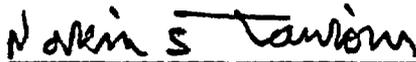
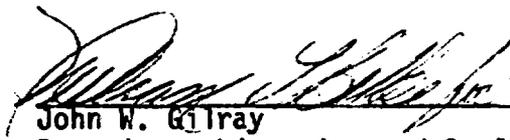


U. S. NUCLEAR REGULATORY COMMISSION  
OBSERVATION AUDIT REPORT NO. 89-3  
FOR THE YUCCA MOUNTAIN PROJECT OFFICE  
AUDIT NO. 89-2 OF HOLMES AND NARVER

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SUMMARY

The Nuclear Regulatory Commission (NRC) staff concluded that the overall Department of Energy/Yucca Mountain Project Office (DOE/YMPO) Quality Assurance (QA) audit No. 89-2 of Holmes and Narver Inc. (H&N) was meaningful and effective. The audit team was qualified in the QA and technical disciplines, and their assignments and checklist items were adequately described in the audit plan. Since the YMPO had recently authorized H&N to start Title II Exploratory Shaft Facility (ESF) design activities, very little ESF Title II work had been performed by H&N. Consequently, the implementation of the QA program pertaining to the Title II design and technical activities was limited. A review and evaluation of the QA and technical procedures and personnel were performed to gain an understanding and determine the acceptability of the overall H&N QA and technical programs, including the capabilities of the H&N QA and technical staff. The results of this evaluation provide confidence that H&N can continue to implement the program satisfactorily.

The NRC staff agrees in general with the DOE/YMPO audit team findings that H&N QA program appears adequate to support the initiation of Title II design, with the exception of those activities that require support from a qualified software program. H&N appears to meet the requirements contained in 10 CFR Part 50, Appendix B and the Nevada Nuclear Waste Storage Investigations Project Quality Assurance Plan, NNWSI 88-9, Revision 2 (88-9 QA Plan) with the exception of the software QA program and certain implementing procedures to control activities associated with construction and site preparation for the ESF. The software QA program is currently under review and development. Since H&N had not started in-depth Title II work, the NRC staff will need to observe DOE/YMPO audits or surveillances during additional program implementation.

## 1.0 INTRODUCTION

From April 24 through 28, 1989, the NRC staff participated as observers in the DOE/YMPO QA audit No. 89-2 of H&N conducted in Las Vegas, Nevada. This audit did not include implementation of the program elements concerning technical products (i.e., engineering drawings, specifications, etc.), since H&N had not performed any in-depth ESF Title II design work.

H&N is the ESF architect-engineer responsible for the design of the underground support systems and the above-ground facilities for the Yucca Mountain Project (YMP). Responsibilities include field surveillance, inspection of construction facilities, material test laboratory support, nondestructive examination services, microfilming, and archival storage of YMP records.

This report addresses the adequacy of the DOE/YMPO audit and, to a lesser extent, the H&N QA program.

## 2.0 OBJECTIVES

The objective of the DOE/YMPO audit was to determine the effectiveness of the H&N QA program in meeting the requirements of the 88-9 QA Plan for the YMPO. The NRC staff's objective was to evaluate the effectiveness of the DOE/YMPO audit and to determine whether the H&N 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

Bill Belke	Observer
Naiem Tanious	Observer
John Gilray	Observer
Robert Brient	Observer (Center for Nuclear Waste Regulatory Analyses)

3.2 DOE/YMPO

Frederick J. Ruth	Audit Team Leader	SAIC, Las Vegas, NV
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Edward M. Cikanek	Lead Technical Specialist	HARZA, Las Vegas, NV
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Michael Robb	Technical Specialist	LATA, Los Alamos, NM
Francisco C. Cheng	Observer	DOE/HQ, Wash., D.C.
W. R. Marchand	Observer	DOE/HQ, Wash., D.C., (Heston)

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 H&N and, to a lesser extent, acceptability of the H&N QA program. The NRC staff evaluations are based on direct observations of the auditors, discussions with the audit team, and review of the audit plan, checklist, background material, and the H&N technical and QA programs. The DOE audit was conducted in accordance with procedures WMPO QMP 18-01, "Audit System for the Waste Management Project Office", Revision 3, and WMPO WMP 16-03, "Standard Deficiency Reporting System," Revision 0.

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 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).

2. 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.

(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 and will be examined by the NRC staff in future audits or observation audits.

4.1 Scope of Audit

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

- 1.0 Organization
- 2.0 Quality Assurance Program
- 3.0 Design Control
- 4.0 Procurement Document Control
- 5.0 Instructions, Procedures and Drawings
- 6.0 Document Control
- 7.0 Control of Purchased Material, Equipment, and Services
- 8.0 Identification and Control of Items, Samples, and Data
- 9.0 Control of Special Process
- 10.0 Inspection
- 11.0 Test Control
- 12.0 Control of Measuring and Test Equipment
- 13.0 Handling, Storage, and Shipping
- 14.0 Inspection, Test, and Operating Status
- 15.0 Control of Nonconforming Items
- 16.0 Corrective Action
- 17.0 Quality Assurance Records
- 18.0 Audits

The scope of the audit is acceptable in that it covered all the 10 CFR Part 50, Appendix B criteria for which H&N has responsibility. These programmatic elements were found acceptable by the NRC staff in their review of the H&N QAPP (ref. Linehan/Stein letter dated April 27, 1989).

(b) The technical portion of the audit covered:

- Technical qualification of design personnel
- H&N technical staff understanding of the design control process
- H&N technical staff understanding of procedural requirements as they pertain to design
- Procedural adequacy from a technical standpoint.

#### 4.2 Timing of the Audit

The NRC staff believes the timing of the QA audit was appropriate based on the recent start of ESF Title II design activities and previously identified concerns with the H&N QA program.

#### 4.3 Examination of Technical Products

In general, the technical portion of the audit was well performed and quite similar to the Fenix and Scisson (F&S) audit. The technical auditors were qualified and adequately trained as auditors. The technical checklist was adequately prepared, and the questions pertained to important technical design issues. The auditors made a representative random selection of the H&N 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 H&N 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 interviewed the 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.

During the audit of the design control process, the NRC staff became aware that the released Subsystem Design Requirements Document (SDRD) Rev. 0 does not contain the changes to resolve the many formal SDRD comments identified to YMPD by the participants. Consequently, a revision to the SDRD will be necessary in the near future. In this regard, particular care and attention will have to be taken by YMP to document and account for all these comments, the resolution of these comments, and to assure that the correct and appropriate changes to the SDRD and participant's design base documents and Title II designs are incorporated. Also, H&N QA and technical personnel recognize that those design and supporting design documents generated prior to the SDRD revision will have to be reevaluated and

verified to determine if design changes are necessary as a result of the SDRD revision. (Level 4)

The NRC observers submitted an Observation Inquiry to the audit team leader requesting a description of H&N process for incorporating new scientific and test data into the Title II design before formal release of the Title II design. H&N responded by stating that the data from the Reference Information Base (RIB) is used in the design, and that new data is required to be entered into the RIB via the Change Control Board and Interface Change Working Group. Once new data is entered into the RIB, H&N then enters the changes into the Design Input Control Document, which is the H&N input to the design documents. Prior to the release of H&N Title II design, there is a final verification of the design package back to all design input documents, to assure all current design requirements, including new scientific and test data, are correctly included into the design. This appears to be a generally reasonable process for Title II design if implemented properly.

Since the YMPO was directed by DOE/HQ not to engage in Title II design activities prior to April 1989, the NRC staff requested an identification of those design activities that have recently taken place or are ongoing that will support ESF Title II design work. After a review of H&N's response, the NRC staff concludes that H&N had essentially performed little or no ESF Title II design work.

The audit team found the H&N designers to be technically qualified and knowledgeable of the design technical procedures with the exception of their lack of understanding "configuration management." The NRC staff agrees with this finding. It appears that the H&N design team has the necessary capabilities to perform technical work on the Title II design.

#### 4.4 Conduct of Audit

The overall conduct of the QA and technical portions of the H&N audit was effective and productive. The audit team was well prepared and demonstrated a sound knowledge of the QA and technical aspects of the H&N program. The audit checklists included the important QA controls addressed in the 88-9 QA Plan that are applicable to H&N (see Section 4.1.1). The audit team used the comprehensive checklists effectively during the interviews with H&N personnel. In general, the team was persistent in their interviews, challenging certain H&N responses when necessary.

The following two YMPO observations are similar in nature to those expressed in our observation report (ref. Linehan/Stein letter dated May 18, 1989) for the recent F&S audit.

- (a) 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 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. In this regard it is recommended that NRC and DOE evaluate the merits of revising this requirement. (Level 4)

- (b) Since the H&N computer software QA program is presently under development and review by YMPO, the NRC staff believes that YMPO and H&N should continue to take the necessary and proper precautions to preclude engaging in Title II activities which require an approved software program (Level 4).

During each of the daily H&N management briefings, the audit team presented their findings from the previous day. There were several instances where these findings were difficult to understand since they were not sharply focused on the identification of the finding and on the basis or rationale for classifying the concern as a finding. In the future, in presenting difficult and important findings, it may be more appropriate and effective for the auditor who originally identified the problem to present the finding, since he or she has the most knowledge of the finding. (Level 4)

The NRC staff observed the manner in which the technical auditors interviewed several of the H&N design personnel in order to gain confidence that the design personnel were sufficiently proficient in their area of expertise. The skill of the auditors in questioning of H&N personnel and the overall knowledge of the H&N design personnel of the design process was observed to be at a proficient level. The NRC staff believes that since the personnel interviews and questioning of the H&N technical staff by the auditors was such an effective tool in determining their understanding, knowledge, and capabilities relative to pertinent program procedures and assigned tasks, that DOE/YMPO should consider applying this interview and questioning technique process to QA/quality control (QC) personnel in future audits. (Level 4)

As a result of NRC staff comments and discussions at previous audits, it was noticed that several of the NRC staff's recommendations have been included into the audit process. For example, it was recommended that an acceptance letter of the particular QAPP be included as part of the audit plan package. This was done for the H&N QAPP as evidenced by the February 3, 1989 acceptance letter from J. Blaylock to J. Calovini. Another example of an NRC recommendation that was included in the DOE audit process was for the DOE auditor to briefly explain to the observers the particular procedures, product, or plan which were audited, and why they were selected. For the H&N audit, the DOE auditors effectively briefed the observers prior to auditing a particular area. This gave the NRC staff the opportunity to acquire an appreciation of how well the DOE auditor was performing as well as being better informed of the audit process.

H&N discussed their reorganization which is currently undergoing review by YMPO. The NRC staff commented in a previous audit that H&N did not have a full time QA individual exclusively devoted to the high-level waste repository program, i.e., individual(s) were devoted part-time to both the weapons program and the repository program. Under the new reorganization, there will be a full time QA supervisor devoted full-time to the YMP. The NRC staff finds this acceptable.

The auditors were effective in their ability to ask questions beyond those on the checklist. The checklists were comprehensive in listing both the 88-9 QA Plan and H&N QAPP requirements. The manner in which the auditors probed in-depth when they sensed a potential problem was done well.

The auditors found an apparent problem concerning the overall interface between H&N, YMPO, and participating contractors. For example, if H&N were to initiate a nonconformance report (NCR) outside their scope of responsibility, copies would go to the Nevada Test Site Operations (NTSO) and to the YMPO. H&N would close their NCR by sending it to the NTSO and YMPO. There do not appear to be procedural controls for identifying and describing responsibilities for the disposition, segregation, tagging, controlling, and close-out of these types of nonconforming items. The audit team believes this may be generic to all participants, and it should be elevated to YMPO to respond accordingly. The NRC staff strongly urges the resolution of this problem to assure proper interface and coordination between all participants prior to start of any site work for the ESF. At the exit meeting, the YMP QA Manager indicated this issue would be resolved by the establishment of an YMP onsite management office to assume the NTSO responsibility associated with the YMP site activity. (Level 4)

The NRC staff observed that H&N initiated a letter from J. Calovini to C. Gertz dated April 6, 1989, whereby an interim policy has been established to furnish only a Certification of Competency, Personnel Department Pre-Employment form, and Position Description to demonstrate qualifications of an individual to perform a particular task. These forms do not reveal the individual's experience, education, training, or certification to determine whether an individual is qualified or certified. The rationale for furnishing the aforementioned three forms is due to the Privacy Act issue which needs to be resolved by DOE. In order to determine whether an individual is qualified for a particular task, this issue needs to be resolved and will remain an open item until resolution. (Level 4)

During the conduct of the audit, it was observed that several of the audit checklist criteria were classified as "not applicable" due to ongoing work not being conducted in a particular area. The NRC staff commented that when work is not being conducted in an area, a random sample of the implementing procedures should be audited to assure such procedures are checked for adequacy and in accordance with the respective commitments and applicable requirements. (Level 4)

Also, during the auditing of nondestructive testing (NDT) personnel, an NRC inquiry was issued by the NRC staff requesting the extent documented evidence is available to demonstrate that NDT personnel meet the education, training and experience requirements within the qualification levels of SNT-TC-1A and whether log sheets of experience hours are maintained on NDT personnel. H&N stated there was not sufficient documentation to support certification to SNT-TC-1A and the experience hours are maintained, but are not easily correlated to specific techniques. This resulted in an audit team observation. Since H&N had not performed any NDT work, this issue was not classified as a Standard Deficiency Report (SDR). Even though audits are an evaluation of selected areas, the NRC staff believes a more thorough audit of this area could have been conducted. (Level 3)

At the exit meeting, there was no explanation of the audit findings. Only the total number of potential SDR's and observations were presented. Even though daily briefings were held with H&N management and certain audit

observers, all of the interested individuals did not obtain a clear picture of the consistency of the potential findings. As with all previous audits, the NRC staff recommends that all findings, even though preliminary, should be described and presented to all interested parties at the exit meeting. (Level 4)

#### 4.5 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.

#### 4.6 Audit Team Preparation

The QA and technical auditors were well prepared in the areas they were assigned to audit and knowledgeable in the H&N 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 H&N 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.

#### 4.7 Audit Team Independence

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 H&N personnel.

#### 4.8 Summary of NRC staff Observations

- (a)\* Consideration should be given to revising the control 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 4.4) (Level 4) DOE should provide a formal response to this observation.
- (b)\* YMPO and H&N should continue to take the necessary precautions to preclude engaging in Title II activities, involving software, without an approved software program. (See Section 4.4) (Level 4) DOE should provide a formal response to this observation.

\* These two observations were also addressed in the NRC staff observation report for F&S.

- (c) The released SDRD, Revision 0 does not contain the changes to resolve the numerous comments identified by the program participants. These comments should be resolved and appropriately incorporated into the next SDRD revision and participants' design base documents and Title II designs. The NRC will continue to monitor this process. (See Section 4.3) (Level 4) DOE should provide a formal response to this observation.
- (d) The designers who were interviewed did not have a clear understanding of "configuration management." H&N will schedule a training session to assure all design personnel understand this term and how it affects design activities and interface responsibilities. (See Section 4.3) (Level 4)
- (e) During the audit team leader's daily briefings to H&N management, there were examples where the team leader had difficulty in explaining and presenting certain findings or observations. This may have been the result of the team leader not fully understanding the particular concern. This could be improved by either having the auditor who identified the concern present it, or for the team leader to better identify the particular requirement or control in question and the rationale as to why the lack of control is of a particular concern. (See Section 4.4). Level 4
- (f) The manner in which the audit team interviewed design personnel was effective. The NRC staff recommends similar interviews for QA/QC personnel. (See Section 4.4.) Level 4
- (g) The NRC staff encourages YMPO and H&N to take the necessary action to assure proper interface and coordination between all program participants, especially the interface with NTSO. (See Section 4.4) (Level 4) DOE should provide a formal response to this observation.
- (h) Due to the Privacy Act issue, auditors and the NRC staff are unable to obtain and review program participant's qualification records to determine which individuals are sufficiently qualified to perform their respective quality affecting activity. This issue needs to be resolved. (See Section 4.4) (Level 4) DOE should provide a formal response to this observation.
- (i) Several of the audit criteria on the audit checklist were classified as "not applicable" due to lack of work being conducted in that area. Consequently, none of the procedures for this particular area were checked for adequacy since this was supposedly done 100% during the conduct of surveillances. For future audits, the NRC staff recommends that when work in a particular area has not been done, auditors should still take a sample of implementing procedures to determine whether such procedures are adequate. (See Section 4.4) (Level 4) DOE should provide a formal response to this observation.

- (j) During the audit exit meeting, only the total number of SDR's and observations were communicated. Except for those attending daily audit meetings, H&N management and audit observers were not informed of the specific preliminary findings. The NRC staff recommends that a brief presentation of preliminary findings be communicated to all participants and observers in order to gain an understanding of all the findings. (See Section 4.4) (Level 4) DOE should provide a formal response to this observation.

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

The preliminary finding of the audit team was that the H&N 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 affected by the H&N software QA program (Note: prior to the audit it was understood by H&N and YMPO that the H&N software QA program is presently under review by YMPO).

The audit team preliminary findings identified one SDR and eleven observations pertaining to H&N QA program and one SDR and three observations pertaining to the YMPO QA program. These are preliminary findings which will be further evaluated by the audit team and the YMPO prior to becoming final. The SDR for H&N was the failure to describe the responsibilities and interface relationships within H&N and external organizations such as the Nevada Test Site Organization. The YMPO SDR pertained to the failure to classify the start of ESF Title II design work as a major milestone which requires a readiness review prior to the start of ESF Title II work.

The staff will evaluate the final audit report issued by DOE to determine if any significant differences exist between the preliminary and final audit findings. The staff will notify DOE if there are any concerns.

#### 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 for ESF Title II design activities, the NRC staff is in general agreement that the QA and technical procedures and personnel are acceptable. The staff will continue to observe DOE/YMPO QA audits and surveillances during further implementation.