

U. S. NUCLEAR REGULATORY COMMISSION  
OBSERVATION AUDIT REPORT NO. 90-8  
FOR THE YUCCA MOUNTAIN PROJECT OFFICE  
AUDIT NO. 90-07 OF FENIX AND SCISSON OF NEVADA

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## 1.0 INTRODUCTION

From September 25 through 28, 1990, members of the U.S. Nuclear Regulatory Commission (NRC) staff participated as observers on the U.S. Department of Energy (DOE)/Yucca Mountain Project Office (YMPO) Quality Assurance (QA) Audit No. 90-07 of Fenix and Scisson (FSN) in Las Vegas, Nevada. FSN, a participant in the Yucca Mountain Project (YMP), is responsible for performing engineering analysis; developing drawings, specifications, and procurement documents; and other services such as geology, geophysical logging, and well cementing (pertaining to drilling and mining) related to surface-based site characterization and the exploratory shaft facility.

This report addresses the effectiveness of the DOE/YMPO audit and, to a lesser extent, the adequacy of the FSN QA program.

## 2.0 OBJECTIVES

The objective of the DOE/YMPO audit was to determine the effectiveness of the FSN QA program in meeting the applicable requirements of the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Quality Assurance Plan NNWSI/88-9 Revision 4 (88-9 QA Plan) for the YMP. The NRC staff's objective was to gain confidence that DOE and FSN are properly implementing the requirements of their QA programs by evaluating the effectiveness of the DOE/YMPO audit and determining whether the FSN QA program is in accordance with the requirements of the 88-9 QA Plan and 10 CFR Part 50, Appendix B.

## 3.0 SUMMARY AND CONCLUSIONS

The NRC staff based its evaluation of the DOE/YMPO audit process and the FSN QA program on direct observations of the auditors, discussions with the audit team, and reviews of the pertinent audit information (e.g., audit plan, checklists, and FSN documents). Although there was a limited amount of work being conducted by FSN under the QA program, the NRC staff has determined that, overall, DOE/YMPO Audit No. 90-07 of FSN achieved its purpose of determining the effectiveness of the FSN QA program. The audit was conducted in a professional manner, and the programmatic and technical portions of the audit were generally effective and well integrated. The audit team was well qualified in the QA discipline, and their assignment and checklist items were adequately described in the audit plan.

The NRC staff agrees with the preliminary finding of the audit team that FSN has an adequate QA program for the areas that were audited, and the FSN YMP QA program has sufficient controls in place to perform work related to site characterization and the exploratory shaft facility. The acceptability of the technical products reviewed by the audit team were not evaluated by the NRC staff since technical specialists were not a part of the NRC observation team. DOE must closely monitor the FSN program to ensure that future implementation is carried out in an adequate manner. The NRC staff expects to participate in this monitoring as observers and may perform its own independent audit at a later date to determine the adequacy and effectiveness of the FSN QA program.

#### 4.0 AUDIT PARTICIPANTS

##### 4.1 NRC

James T. Conway	Observer
John T. Buckley	Observer
Bruce Mabrito	Observer (Center for Nuclear Waste Regulatory Analyses)

##### 4.2 DOE

Frank J. Kratzfinger	Audit Team Leader	SAIC
Thomas J. Higgins	Lead Technical Specialist	SAIC

##### DOE

A. Edward Cocoros	Auditor	DOE/YMPO (MACTEC)
Neil D. Cox	Auditor	SAIC
Robert H. Klemens	Auditor	SAIC
Kenneth T. McFall	Auditor	SAIC
Richard C. Weeks	Auditor	SAIC
Edward M. Cikanek	Technical Specialist	DOE/YMPO (Harza)
Craig Walenga	Auditor-in-Training	CER Corporation
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##### 4.3 STATE OF NEVADA

Susan Zimmerman	Observer
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##### 4.4 CLARK COUNTY (NEVADA)

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#### 5.0 REVIEW OF THE AUDIT AND AUDITED ORGANIZATION

The DOE audit was conducted in accordance with procedures YMPO QMP 18-01, "Audit System for the Waste Management Project Office," Revision 3, and YMPO QMP 16-03, "Standard Deficiency Reporting System," Revision 1. The NRC staff observation of the DOE/YMPO audit was based on the NRC procedure "Conduct of Observation Audits" issued October 6, 1989.

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

##### (a) Level 1

Failure of the audit team to independently identify either:

- 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 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). Failure of the audit team to adequately assess a significant area of the QA program or its implementation, such as technical products, applicable 10 CFR Part 50, 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, or failure of the audit team to follow applicable audit procedures.

Level 1, 2 and 3 NRC staff observations require a written response from DOE to be resolved.

The NRC staff findings may also include weaknesses (actions or items which are not deficiencies but could be improved), good practices (actions or items which enhance the QA program) and requests for information required to determine if an action or item is deficient. Written responses to weaknesses identified by the NRC staff will be requested when appropriate.

In general, weaknesses and items related to requests for information will be examined by the NRC staff in future audits or surveillances.

5.1 Scope of Audit

The audit scope was to verify that the FSN QA program meets the requirements of the FSN QA Program Plan (QAPP), Revision 6 dated January 31, 1989, and to verify the adequacy of implementation of the QA program. The audit determined whether FSN had taken effective corrective actions to resolve findings identified during previous DOE audits and surveillances.

(a) Programmatic Elements

The programmatic portion of the audit utilized checklists based on the requirements in the 88-9 QA Plan, the YMPO Administrative

Procedures (APs), the QAPP, and FSN Quality Procedures (QPs). The checklists covered QA program controls for eight of the eighteen 10 CFR Part 50 Appendix B criteria.

Criteria IV, VII, VIII, IX, X, XI, XII, XIII, XIV, and XV of 10 CFR Part 50, Appendix B (Sections 4, 7, 8, 9, 10, 11, 12, 13, 14, and 15 of the 88-9 QA Plan and the QAPP) were not included in the scope of the audit since FSN currently is not performing activities in these areas. The NRC staff has accepted the eight programmatic elements addressing Appendix B criteria in their review of the QAPP (ref. Linehan/Stein letter dated October 24, 1989).

(b) Technical Areas

Technical activities engaged in by FSN were limited, and only two activities were selected by DOE/YMPO to be reviewed during the audit. The activities included alternative studies for the exploratory shaft facility (ESF) and Study Plan 8.3.1.14.2 x for Soil and Rock Properties of Locations of Surface ESF. The technical checklists were developed from information contained in FSN monthly Project Status Reports and Technical Procedures (TPs). The technical specialists were instructed to include the following areas in their evaluations:

- Technical qualifications of scientific investigators and design personnel;
- Understanding of procedural requirements as they pertain to scientific investigation and design control activities; and
- Adequacy of technical procedures.

5.2 Timing of the Audit

The NRC staff believes the timing of the QA audit was appropriate. FSN had made a number of improvements in their QA program in the last year, and even though implementation was limited, it was beneficial to assess the adequacy of the improvements to date.

5.3 Examination of Programmatic Elements

The DOE/YMPO programmatic checklists covered the QA program controls for the eight elements listed below:

- 1.0 Organization
- 2.0 Quality Assurance Program
- 3.0 Scientific Investigation Control and Design Control
- 5.0 Instructions, Procedures, Plans, and Drawings
- 6.0 Document Control
- 16.0 Corrective Action
- 17.0 Records
- 18.0 Audits

The NRC staff observed the audit team's evaluation of selected programmatic elements of the QAPP. Since only some elements of the QA program were observed, the details of unobserved program deficiencies identified by the DOE/YMPO audit team will not be addressed in this report.

(a) Organization (Criterion 1)

The DOE auditors utilized the published audit checklists and were thorough in reviewing objective evidence presented. The auditors utilized in-depth questioning and interviewed the FSN Director of QA Engineering to obtain his description of the FSN organizational structure and the responsibilities of persons and organizations performing quality affecting activities.

The auditors reviewed Procedure PP-10-00, "YMP Organization" and three organizational charts dated May 1990 and verified that the responsibilities of the organizational elements depicted thereon including individuals from Parsons-Brinckerhoff working on the YMP were covered by the FSN QA program. The organizational structure of FSN will be changed in the near future when FSN and Holmes & Narver (HN) are merged into Ratheon Services Nevada (RSN) in November 1990. FSN has sold their operations in Tulsa, OK.

RSN will be the architect/engineer for the YMP and will be responsible for subsurface and surface activities. It is planned that RSN will have a QA Manager who will report to a QA Director at Las Vegas along with other QA Managers in RSN responsible for activities on Johnson Island, Tonopah Test Range, and the Nevada Test Site. RSN's QA organization will have approximately ten individuals.

It was noted that Item No.1-4 of the YMPO checklist No. 90-07-1 included six detailed questions which addressed Stop Work Orders (SWO). The Director of QA Engineering stated that FSN has never issued a SWO. It would appear that this issue should have been identified during the pre-audit scoping trip, and the item should never have been on the checklist.

Based on the depth of questioning and satisfactory completion of the audit checklist, the auditors adequately reviewed and evaluated the FSN organizational structure for compliance to the 88-9 QA plan and the QAPP.

(b) Quality Assurance Program (Criterion 2)

The evaluation of personnel qualification, indoctrination and training was restricted by the Privacy Act limitations to interviews with the Director of QA Engineering, Personnel Administrator, and the Senior Quality Engineering Coordinator. Position Descriptions (PD) for 10 individuals selected from the organization charts were reviewed. The PDs, which are approved by the Project Design Manager and the Senior Project Manager for YMP (i.e., TPO), contained sections addressing Basic Function, Duties/Responsibilities, Minimum Education, and Minimum Experience Required. The proficiency requirements of individuals are documented on Personnel Qualification Evaluation (PQE) forms. The PQEs

are checked and verified on an annual basis by the Director Human Resources and the TPO. The PQEs for 11 individuals who worked on the ESF Alternative Study were reviewed and found acceptable. The Manager of Administration indicated that personnel records, which include among other things a resume and performance reviews, could not be released due to the Privacy Act.

The auditors reviewed the QA Training Records which consisted only of Self-Study Records (SSR). On the SSR, an individual acknowledges that he or she has read and is cognizant of the requirements of the information contained in a document (i.e., regulation/procedure) that applies to their work assignment. Although the training coordinator was let go in December 1989 when the FSN training budget was reduced to zero, there will be a full-time training coordinator under RSN.

It was noted that FSN waived the QA Training/Indoctrination for outside consultants who performed the Management Assessment (MA) of FSN in 1990 because they did the MA in 1989 and were previously indoctrinated into the FSN QA program. In addition, checklist Items 2-1 and 2-8 addressed Readiness Reviews (RR) and Nondestructive Examination (NDE) Personnel Qualification and Certification, respectively, but cognizant FSN management indicated that FSN has never done RRs or any NDE work. This appears to be a similar concern as discussed under Criterion 1.

When RSN assumes control on November 5, 1990, the HN QA program will be factored into the FSN QA program to meet the requirements of DOE's Quality Assurance Requirements Document.

Based on the extent of the checklist and depth of the evaluation, the audit of Criterion 2 appeared to be effective, and the implementation by FSN appeared to be adequate.

(c) Scientific Investigation Control (Criterion 3)

Computer software documentation and control were audited using the programmatic checklist which included requirements from the FSN Software QA Plan (SQAP, Revision 0) and implementing procedures (PP-80-series). Since the procedures had only recently been issued, overall implementation was not sufficient to determine the effectiveness of the quality system in this area. There was adequate verification of objective evidence by the auditor to prove some utilization of the procedure. The auditor was familiar with the procedures under evaluation and applicable programmatic requirements and asked pertinent questions of the FSN representative. Hardware or software certifications had not taken place at FSN at the time of this audit. Compliance with the computer software storage requirements was verified.

The software QA audit was able to determine the adequacy of QA controls, but due to the lack of implementation of the software program and quality-affecting technical work not having taken place, the auditor was unable to determine the effectiveness of implementation of the software QA program.

(d) Document Control (Criterion 6)

The audit checklist items (i.e., "Standard Quality Requirements Audit Guidelines" (SQRAG)) were appropriate, comprehensive, and adequate for the purpose of the audit. The auditor was extremely thorough in his approach and carefully reviewed the objective evidence to ensure compliance with the FSN policy and implementing procedures. The FSN Document Control system appeared to be effectively implemented.

(e) Corrective Action (Criterion 16)

The auditor utilized a detailed checklist and pursued all areas listed in the SQRAG. The process of interviewing the cognizant FSN individual and requesting objective evidence as proof of accomplishment of the requirement was utilized throughout. Since Corrective Action Requests (CARs) had not been initiated by FSN, implementation could not be evaluated. However, the auditor checked the Deficiency Reports to determine if they may have been candidates for upgrade to CAR status and found none. The conduct of this portion of the audit appeared to be effective, and the FSN implementation of corrective action controls appeared to be satisfactory. As previously noted under Criterion 1, the checklist for this criterion contained seven questions addressing CARs, but no CARs were issued.

(f) Audits (Criterion 18)

The DOE auditors used their audit checklist as the basis for reviewing internal audit files and for discussions with QA personnel. The auditors interviewed cognizant FSN personnel, selected an adequate sample size, reviewed objective evidence, and documented their verifications. The internal audits were performed by persons independent of the tasks being audited. A review of the records indicated that the internal audits (one in 1989 and two in 1990) were conducted by individuals who were certified to be Lead Auditors. The audit files contained a Quality Audit Checklist, Audit Plan (approved by Audit Team Leader and Manager of QA), Audit Guide for Technical Specialists, Audit Report, and Deficiency Reports. The FSN program of internal audits appears to be well planned and implemented and generally effective. The audit of this area was thorough and professional in nature, emphasizing the use of objective evidence to support statements made by FSN QA personnel.

(g) Conclusions

The programmatic audit of the FSN QA program evaluated the degree of compliance to the 88-9 QA Plan, the QAPP and applicable implementing procedures. The audit utilized appropriate checklist questions and in-depth interviews to obtain the required information in evaluating the FSN QA program. The daily caucuses held by the audit team provided good interaction between the technical and programmatic auditors.

The audit of the elements observed was conducted in a professional and effective manner. Because of the recent release of 13 software procedures

and the limited time to implement them, the software QA program remains indeterminate regarding implementation. The audit checklists were thorough, although more complete scoping prior to the audit might have eliminated some of the audit questions. The management of the audit team was effective, and the formal interfaces with the YMPO and FSN organizations were appropriate.

The observations were well substantiated and conclusions regarding effectiveness were appropriate. FSN personnel appeared to be competent and knowledgeable of QA requirements and responsibilities. In general, the FSN YMP QA program is adequate and effective to the degree that it has been implemented.

#### 5.4 Examination of Technical Products

The audit team technical specialists reviewed the technical areas listed below:

- ° Alternative studies for the exploratory shaft facility, and
- ° FSN Study Plan 8.3.1.14.2. x Study Plans for Soil and Rock Properties of Locations of Surface ESF.

Programmatic and technical review checklists were developed from the requirements presented in QAPP-002, Rev.6 and DC-03. The checklists were adequate, and both the auditors and technical specialists were familiar with the procedures being reviewed. The audit of the ESF Alternative Study and study plan resulted in the identification of one observation. The procedures require that the study plans be independently reviewed by FSN to assure technical adequacy and inclusion of appropriate quality requirements. Although the study plan was reviewed, it was determined to be ineffective in that the reference list contained several incorrect or outdated references. However, with regard to Criterion 3, the audit team found that the activities conducted by FSN met the procedural requirements, and the procedures were effectively implemented. Although, the work done by FSN in the ESF Alternative Study was found to be technically adequate by the audit team, the NRC staff could not confirm these conclusions as the NRC observation team did not include any technical specialists.

Although the NRC observers agree with the preliminary findings of the audit team, it appears that the technical specialist may have been too closely involved with Study Plan 8.3.1.14.2. x to be completely independent and non-biased. On several occasions the technical specialist made reference to knowing the answer to checklist questions prior to asking them. In general, the NRC observers believe that the audit team was well prepared and conducted an effective audit in this area.

#### 5.5 Conduct of Audit

The overall conduct of the QA and technical portions of the FSN audit was productive and performed in a professional manner. The audit team was

well prepared and demonstrated a sound knowledge of the QA and technical aspects of the FSN program. The audit checklists included the important QA controls addressed in the 88-9 Plan that are applicable to FSN. The audit team used the comprehensive checklists effectively during the interviews with FSN personnel and review of documents. In general, the team was persistent in their interviews, challenging certain FSN responses when necessary. The integration of the technical and programmatic portions of the audit was effective.

#### 5.6 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 YMPO procedure for qualifying auditors.

The Lead Technical Specialist for this audit also acted as the Lead Technical Specialist on Audit 90-05 of the United States Geological Survey, and was evaluated as qualified by the NRC technical staff who participated in that audit.

#### 5.7 Audit Team Preparation

The QA auditors and technical specialist were well prepared in the areas they were assigned to audit and knowledgeable in the QAPP and FSN implementing procedures. Overall Audit Plan 90-07 was complete and included: (1) the audit scope; (2) a list of audit team personnel and observers; (3) a list of all the audit activities; (4) the audit notification letter; (5) the QAPP, and past audit report; and (6) the QA and technical checklists.

#### 5.8 Audit Team Independence

With the possible exception of the technical specialist (see Section 5.4), the audit team members did not have prior responsibility for performing the activities they investigated. 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 FSN personnel.

#### 5.9 Review of Previous Audit Findings

- (a) No deficiencies were identified in the April 1989 QA audit. At the time of the audit all Standard Deficiency Reports (SDRs) from previous surveillances had been closed.
- (b) The NRC observations resulting from the 1989 audit were resolved prior to this audit.
- (c) The State of Nevada did not have any previous observations requiring resolution.

## 5.10 Summary of NRC Staff Findings

### (a) Observations

- The NRC staff did not identify any observations relating to deficiencies in either the DOE/YMPO audit process or the FSN QA program.

### (b) Weakness

- Audit preparation by the audit team should be revisited to examine the "scoping issue" as to why extraneous audit checklist items (e.g., SWO, RR, NDE and CAR) were included in the audit when no work or activities had occurred in these areas since the last audit in April 1989.
- There is a commitment in the 88-9 QA Plan for the YMPO to perform annual audits, but this limited scope audit of FSN was conducted approximately 17 months after the last YMPO audit of FSN.
- The independence of the technical specialist as it pertained to the review of Study Plan 8.3.1.14.2.x is questionable.
- Two FSN individuals who were primarily responsible for the ESF Alternative Study were not available to provide needed information for the audit.
- Although DOE has verbally agreed to evaluate earlier observations, the DOE audit procedure(s) does not explicitly require that previous NRC and State of Nevada findings be reviewed to determine the scope of the audit.
- Access to personnel qualifications was not permitted due to the Privacy Act limitations.
- The effectiveness of computer software controls could not be determined due to a lack of implementation of technical activities under the software procedures which were only recently approved.

### (c) Good Practices

- Improved performance in coordinating the QA programmatic and technical evaluations simultaneously to allow the integration of these two aspects of the audit.
- The audit team was well prepared and conducted a thorough audit in a professional manner.

**5.11 Summary - DOE/YMPO Audit Team Findings**

During the course of the audit, the audit team did not identify any deficiencies in the FSN QA program, but did identify four observations in the areas of QA Program (2), Scientific Investigation Control and Design Control, and Document Control. The observations were well substantiated and reflected issues important to the quality system.