



WM DOCKET CONTROL CENTER

*Teak*

Department of Energy  
Chicago Operations Office '86 OCT 14 P2:2  
Salt Repository Project Office  
505 King Avenue  
Columbus, Ohio 43201-2693  
Commercial (614) 424-5916  
F.T.S. 976-5916

September 24, 1986

Mr. Thomas O. Mallonee, Jr.  
Project Manager  
Fluor Technology, Inc.  
Advanced Technology Division  
3333 Michelson Drive, F2X  
Irvine, CA 92730

Dear Mr. Mallonee:

SUBJECT: DOE-SRPO QA AUDIT OF FLUOR'S QA PROGRAM AUDIT NO. FLUOR-86-11-E  
CONTRACT NUMBER DE-AC02-83WM46656

The attached report presents the results of the subject audit conducted at your facility on August 26-28, 1986. The results of the audit were discussed with Fluor representatives at the postaudit meeting on August 28, 1986.

The cooperation, responsiveness, and the courtesies extended by your personnel during the conduct of the audit and during the postaudit meeting are noted and greatly appreciated.

It is requested that you reply to this report within 30 days of receipt. Your reply shall be addressed to the SRPO Chief, Quality Assurance and shall identify the (1) root cause of the problem, (2) the actions to be taken to correct the reported finding and observations, (3) the actions to be taken to preclude recurrence of similar deficiencies, and (4) a schedule for completion of all involved actions. Please provide your responses on the attached Audit Action Reports.

WM Record File 106 WM Project 16  
Docket No. \_\_\_\_\_  
PDR   
LPDR

8610220427 860924  
PDR WASTE PDR  
WM-16

Distribution: J Linehan  
M Delligatti J Kennedy  
RDM S Pithorn  
(Return to WM, 623-SS) D Hedges Sac  
G Ankrum

14/46

September 24, 1986

If you have any questions, please contact me at (614) 424-5916.

Sincerely,

*for Dennis Anderson*  
T.J. Reese  
Chief  
Quality Assurance  
Salt Repository Project Office

SRPO:TJR:max:1297SS

Enclosure:  
As Stated

cc: J. Neff, SRPO  
R. Wunderlich, SRPO  
R. Lahoti, SRPO  
L. Parys, SRPO  
K. Robinette, SRPO  
D. Anderson, SRPO  
M. Langston, HQ, RW-43  
C. Newton, HQ, RW-23  
M. Flannigan, DOE-CH  
L. Ibe, Weston  
J. Fitch, Fluor/Cols.  
T. Verma, NRC  
J. Berg, ONWI  
C. Williams, BPMD  
F. Hood, BPMD  
I. Lefman, BPMD  
F. Carpenter, Fluor/Irvine

QA# 258-86

**DOE**  
**SALT REPOSITORY PROJECT OFFICE**  
**(SRPO)**  
**QUALITY ASSURANCE AUDIT REPORT**  
**NO. FLUOR-86-11-E**

**OF**

**FLUOR TECHNOLOGY, INC.**  
**3333 MICHELSON DRIVE, F2X**  
**IRVINE, CALIFORNIA 92730**

**AUDIT DATES**  
**AUGUST 26 THROUGH 28, 1986**

## EXECUTIVE SUMMARY

An audit of Fluor Technology Inc. was conducted on August 26-28, 1986, in their Irvine, California facilities. The purpose of the audit was to evaluate the effectiveness of the QA Program supporting the ongoing nuclear waste repository activities. QA programmatic and technical aspects were evaluated during this audit.

In general, it was concluded by the Audit Team that Fluor has an effective QA Program for their current phase of activities as identified in their Statement of Work.

The Audit Team noted that Fluor personnel were knowledgeable and supportive of the QA program; QA records were adequately controlled and maintained; and internal QA audits were adequately performed and in-depth; however, some weaknesses were noted in the auditing program.

The Audit Team found where some of the audited activities were not in full compliance with Fluor's quality assurance procedures; some deficiencies were noted in the indoctrination, training and qualification program; and the QA program was not in total compliance with the NRC Review Plan. The results of the audit were summarized into four deficiency areas for Fluor's evaluation and corrective action.

Audit No.: FLUOR-86-11-E

Organization Audited: Fluor Technology, Inc.

Dates of Audit: August 26-28, 1986

Purpose:

The audit was conducted to evaluate the effectiveness of the QA program, and evaluate the programmatic and selected technical activities within the current phase of the project.

Audit Team & Scope

The audit team consisted of J. Lefman - Lead Auditor, BPMD; C. Newton - Auditor, DOE-HQ; C. Williams, Jr., - Auditor, BPMD; D. Anderson - Auditor, DOE-SRPO; J. Berg - Technical Observer, ONWI; K. Robinette - Technical Observer, DOE-SRPO; T. Verma - Observer, NRC; and C. Walenga - Observer, NRC. The audit focused primarily on the following technical areas: independent technical reviews, calculations, computer code verification, and review of drawings and engineering sketches. The following QA program areas were also evaluated: indoctrination, training, and qualification program; procurement document control; procedures and instructions; document control, subcontractor control, nonconformance control, corrective action, QA records, and audits.

Involved Personnel

A pre-audit meeting was held to introduce the audit team members, discuss the content and schedule of the audit, and to provide Fluor management with an opportunity to ask questions regarding the audit. Attachment 1 is a listing of those individuals who attended either the pre-audit and/or postaudit meeting(s), and/or were contacted during the course of the audit.

### QA Program Effectiveness

With the exception of one finding and three observations noted on Audit Action Reports (AAR) No. 1 through 4, the audit team concluded that Fluor has an effective QA program for the current phase of activities audited. Personnel contacted appeared to be knowledgeable of QA programmatic requirements and supportive of the QA program. Selected QA records were retrievable and adequately protected; the QA manual and procedures were adequately controlled and maintained; internal audits performed by QA personnel were of an in-depth nature (with some weaknesses noted).

### Audit Results

The audit was conducted to verify that Fluor has implemented an effective QA program applicable to their current phase of activities as defined in their Scope of Work. The audit focused on QA programmatic activities (e.g., audits) and selected technical activities such as internal technical reviews of engineering study reports, computer software activities that support deliverable documentation, and generation and review of calculations.

The audit team noted that Fluor management exhibited support of the QA program, with top management attendance at both the audit team's preaudit and postaudit conferences.

The team noted deficiencies in the QA programmatic area for the following reasons:

- The Fluor QA Manual and Morrison-Knudsen (M-K) QA Manual do not meet NRC Review Plan requirements even though a letter from Fluor had stated otherwise. Also, Fluor had not maintained current status of the flow down requirements for M-K to update their QA program to meet the NRC Review plan; this was identified as AAR No. 1.
- Several deficiencies were observed for indoctrination and training of personnel in that:
  - a. Evidence did not exist to indicate that line management is sufficiently involved in the establishment of training objectives and requirements.
  - b. Documentation problems were observed in the training records.
  - c. Personnel are working on quality-affecting activities even though training has not been completed in all cases.
  - d. Training requirements are not clearly identified.

This was identified as AAR No. 2.

- Weaknesses were identified in QA audit system in that:
  - a. Checklists were not always properly completed.
  - b. All active elements of the QA program had not been scheduled in the Revision 5 Audit Schedule to be audited.
  - c. An independent QA audit of Fluor's subcontractor's activities had not been scheduled.
  - d. An audit needs to be scheduled in order to complete all the checklist items identified in one (i.e., SAIC) of the internal audits.

This was identified as AAR No. 4.

Within the technical areas audited it was noted that calculations had been adequately performed and checked, computer software activities had been adequately performed and documented, and the independent technical reviews were adequate. However, a problem was identified in the technical review area for the following reasons:

- a. The selection criteria for reviewers and the method to demonstrate the qualification of the reviewers for the various types of reviews conducted are not adequately defined in the procedures.
- b. The procedure requires clarification to establish the rationale for selection of single vs. multiple reviewers.
- c. Procedures 6.8 and 6.12 need to be reviewed and revised as necessary to eliminate redundancies.

This was identified as AAR No. 3.

The audit resulted in a total of one finding and three observations which are attached for Fluor's evaluation, response, and action.

More details can be found in the attached Audit Action Reports.

The audit team commented on the following:

It appears that the Fluor QA Manager may be involved in too many activities that more appropriately belong to the Line Manager such as answering and tracking actions in response to the Management Assessment that was conducted in December 1985, conducting and documenting training sessions, establishing document control and receipt acknowledgements for the Fluor QA Manual, and reviewing QA records. This area, of concern should be evaluated for possible reassignment of responsibilities.

**DEFINITIONS**

Finding - An audit finding is a lack of compliance with any element of the quality assurance program including applicable codes, standards or specifications required by DOE-SRPO on this contract or contractor prepared documents which have been accepted by DOE-SRPO.

Observation - An observation is a program weakness or practice that is not necessarily related to a specific contractual requirement, but which could lead to a more serious deficiency if not corrected. An observation does not necessarily constitute a lack of compliance with applicable QA requirements.

\* \* \* \* \*

Prepared by: *I. J. Lefman* Date *08/19/86*  
I. J. Lefman, Lead Auditor, BPMD

Approved: *T. J. Reese* Date *9/19/86*  
T. J. Reese, Chief, Quality Assurance, SRPO



**SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)**

**AUDIT ACTION REPORT**

PAGE 1 OF 2

FINDING

OBSERVATION

CAUSE CODE

AUDIT NUMBER FLUOR-86-11-E

AAR NUMBER 86-11-E-01

AUDITOR

AUDITED ORGANIZATION Fluor Technology, Inc.

LOCATION Irvine, California

ACTIVITY Conceptual Design of Repository in Salt

REQUIREMENT(S)  
Compliance with applicable criteria of the NRC Review Plan, QA programs for Site Characterization of High Level Waste Repositories.

NONCONFORMANCE (SEE CONTINUATION SHEET)

DEF. CODE  
TBP

AUDI-TEE

DISCUSSED WITH/s/ T. O. Mallonee

AUDITOR

SIGNIFICANT CONDITION ADVERSE TO QUALITY?

YES

NO

CAR ISSUED? YES  NO

CAR NUMBER \_\_\_\_\_

PREPARED BY /s/ C. Williams, Jr. *C. Williams, Jr.* DATE 08/28/86

AUDITEE

CORRECTIVE ACTION PROPOSED AND/OR IMPLEMENTED (Including scheduled completion date, action to prevent recurrence, and root cause of the nonconformance)

CAUSE CODE  
1

AUTHORIZED REPRESENTATIVE \_\_\_\_\_ DATE \_\_\_\_\_

AUDITOR

CLOSED BY \_\_\_\_\_ DATE \_\_\_\_\_



SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)

AUDIT ACTION REPORT  
CONTINUATION SHEET

PAGE 2 OF 2

AAR NUMBER 86-11-E-01

AUDIT NUMBER FLUOR-86-11-E

ITEM

Reference: Letter dated March 6, 1985, Louis A. Parys, SRPO to Thomas O. Mallonee, Jr., Fluor.

The referenced letter directed Fluor to incorporate the applicable criteria of the NRC Review Plan, QA Programs for Site Characterization of High Level Waste Repositories into their QA program.

Observations made by the Audit Team during this audit indicate that there are some areas of the Fluor QA Program which are not in full compliance with applicable portions of the Review Plan. These areas included the following:

- Section 2.8 ● Lack of a documented personnel Qualification Program.
- Section 1.12 ● Lack of specific provisions for the QA organization to have "Stop Work Authority."
- Section 1.1.3 ● No specific provisions for the resolution of disputes arising from differences of opinion between QA personnel and other department personnel.
- Section 2.8 ● Provisions for management to monitor the performance of individuals involved in activities affecting quality.

It was also not apparent to the Audit Team that Fluor has taken effective action to assess that M-K revises their QA Program to fully meet the NRC Review Plan. M-K has not submitted any status plans to indicate when their QA Program will be revised.

The Audit Team acknowledges that Fluor is in the process of evaluating their QA Program against the criteria of the NRC Review Plan. A completion date for the accomplishment of this work and the subsequent revision of affected QA program documents needs to be established.



**SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)**

**AUDIT ACTION REPORT**

PAGE 1 OF 2  
FINDING   
OBSERVATION

CAUSE CODE  
AUDIT NUMBER FLUOR-86-11-E  
AAR NUMBER 86-11-E-02

AUDITOR

AUDITED ORGANIZATION Fluor Technology, Inc.  
LOCATION Irvine, California  
ACTIVITY Conceptual Design of Repository in Salt

REQUIREMENT(S) NQA-1 Basic Requirement 2; NRC Review Plan, Section 2.7  
"Indoctrination and Training of Personnel"

NONCONFORMANCE (SEE CONTINUATION SHEET)

DEF. CODE  
TBP

AUDITEE

DISCUSSED WITH /s/ T. O. Mallonee

AUDITOR

SIGNIFICANT CONDITION ADVERSE TO QUALITY?  
YES  NO

CAR ISSUED? YES  NO   
CAR NUMBER \_\_\_\_\_

PREPARED BY /s/ C. Williams, Jr. *C. Williams Jr.* DATE 08/28/86

AUDITEE

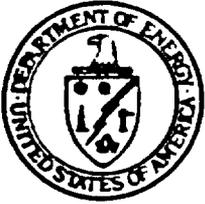
CORRECTIVE ACTION PROPOSED AND/OR IMPLEMENTED (including scheduled completion date, action to prevent recurrence, and root cause of the nonconformance)

CAUSE CODE  
|

AUTHORIZED REPRESENTATIVE \_\_\_\_\_ DATE \_\_\_\_\_

AUDITOR

CLOSED BY \_\_\_\_\_ DATE \_\_\_\_\_



SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)

AUDIT ACTION REPORT  
CONTINUATION SHEET

PAGE 2 OF 2

AAR NUMBER 86-11-E-02

AUDIT NUMBER FLUOR-86-11-E

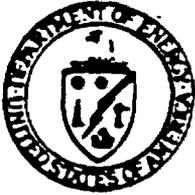
ITEM

The Audit Team observed several deficiencies in the Fluor Program for the Indoctrination and Training of Personnel.

It should be noted that deficiencies in this area were observed during the last SRPO Audit and in the Management Assessment performed in December 1985. The observations made by the Audit Team during this audit indicate that the Corrective Actions taken to date have not been effective in completely correcting the concerns of the SRPO audit team and the Fluor Management Assessment Team.

Specific Observations made by the Team are shown below:

- (a) Training requirements are not really being determined by line management and line managers are not sufficiently involved in the establishment of training objectives and requirements for individual employees. The current practice of having the QA Manager establish requirements and then circulate these to the line managers for comment is not sufficient involvement.
- (b) The training records now indicate that training has been received by the employees based on a questionnaire sent to them by the QA Manager. In some instances there is no documentation that the training has actually been received. There are no files for individual training records which makes retrieval difficult.
- (c) People who have not been trained are permitted to continue working on activities important to quality. The training requirements have no "teeth" in them.
- (d) Training requirements are not clear in that sometimes portions of a document are identified as being needed, yet the required portions are not identified.



**SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)**

**AUDIT ACTION REPORT**

PAGE 1 OF 2

FINDING

OBSERVATION

CAUSE CODE

AUDIT NUMBER FLUOR-86-11-E

AAR NUMBER 86-11-E-03

AUDITOR

AUDITED ORGANIZATION Fluor Technology, Inc  
 LOCATION Irvine, California  
 ACTIVITY Conceptual Design for Repository in Salt

REQUIREMENT(S) Document Reviews - Procedures 6.8 and 6.12 - all engineering study reports, drawings, specifications, and calculations shall undergo independent technical review and design review.

NONCONFORMANCE (SEE CONTINUATION SHEET)

DEF. CODE  
TBP

AUDITEE

DISCUSSED WITH /s/ T. O. Mallonee

AUDITOR

SIGNIFICANT CONDITION ADVERSE TO QUALITY?

YES

NO

CAR ISSUED?

YES

NO

CAR NUMBER \_\_\_\_\_

PREPARED BY /s/ J. Berg/C. Williams, Jr.

DATE 08/28/86

AUDITEE

CORRECTIVE ACTION PROPOSED AND/OR IMPLEMENTED (Including scheduled completion date, action to prevent recurrence, and root cause of the nonconformance)

CAUSE CODE  
|

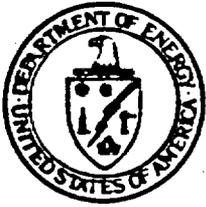
AUTHORIZED REPRESENTATIVE \_\_\_\_\_

DATE \_\_\_\_\_

AUDITOR

CLOSED BY \_\_\_\_\_

DATE \_\_\_\_\_



SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)

AUDIT ACTION REPORT  
CONTINUATION SHEET

PAGE 2 OF 2

AAR NUMBER 86-11-E-03

AUDIT NUMBER FLUOR-86-11-E

ITEM

Several weaknesses were noted in the internal review process of engineering study reports:

- (a) The selection criteria for reviewers and the method to demonstrate the qualification of the reviewers for the various review functions-committee reviews, independent technical reviews, multidisciplinary reviews, must be formalized. The supporting documentation should be maintained as part of the package, or readily identifiable, traceable, and retrievable.
- (b) The procedure should be clarified to establish the rationale for making a decision on the correct number of personnel (single vs. multiple reviewers) to participate in the independent technical review process.
- (c) Procedures 6.8 and 6.12 should be reviewed and revised as necessary to eliminate redundancies, conflicts, and to combine into a single procedure which provides the necessary direction to complete these reviews.



**SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)**

**AUDIT ACTION REPORT**

PAGE 1 OF 2

FINDING

OBSERVATION

CAUSE CODE

AUDIT NUMBER FLUOR-86-11-E

AAR NUMBER 86-11-E-04

AUDITOR

AUDITED ORGANIZATION Fluor Technology, Inc.

LOCATION Irvine, California

ACTIVITY Conceptual Design of Repository in Salt

REQUIREMENT(S) Fluor QA Manual, Section 18, Paragraph 18.2.1, states in part that audits of Fluor Technology, Inc. and participating subcontractor task force team will be performed on a regularly scheduled basis.....

NONCONFORMANCE (SEE CONTINUATION SHEET)

DEF.  
CODE  
TBD

AUDI-  
TEE

DISCUSSED WITH /s/ T. O. Mallonee

AUDITOR

SIGNIFICANT CONDITION ADVERSE TO QUALITY?

YES

NO

CAR ISSUED? YES  NO

CAR NUMBER \_\_\_\_\_

PREPARED BY /s/ I. J. Lefman *[Signature]* DATE 08/28/86

AUDITEE

CORRECTIVE ACTION PROPOSED AND/OR IMPLEMENTED (Including scheduled completion date, action to prevent recurrence, and root cause of the nonconformance)

CAUSE  
CODE  
1

AUTHORIZED REPRESENTATIVE \_\_\_\_\_ DATE \_\_\_\_\_

AUDI-  
TOR

CLOSED BY \_\_\_\_\_ DATE \_\_\_\_\_



SALT REPOSITORY  
PROJECT OFFICE  
(SRPO)

AUDIT ACTION REPORT  
CONTINUATION SHEET

PAGE 2 OF 2

AAR NUMBER 86-11-E-04

AUDIT NUMBER FLUOR-86-11-E

ITEM

Some weaknesses were noted in the internal QA audit program as follows:

- (a) In the checklists reviewed for audits SP-01-86, SP-02-86, it was noted that audit results blocks were not identified, but left blank. This caused problems in correlating the statements made with the findings and observations that were identified in the audit report. Some important comments were stated which indicated unsatisfactory conditions in Audit Report SP-01-86, but were not identified in the audit report.
- (b) Audits need to be scheduled to cover all active elements of the QA program. After reviewing the audit schedule Rev. 5, dated July 11, 1986, it was noted that there was no scheduled audit to cover Fluor independent technical review activities. Audit SP-02-86 had one question on squad check activities, but this was not determined to be sufficient.
- (c) There was no independent audit of Morrison-Knudsen (M-K) activities scheduled to date. Although the QA Manager participated in an internal audit of M-K, this does not meet the requirements for conducting external audits of contractors.
- (d) An audit needs to be considered for conduct at Science Applications International Corporation's office in San Leandro, California, to complete the audit checklist of a previous internal audit computer software verification activities.

PERSONNEL CONTACTED

A. Sacker	1,3	Fluor	Vice President and Division Manager
T. Mallonee	1,3	Fluor	Project Manager
E. R. Phillips	1,3	Fluor	Area Manager
W. C. Brown	1,3	Fluor	Area manager
B. Griffin	1,2,3	Fluor	Engineering Manager
B. Lee	1,2,3	Fluor	Records Manager
F. Carpenter	1,2,3	Fluor	Quality Assurance Manager
B. Leonard	1,2,3	Fluor	Quality Assurance
V. Pierce	1,2,3	Fluor	Nuclear Technology
D. Josselyn	1,2,3	ESD	Industrial Engineering
H. May	3	Fluor	Coordinator
J. Parish	1,2,3	Fluor	Contracts Manager
M. de la Puente	1,2,3	Fluor	Repository Area Manager
E. Parente	1,3	Fluor	President FTI
J. Arbital	1,2,3	SAIC	Project Engineer
H. Koza	2,3	Fluor	Structural Engineer
P. Solberg	2,3	WCC	Geologist
R. Nelson	1,2,3	WCC	Geotechnical Manager
R. Miller	1,2,3	Fluor	Report Coordinator
H. Rahmani	1,2,3	Fluor	RAM/PRA Engineer
L. Peterson	3	Fluor	Project Secretary
J. Clark	1,2,3	Fluor	Deputy Project Manager
M. Klein	1,2,3	Fluor	Project Controls Manager
J. Tinucci	2	SAIC	
B. Johnson	2,3	Fluor	Process Engineer
V. Hawkinson	2,3	Fluor	Information/Records Specialist
N. Greenberg	1	Fluor	Piping Engineer
H. Kortnicki	1	Fluor	Mechanical Engineer
M. Fortsch	1	Fluor	Nuclear Technology
A. Kint	1	ESD	Project Manager IE&ME
C. Rhee	1	Fluor	Process Engineer
D. Sharp	1	Fluor	HVAC

---

1 = Attended preaudit conference.  
 2 = Contactd during audit.  
 3 = Attended postaudit conference.