immediately affected by the F&S software QA program (Note: prior to the audit it was understood by F&S and YMPO that the F&S software QA program is presently under review by DOE/YMPO).

Two minor deficiencies (one in document control and one in QA records) and nineteen observations were identified. Eleven of the observations were identified in the scientific investigation and design areas. These deficiencies and observations warrant the attention of F&S to initiate timely corrective actions in order to further enhance their QA program. The NRC staff will verify that these preliminary deficiencies identified by the audit team are incorporated into the DOE/YMPO audit report.

#### 6.0 Conclusions:

The DOE/YMPO QA audit team performed in an acceptable and effective manner. The audit checklists were of sufficient depth both in the QA and technical areas to allow DOE/YMPO audit team members and NRC staff to gain an understanding of the acceptability of the QA and technical programs and the qualifications and acceptability of the QA and technical staff. With the exception of the QA software program, the NRC staff is in general agreement that the QA and technical procedures and personnel are acceptable, but the staff will need to observe a DOE/YMPO QA surveillance and/or audit during implementation in order to determine if F&S has a fully satisfactory and qualified QA Program.