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In the Matter of
Louisiana Power & Light Company
(Waterford Steam Electric Station, Unit 3)
Docket No. 50-382 OL

Dear Administrative Judges:

By letter dated November 2, 1984, I submitted to you for your information LP&L's initial response to Issue 10 of the NRC staff's June 13, 1984 letter to LP&L. This response is also attached to LP&L's November 30 "Answer to Joint Intervenor's Motion To Reopen the Record and Admit Three New Contentions." LP&L's November 30 filing in addition included as an attachment LP&L's initial response to Issue 1 of the staff's June 13

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letter. As committed by LP&L in the initial responses to these two issues, revisions supplementing those responses have been provided to the staff. This was done by letter to the staff dated December 6, 1984. The December 6 submittal concerning Issue 10 is referenced in the supplemental affidavit of Robert E. Shewmaker (p. 5) filed with the Board by the staff on December 17, 1984.

The revisions to the responses to Issues 1 and 10 are herewith provided to you to assure that the Board's files in these matters are current.

Sincerely,

Bruce W. Churchill
Counsel for Applicant

cc: Service List Attached

RESPONSE

ITEM NO: 1 (Revision 1)

TITLE: Inspection Personnel Issues

NRC DESCRIPTION OF CONCERN:

As a part of the NRC staff's review, the credentials of quality assurance and quality control inspectors were examined. Included in this effort were the verification of previous job experience and qualifications and certification of personnel as inspectors.

The following items were found.

(1) NRC reviewed inspector certifications for 37 of 100 Mercury QC inspectors, including certifications for all Level III personnel. Twelve inspector certifications were found questionable due to insufficient education or experience.

(2) The certification records of 38 Tompkins-Beckwith (T-B) QC inspectors were selected at random and reviewed. Fourteen inspector certifications were found questionable due to insufficient education or experience.

(3) A 30% sample by the staff of inspector certifications of the Mercury QC work force revealed that no verification of past employment was documented. A sample by the staff of inspector certifications of the Tompkins-Beckwith QC work force produced similar results.

The safety significance of these findings is that unqualified inspectors may have inspected safety-related systems, thereby rendering verification of the quality of these systems indeterminant. LP&L shall: (1) verify the professional credentials of 100% of the site QA/QC personnel, including supervisors and managers, (2) reinspect the work performed by inspectors found unqualified, and (3) verify the proper certification of the remaining site QA/QC personnel to ANSI N45.2.6-1973.

DISCUSSION:

A verification program was implemented to review the professional credentials of 100% of the site QA/QC personnel who may have performed safety-related functions at Waterford 3, concentrating on inspection personnel and including supervisors, managers and remaining QA/QC personnel.

This verification program included the QA/QC personnel of all site organizations which performed safety related functions. Personnel from the following organizations will be addressed in this response:

(1) LP&L
(2) Ebasco
(3) American Bridge
(4) B&B Insulation
(5) Chicago Bridge & Iron
(6) Combustion Engineering
(7) Fischbach and Moore
(8) GEO (NDE)
(9) Gulf Engineering
(10) Mercury Company of Norwood
(11) Nisco
(12) Nooter
(13) Sline
(14) Tompkins-Beckwith
(15) Waldinger

The responses to Issues No. 10 and 20 discuss inspector qualifications for Fegles, GEO (CMT) and J.A. Jones QA/QC personnel.

The program, which is being performed under the overall direction of LP&L, consists of three major elements:

- o Collection and verification of personnel data.
- o Evaluation of qualifications against specified standards.
- o Dispositioning of deficiencies resulting from cases where inspections and tests were conducted by personnel whose qualifications against the appropriate standards could not be confirmed.

Collection and Verification of Personnel Data

Most of the contractors which performed safety related work on Waterford 3 have demobilized. Personnel data was collected from various sources, including site files, contractor home office files, personal contact with individuals or supervisors and through a background verification program.

Personnel data for LP&L QA/QC personnel was compiled under the supervision of LP&L. Personnel data for Ebasco QA/QC personnel and that of the QA/QC personnel of other site contractors was compiled under the supervision of Ebasco.

Efforts were made to verify the education and work experience of 100% of the site QA/QC personnel by researching Waterford 3 contractor records and by contacting schools, former employers and others. The background verification effort for site subcontractor personnel was a joint LP&L/Ebasco effort. LP&L performed the verification of the backgrounds of its own employees and of Ebasco employees. Ebasco personnel were used to some extent in this effort under overall LP&L control. LP&L also audited and sampled the background verification performed by Ebasco. While the success rate of this effort was good, there were cases where confirmatory information was not obtainable. In such cases, the judgement of the LP&L Review Board, as described below, was used to rule on the reliability of the available information.

Evaluation of Qualifications to Specified Standards

QA/QC personnel data were evaluated in order to classify individuals as either having verified qualifications or not. Training, education and work experience were the qualifications of primary concern. These qualifications were verified against the following criteria:

(1) Inspectors - ANSI N45.2.6-1973

(2) NDE Personnel - ANST SNT-TC-1A 1968 or 1975, as appropriate.

(3) Other QA/QC Personnel - QA Program requirements

(4) Operational QC Personnel - Regulatory Guide 1.58 Rev. 1 (ANSI N45.2.6-1978)

Initial qualification determinations for Ebasco and LP&L QA/QC personnel were performed by an LP&L review group. Initial qualification determinations for QA/QC personnel of other contractors were performed first by Ebasco and then separately by the LP&L review group. In order to control the consistency of these determinations, approved procedures were utilized. Determinations related primarily to balancing education, experience and training factors.

The LP&L review group qualification determinations were rendered in two categories: "qualified" and "potentially not qualified". "Potentially not qualified" determinations were referred to an LP&L Review Board comprised of senior LP&L QA personnel. The Review Board was supported by contractor personnel and a consultant very familiar with inspector qualification and related standards. This process resulted in a final determination for all QA/QC personnel as either "qualified" or "unqualified".

In addition to the redundant reviews indicated above, LP&L has specifically requested the NUS/UNC Pre-Licensing Issues Task Force to verify the qualifications to applicable standards of all LP&L QA/QC personnel and to sample Ebasco QA/QC personnel.

The qualification review process is described in QASP 19.12 and QAI-32. The following points further clarify the process:

1. The meaning of the term "unqualified" must be amplified. In some cases determinations were made that, based on verified data, individuals' backgrounds did not warrant qualification to ANSI N45.2.6-1973. In other cases, however, individuals were considered "unqualified" as an expedient in reaching resolution to the concern. This occurred in cases in which:

    a. Research of records, inquiries to past employers, contact with schools and verification of training received was either not possible or could not be concluded in a reasonable period of time.

    b. Apparent discrepancies existed between background information provided by some individuals and that obtained in the verification process, and resolution could not be achieved on a timely basis. Minor discrepancies were excused; however, significant discrepancies generally rendered any other significant but unverified data as suspect.

2. In the process used, being judged as "unqualified" to ANSI N45.2.6-1973 did not automatically render the individual's work as invalid. For example, an individual may not have the education and experience qualifications for all inspection work, yet be fully competent through specific training or other means to perform the particular tasks assigned to him, which might have been very simple and repetitive in nature. Such an individual potentially satisfies ANSI requirements, which ultimately require that an individual's qualifications be sufficient to provide reasonable assurance that the individual can competently perform a particular task. Whether or not the individual meets all the requirements of the appropriate standard, the individuals' work can be deemed valid.

3. During the construction period, some contractors made undocumented judgements with respect to the need for eye examinations for inspection personnel. Such judgements were based on the level of visual acuity or color perception required to achieve competent inspections. Such judgements were also made as part of the verification program and disposition process and will be documented. It is noted that such judgements are specifically suggested in ANSI N45.2.6-1978. This factor was not deemed disqualifying.

4. Some individuals were classified as inspectors but performed no safety-related inspections.

Disposition of Deficiencies

For each contractor which performed safety related work, the LP&L Review Board compiled a list of "unqualified" inspector personnel, and Corrective Action Requests (CAR) were written to formally track and disposition potential deficiencies. Disposition required research into inspections performed by individuals, further research into an individual's background, reinspection, engineering evaluation, analysis of previous reinspections or proof tests (NDE, hydrostatic tests), statistical analyses or rework in order to assure acceptability of the plant components inspected by the personnel in question. Determination of the method of dispositioning was on a contract-by-contract or individual-by-individual basis. The dispositioning process for many individuals included further investigation of background and education and/or the identification of specific job functions performed. With this additional information, dispositioning in many instances is on the basis that individuals were, in fact, qualified for the work performed, or performed no safety related inspections. Such cases are explained on a contract-by-contract basis.

For most contractors who performed safety related work, the disposition of deficiencies generally has not required a large degree of reinspection. In the case of Mercury, substantial reinspection was initiated, particularly the N1 instrumentation tubing installation. More importantly, as a result of the entire QC inspector Verification Program, no significant rework was required.

The qualifications for LP&L and Ebasco and any other inspection personnel involved in the overinspections and reinspections were addressed in the review and resolution of inspector qualifications and functions for those respective companies. On that basis, it can be stated that, where credit was taken for overinspections or reinspections by qualified inspection personnel, their qualifications have been verified.

Included in Attachment 1 are the verification program results for inspectors and descriptions of how deficiencies stemming from those found not qualified were resolved.

Remaining Site QA/QC Personnel

The qualifications of personnel currently performing QA/QC functions on site have been included in the verification program.

CAUSE:

ANSI N45.2.6-1973 allows substitution for education and experience levels by noting that "... education and experience requirements specified for the various levels should not be treated as absolute when other factors provide reasonable assurance that a person can competently perform a particular task." Waterford 3 contractors, to varying degrees, employed such substitutions in certifying the qualifications of their QA/QC personnel. However, the verification program revealed that verification of background data was not adequate or documented, documentation of the justification for substitution was sometimes not provided or lacked depth, and/or was not always totally in accord with contractor procedures or the ANSI Standards, as currently interpreted.

GENERIC IMPLICATIONS:

This issue has been treated generically. The scope of the verification program included 100% of the QA/QC personnel of all site contractors who performed safety related work.

With regard to future work, qualification and certification of inspectors (including NDE personnel) will be administered through strict compliance with LP&L Nuclear Operations Procedures which meet the requirements of Regulatory Guide 1.58 Rev. 1 (ANSI N45.2.6-1978) and SNT-TC-1A-1975, as applicable.

SAFETY SIGNIFICANCE:

The results of the effort employed in responding to this issue further confirm the many other methods (including independent (ANI, etc.) inspection, nondestructive testing, prerequisite/preoperations/integrated testing, and special analyses) which were employed at Waterford 3 to gain adequate confidence that the Waterford 3 systems, structures, and components will perform satisfactorily in service.

CORRECTIVE ACTION PLAN/SCHEDULE:

Priority attention has been given to completion and dispositioning of QC (inspector) issues, since actual inspections have a more direct bearing on the quality of the constructed plant. The review of QA (non-inspector) personnel qualifications is over 90% complete and, to date, no significant concerns have been identified. These personnel will be addressed in the final report.

ATTACHMENTS:

Verification Program Results and Disposition of Deficiencies, by Contractor.

REFERENCES:

1. QASP 19.12, Review of Contractor QA/QC Personnel Qualification Verification
2. QAI-32, Instructions for Verification of QA/QC Personnel Qualifications

ATTACHMENT I

SITE ORGANIZATIONS WHICH PERFORMED SAFETY RELATED WORK *

INDEX

A. LP&L

B. Ebasco

C. American Bridge

D. B&B Insulation

E. Chicago Bridge & Iron

F. Combustion Engineering

G. Fischbach and Moore

H. GEO (NDE)

I. Gulf Engineering

J. Mercury Company of Norwood

K. Nisco

L. Nooter

M. Sline

N. Tompkins - Beckwith

O. Waldinger

* Fegles, GEO (CMT) and J.A. Jones are included in Items No. 10 and 20.

ATTACHMENT 1

A. LP&L

1. On-Site Dates: April 1975 to present

2. Scope of Work:

Owner

3. Scope of Inspection:

a. Construction Phase - Reinspection of selected construction activities.
b. Startup Phase - Inspection of designated startup activities.
c. Operations Phase - Inspection during:
   1) Maintenance
   2) Modifications
   3) Repair
   4) Material Receiving
   5) Storage Activities

4. QA Program Requirements:

a. INSPECTORS
   1) Construction Phase
      a) ANSI N45.2.6 - 1973
      b) QASP 2.12 "QA Section Qualification and Certification of Inspection Personnel"
   2) Startup Phase
      a) ANSI N45.2.6 - 1978(Regulatory Guide 1.58, Revision 1, September 1980)
   3) Operations Phase
      a) ANSI N45.2.6 - 1978(Regulatory Guide 1.58, Revision 1, September 1980)
      b) QI-010-001 "Inspector Qualification"

b. AUDITORS
   1) Construction Phase
      a) ANSI N45.2.23 - 1978(Used as guide only)
      b) QASP 2.3 "Qualification and Certification of Audit Personnel"
   2) Startup Phase
      a) ANSI N45.2.23 - 1978(Regulatory Guide 1.146-1980)
      b) QASP 2.3 "Qualification and Certification of Audit Personnel"
   3) Operations Phase
      a) ANSI N45.2.23 - 1978(Regulatory Guide 1.146-1980)
      b) QASP 2.3 "Qualification and Certification of Audit Personnel"

ATTACHMENT 1

A. LP&L (Continued)

5. Inspector Qualification and Dispositioning of Deficiencies:

The Verification Program identified four (4) LP&L QC personnel whose qualifications were initially determined as not meeting the requirements of ANSI N45.2.6-1973. All were contract personnel. Corrective Action Requests (CAR) EQA84-8 and EQA84-24 were initiated to disposition this deficiency.

The work assignments and qualifications of these individuals were further evaluated and the deficiencies were dispositioned as follows:

The Verification Program assigned one individual as "Indeterminate" status because the activities he was authorized to inspect were not listed on his certification. Subsequently, it was determined that his responsibilities included Electrical, I&C, and Receipt Inspections. A review of this individual's education and experience supports his competence to perform in these particular areas. Therefore, the activities performed by this individual in these disciplines are concluded to be satisfactory.

One individual did not meet the ANSI requirements for Level II Electrical. The LP&L QC Manager determined that this individual did not perform inspections in the electrical discipline which required a determination of acceptability. He did, however, perform surveillance inspections to determine procedural compliance with electrical activities. Based on his education and experience (which includes 1½ years of college and over 5 years of nuclear plant field work) together with his verified Level II certifications in I&C and Mechanical, the surveillance activities performed by him in the electrical discipline are concluded to be satisfactory.

One individual did not meet the ANSI requirement for Level II Mechanical. His certification was active for only one month prior to his resignation. It has been determined that he did not perform inspections for the installation or maintenance of plant equipment during this one month period. In any event, this individual had over 17 years of verified inspection experience in the mechanical and electro-mechanical disciplines. During his tenure his assigned responsibility was to perform independent surveillance of Phase I and Phase II Startup activities.

One individual did not satisfy the ANSI requirement for Level II I&C. It was determined that this individual performed no inspections for the installation or maintenance of plant equipment while employed by LP&L. In any event, he had over 10 years of related and verified electrical inspection/craft experience prior to his employment. His assignments at Waterford 3 were to perform independent surveillance of Phase I and Phase II Startup activities.

On these bases, there is sufficient assurance that the work inspected by the identified individuals was satisfactorily performed.

ATTACHMENT 1

B. EBASCO

1. On-Site Dates: April 1972 to present.

2. Scope of Work:

   a. Architect/Engineer
   b. Construction Management
   c. Installation and Construction

3. Scope of Inspection:

   a. Receiving Inspection
   b. Surveillance of Contractor activities
   c. Inspection of Ebasco installation and construction (all disciplines)
   d. Independent QC inspection of construction activities through 1977.

4. QA Program Requirements/Contractual Commitments:

   a. QAE Personnel - Basic Site Orientation or QA and Safety Orientation
   b. Quality Management/Supervisors - Basic Site Orientation or QA and Safety Orientation.
   c. QA Auditors - Ebasco Procedure QA G.3, "Qualification of QA Audit Personnel". Qualification requirements are based on education, nuclear experience, related Engineering, or manufacturing experience and professional credentials.
   d. QA Records Reviewers - Ebasco Procedure QAI-14, "Training and Qualification Requirements for Quality Assurance Records Personnel". Qualification requirements are high school graduate or G.E.D., QA Indoctrination, procedural training, and on-the-job training.
   e. Nondestructive Testing Personnel - SNT-TC-1A and Ebasco Procedure NDE-1, "Ebasco Service Incorporated Procedure for Training, Examination, and Certification of Nondestructive Examination Personnel".
   f. QC Personnel - ANSI N45.2.6, 1973 and Ebasco Procedure ASP-I-3, "Indoctrination and Training".

5. Inspector Qualification and Dispositioning of Deficiencies:

The Verification Program identified sixty (60) Ebasco QC inspectors who performed safety related inspections and whose qualifications were initially determined as not meeting the requirements of ANSI N45.2.6-1973 or SNT-TC-1A, as appropriate. Corrective Action Requests (CAR) EQA84-13, EQA84-28, and EQA84-32 were initiated to track the disposition of this deficiency.

B. EBASCO (Continued)

Because of the number of identified individuals and the importance of the functions performed, extensive effort was expended during the dispositioning of these CARs. A principal characteristic of this extensive effort is mentioned on page 1-4 of the basic response and is quoted here for emphasis.

> "The dispositioning process for many individuals included further investigation of background and education and/or the identification on specific job functions performed. With this additional information, dispositioning in many instances was on the basis that individuals were, in fact, qualified for the work performed, or performed no safety related inspections."

Following this effort which included a detailed review of the extent, type, timeframe, and discipline involved in the inspections performed (if any) by each of the individuals, the CARs were dispositioned on an individual-by-individual basis. For simplicity of explanation, the dispositions are summarized by category as explained below.

a. Five (5) of the identified individuals did, in fact, meet the ANSI requirements.

b. Six (6) of the identified individuals served in a Level III capacity as supervisors or managers and performed no hands-on or sign-off of inspections or, to the degree they did do so, such inspections were Level II functions, for which they were qualified. Further, it was determined that these individuals did not certify any QC inspection personnel nor did they have sole responsibility for review and approval of QC procedures.

c. Fifteen (15) of the identified individuals were found not to have performed QC functions while employed by Ebasco at Waterford 3.

d. One (1) of the identified individuals had been certified Level II prior to attaining sufficient experience. However, a review of his inspection records indicate that he did not perform Level II type inspections until suitable proficiency was attained and he was thereafter determined to be qualified to the standard.

The above results in a balance of thirty-three (33) individuals who actually conducted inspections while not found to be qualified to ANSI N45.2.6-1973 standards. The work inspected by these individuals was dispositioned also on an individual-by-individual basis as follows:

B. EBASCO (Continued)

e. For seven (7) identified individuals who performed quality control receiving inspections, the education, and experience required to substantiate their level of certification was not able to be verified. One (1) of these individuals was also determined to be not certifiable as a Level I Civil Inspector. The records for the Civil Inspections that he performed were reviewed and it was determined that these inspections were not safety related. These seven (7) individuals were dispositioned as follows:

1) One (1) individual was later determined to be qualified to the requirements of ANSI N45.2.6-1973 based on additional information that was obtained regarding his experience.

2) One (1) individual was certified as Level II but was verified to be qualified only as Level I. However, his inspection documentation was reviewed and accepted by a qualified QC Lead Inspector (Level II or III).

3) Five (5) individuals were certified as Level I but were determined to be not certifiable to that Level. Their inspection documentation was also reviewed and accepted by a qualified QC Lead Inspector (Level II or III). This Lead Inspector was able to provide close supervision over these individuals since his office was in the immediate vicinity of the materials receiving area.

In any event, in view of the overall inspection process, materials receipt inspection is considered an interim inspection between manufacturing inspection and final installation inspection. At Waterford 3 it is primarily intended to verify that there are no overages or shortages in the shipment, that damage has not occurred to the material or equipment, and that material traceability is maintained. Acceptability of the material/equipment during manufacturing is assured by Ebasco's vendor QA representative and/or the vendor's QA program. Acceptability of the installed equipment is assured by the installer's QA program. Further, Fischbach & Moore, Gulf Engineering, Mercury, NISCO and Tompkins-Beckwith maintained separate receipt inspection programs which served as an additional check on the condition of the material/equipment prior to acceptance from Ebasco storage for installation.

f. Two (2) of the identified individuals primarily performed overinspection of contractor's work. The quality of the work overinspected by these individuals has been determined to be acceptable without using the overinspections which they performed.

B. EBASCO (Continued)

g. One (1) of the identified individuals performed a limited number of electrical inspections. A review of the inspection documentation revealed that the items which were inspected by him were all terminations of cables associated with space heaters which were subsequently determinated under CIWA 009388.

h. One (1) of the identified individuals performed a limited number of weld inspections. A review of the inspection documentation revealed that 15 of the welds which he inspected were subsequently Ultrasonically Tested. The remaining accessible safety related welds which he inspected were reinspected under LP&L Procedure QASP 19.10. These welds were found to be acceptable with no rework required.

i. One (1) of the identified individuals only signed weld rod requisitions with the exception of one HVAC duct installation inspection. For this single HVAC inspection, his work was reviewed and signed by a qualified inspector.

j. Nine (9) of the identified individuals were determined to have been qualified for the inspection activities actually performed on the basis of the limited type of inspections performed and the training received on those specific activities.

k. Seven (7) of the identified individuals were found to have performed HVAC inspections. The collective significance of that concentration on the HVAC systems triggered a sampling reinspection program which was instituted under LP&L procedure QASP 19.19. The results of the reinspections were evaluated by Engineering and were found to be satisfactory.

l. Four (4) of the identified individuals were found unqualified in the civil area and performed inspections at the concrete test station. Inspections or tests at that station were in addition to those conducted independently by GEO-CMT and which were resolved in the response to Issue 20. The engineering evaluation concluded that the concrete testing was acceptable. On that basis and the simplicity of the tests and inspections involved there is reasonable assurance that the safety aspects of the related construction has not been compromised.

m. One (1) of the identified individuals was initially determined to not meet the requirements of ANSI N45.2.6-1973 as a Level II Electrical inspector due to insufficient experience and training. The individual was, however, properly certified as a Level II Electrical - Material Control inspector and accumulated approximately 3 years of nuclear inspection experience prior to his original departure from the Waterford project.

B. EBASCO (Continued)

He returned 9 months later, at which time he was given a proficiency evaluation and found qualified by Ebasco and certified as a Level II Electrical inspector. After 3 months his performance as a Level II Electrical inspector was evaluated and found satisfactory. His annual evaluation was accomplished 8 months later and his competency as an electrical inspector was rated as "satisfactory" to "excellent."

Ebasco's qualification program was revised shortly thereafter and he was given oral and written Level II Electrical examinations for which he scored 100% and 90% respectively. One year later he was given a written Level III Electrical examination and scored 90%.

Based on the individual's nuclear inspection experience in the electrical discipline, his proficiency evaluations which demonstrated his improvement over time, and successful completion of testing in the Level II and III electrical disciplines, it is concluded that the individual has demonstrated the required level of competence to function as an electrical inspector.

On these bases, there is sufficient assurance that the work inspected by the identified individuals was satisfactorily performed.

ATTACHMENT 1

C. AMERICAN BRIDGE

1. On-Site Dates: March 1977 to May 1980

2. Scope of Work:

   Erection of main and miscellaneous structural steel in the following areas; reactor building, reactor auxiliary building, fuel handling building, cooling tower area, turbine generator area, circulating water system and construction trestle.

3. Scope of Inspection:

   a. Receiving inspection (upon receipt from Ebasco warehouse).
   b. Fit-up, in-process, and final visual inspection of welds on structural steel.
   c. Inspection of high strength bolting, including torque inspection.
   d. Inspection of installation of expansion type concrete anchors.
   e. Calibration of inspection and testing equipment.
   f. Housekeeping inspection.

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel except Auditors - ANSI N45.2.6 and Procedure 14, "Personnel Training and Qualification".
   b. QA Auditors - ANSI N45.2.23, Quality Assurance Manual Section 1.18 and Procedure 8, "Audit Procedure".
   c. QC Inspectors - ANSI N45.2.6 and Procedure 14, "Personnel Training and Qualification".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program determined that American Bridge QC inspectors met the requirements of ANSI N45.2.6-1973.

ATTACHMENT 1

D. B&B INSULATION

1. On-Site Dates: April 1982 to Present

2. Scope of Work:

   a. Installation of penetration, radiation shields, fire stops, and air seals.
   b. Installation of ventilation equipment providing ventilation for curing penetration seal materials.
   c. Installation of flexible boot seals.
   d. Seal internal conduit seals.
   e. Drill holes in flange of HVAC penetration for sealing material.
   f. Installation of protective envelop for cable tray, conduit, cable airdrop and junction boxes.

3. Scope of Inspection:

   a. Material Receiving Inspection
   b. Inspection performed on Electrical Cable Tray and Conduits are as follows:
      1. Penetration Seals Inspection
      2. Cable Tray Wrap Inspection
      3. Fire Protection Inspection

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel - No procedural requirements for qualification.
   b. QC Inspectors - B&B Procedure QCP-0010, "Certification of Inspection and Examination Personnel", which meets the intent of ANSI N45.2.6.

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified twenty-five (25) B&B QC inspectors whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request (CAR) EQA84-09 was initiated to track the disposition of this deficiency.

   A quality assurance program meeting the requirements of 10CFR50, Appendix B and ANSI N45.2.6 is not required for the work performed by B&B. B&B work is not considered a safety related activity. However, the nuclear insurers require that an independent verification of the installation of conduit seals, penetration seals, and fire barrier wraps be performed. The B&B Quality Assurance Program was established, and approved by the insurers, to fulfill this requirement and B&B provided appropriate training and supervision.

D. B & B INSULATION (Continued)

Waterford 3 was one of the first nuclear power plants to extensively utilize newly developed technology associated with the installation of conduit seals, penetration seals, and fire barrier wraps. As developer of this new technology for Waterford 3, B&B is probably one of the most cognizant and experienced sources of knowledge concerning installation and inspection/inspector requirements. To fulfill the requirement for qualified personnel, B&B instituted an extensive on-site program (QCP-0022 - Training of Quality Personnel) to impart its knowledge and experience to its QC Inspectors.

As part of the approved B&B Quality Assurance Program, Procedure QCP-0010 (Certification of Inspection, Examination, and Testing Personnel) was generated to "describe the guidelines and methods for the certifications of personnel performing quality related functions". Per paragraph 2.0 of QCP-0010, "this procedure was developed utilizing the intent of ANSI N45.2.6, but does not imply full compliance with its requirements". B&B inspection personnel met the requirements of the B&B QA program.

In addition to the B&B QA and Training Programs, there are additional considerations that add to the credibility of the B&B QC Inspection Program and quality of the work performed. These considerations include:

1. The structure and language of the B&B installation and Quality Control Procedures. B&B Procedures are clearly structured so that the hold points and acceptance criteria are well defined and require a minimum of field interpretation.

2. Ebasco Quality Assurance Audits. The Ebasco Quality Assurance Department has performed audits of the B&B installation and Quality Control Program.

3. The use of craftsmen familiar with the general mechanics of the installation. Although the application of this technology to the nuclear industry is a recent development, it draws, wherever possible, upon existing commercial practices. An experienced labor pool did not exist for Quality Control Personnel. However, B&B was able to utilize and train craftsmen experienced with similar commercial installations. For example, the seal pumpers that B&B utilized were supplied from Local Union #75B. This single local supplies pumpers to other nuclear projects, as well as to commercial high-rise building projects, which apply similar sealing compounds.

D. B & B INSULATION (Continued)

4. B&B Quality Control Inspection Reports. B&B Quality Control personnel generated inspection reports covering deficiencies in material and field installation of conduit seals, penetration seals, and Appendix R wrap. The quantity and content of the inspection reports demonstrates B&B's capability to identify, document, and resolve such deficiencies.

Further confidence in the quality of B&B work is provided by the following independent inspections or verifications of the work, which were performed by personnel who were qualified for the stated activities:

1. The implementation of Ebasco Procedure ASP-IV-140 (Inspection of Seals and Barriers). This procedure resulted in a 100% visual verification of conduit seals, penetration seals, and Appendix R Fire Barriers as the work was accomplished. Performance of this verification by Ebasco was totally independent of the B&B Quality Control Program.

2. Third party verification on behalf of the nuclear insurance carriers. To fulfill the requirements of the nuclear insurance carriers, a final visual verification of each of the conduit seals, penetration seals, and Appendix R fire barriers was performed. This program was performed by Ebasco personnel and was totally independent of the ASP-IV-140 verification program and the B&B Quality Control Program.

The primary B&B QC inspection function which would not have been verified by 1 and 2 above was density testing of the sealing compounds. As performed by B&B this check was reduced to the simple determination of a sample weight. No calculations of any kind were required. In addition this check was performed prior to installation of these sealing compounds.

The above factors provide a high level of confidence in the quality of B&B work and related inspections.

ATTACHMENT 1

E. CHICAGO BRIDGE & IRON

1. On-Site Dates: June 1976 to April 1978

2. Scope of Work:

   a. Erect Steel Containment Vessel complete with all appurtenances, equipment hatches, personnel locks and penetrations.
   b. Post-weld heat treat Steel Containment Vessel.
   c. Test Steel Containment Vessel.
   d. Purchase Order includes applicable NDE.
   e. Purchase Order, also covers design, fabrication, delivery, and handling of Steel Containment Vessel.

3. Scope of Inspection:

   a. Receiving inspection.
   b. Visual inspection of welds, which includes fit-up, in-process, and final weld.
   c. Perform and evaluate NDE of welds (MT or LP and RT, as applicable).
   d. Dimensional inspection.
   e. Witness and evaluate site testing within CB&I work scope.
   f. Assure calibration of jobsite M&TE is performed within CB&I work scope.
   g. Test of Steel Containment Vessel includes Soap Bubble Tests, Overhead Pressure Test, Leak Plate Tests (including personnel locks) and operational testing.

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel - CBI Procedure TIP-1, "Training Indoctrination and Qualification Program". This procedure references CBI's QA manual Appendix C for auditors and Appendix J for NDE personnel. NDE personnel are certified to SNT-TC-1A requirements.
   b. QC Personnel - CBI Procedure TIP-1, "Training Indoctrination and Qualification Program".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program determined that Chicago Bridge & Iron QC inspectors met the requirements of ANSI N45.2.6-1973.

ATTACHMENT 1

F. COMBUSTION ENGINEERING

1. On-Site Dates: March 1982 to January 1984

2. Scope of Work:

   a. Provide Reactor Vessel Internals installation assistance.
   b. Perform related work.
   c. Related work includes providing installation procedures, technical direction, services and drawings, and QA personnel.

3. Scope of Inspection:

   a. Limited onsite inspections of specialized NSSS vendor activities.

4. QA Program Requirements/Contractual Commitments:

   a. All QA/QC Personnel - Training to CE QA Program, Standards, Specifications, Codes, QA responsibilities and documentation.
   b. QA Auditors - Orientation and training, examination, on-the-job training, and maintain proficiency through active participation.
   c. Records Control Personnel - QC Software training, time requirements are based on level of certification.
   d. Inspector Personnel - Visual Inspection to SNT-TC-1A and Dimensional and Mechanical to ANSI N45.2.6.

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified six (6) Combustion Engineering QC inspectors whose qualifications were initially determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request (CAR) EQA84-06 was initiated to track the disposition of this deficiency.

   Based on additional investigation of background, education and/or specific job function, as described in the basic response, it was determined that the identified individuals were qualified to perform their functions.

   One (1) identified individual did not perform QC inspections at Waterford 3. He is a certified examiner who administered examinations to CE-Chattanooga QC personnel.

   Two (2) of the identified individuals are employees of Electro-Mechanics, Inc. (E-M) and performed QC inspections during a field wiring modification of the Control Element Drive Mechanism Control System at Waterford 3. These inspections were performed to the same performance standards as those in force at the E-M manufacturing facility where this equipment was manufactured.

F. COMBUSTION ENGINEERING (Continued)

One (1) identified individual's qualifications to perform as a Visual (VT) QC inspector were initially questioned because supporting documentation (VT certification) was not in his personnel file. Subsequently, Combustion Engineering provided the required certification, which covered the period of time in question.

One (1) identified individual who was certified for NDE Level II (MT, PT, and RT) was disqualified by the Verification Program because his high school education could not be verified. Verification of satisfactory completion of the General Educational Development (GED) Tests administered by the United States Armed Forces Insititute was later obtained.

One (1) identified individual who was certified as a Level II (Visual) inspector was disqualified by the Verification Program because no examination records could be established for Level II visual inspection. Research of Waterford 3 inspection records revealed that he performed no visual inspections at Waterford 3. He performed only mechanical inspections at Waterford 3, for which he was qualified.

On these bases, there is sufficient assurance that the work inspected by the identified individuals was satisfactorily performed.

ATTACHMENT 1

G. FISCHBACH AND MOORE

1. On-Site Dates: May 1977 to December 1983

2. Scope of Work:

   a. Installed safety and non-safety equipment, accessories, raceways, cable and non-vendor furnished interconnection between equipment, connections to all equipment, accessories and devices.
   b. Installed seismic and non-seismic conduit, tray and box supports (AWS D1.1).
   c. Installed expansion anchors and bolting of structural steel.

3. Scope of Inspections:

   a. Material Receiving inspection.
   b. Support fit-up and final visual inspection.
   c. Inspection of installation of equipment.
   d. Inspection of routing and connection of trays and conduit.
   e. Inspection of routing and termination of cable.
   f. Inspection for proper bolting (Torque and tension testing).
   g. Megger/continuity testing of cable and equipment.

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel - 10CFR50 Appendix B and ANSI N45.2.
   b. QA Auditors Personnel - Documented experience of previous auditing, orientation, and training in QA program, procedures, and activities to be audited.
   c. Inspector Personnel - ANSI N45.2.6 and Fischbach & Moore Procedure QAP-101W3, "Personnel Qualification and Certification".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified twenty-seven (27) F&M QC inspectors whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Requests (CAR) EQA84-10 and EQA84-29 were initiated to track the disposition of this deficiency. The F&M inspector qualification deficiencies were primarily unverifiable inspection experience and unverifiable high school education.

   Disposition of the CARs was based on the F&M Training and QA Programs, which qualified personnel for specific tasks and monitored their performance. In addition, during the Startup Test Program, LP&L conducted independent tests of F&M on installed electrical equipment. Also, during construction LP&L and Ebasco performed several reinspections of F&M work. For example, LP&L performed a complete reinspection with regard to electrical circuit separation for safety related cables. LP&L and Ebasco personnel performing those reinspections were verified as being qualified to perform the safety activities.

G. FISCHBACH & MOORE (Continued)

Field QC Supervisors were responsible for activities within their assigned areas and had final approval of all inspection results. F&M inspection reports were reviewed, approved and countersigned by Qualified Field QC Supervisors.

Functions and Monitoring of the 27 Personnel's Activities

A review of F&M QC files was conducted to determine whether the monitoring program described above was applied to the 27 identified individuals. It was determined that 26 of the 27 such individuals were Level I inspectors, only 4 of which were designated as "leads" for discretely identified tasks such as coordinating inspection schedules, obtaining scaffolding or otherwise assisting Level II lead inspectors for whom they performed these tasks. Any actual inspections performed by the 26 individuals were performed under a Level II "lead" or field QC supervisor, the latter of which reviewed, approved and countersigned the inspection reports. The one remaining individual was on site for 6 months, 3 months of which were as a Level II, was never designated as a "lead" or field QC supervisor and thus his work was monitored by a "lead" and reviewed, approved and countersigned by the appropriate QC supervisor. Thus the program, as outlined above, and which provided tiered monitoring and review of base level inspector activities, was followed and provides sufficient assurance of the adequacy of both those inspections and the hardware involved.

LP&L/Ebasco Testing and Inspection - In addition to the F&M/QC inspections, the quality of the F&M construction activities is further confirmed by the following testing and inspection activities by LP&L and Ebasco.

a. Ebasco performed receipt QC inspections of permanent material to be installed by F&M prior to issuance to F&M. The receipt inspection performed by F&M was thus a redundant site inspection performed to verify that the material received was the correct type and was not damaged.

b. As a part of the LP&L Startup testing program, walkdowns of electrical installations were performed by LP&L Startup.

c. Ebasco and LP&L performed a walkdown to inspect conduit span lengths. NCR-7168 required Ebasco to reinspect supports.

d. The LP&L Startup program required that terminations of cables be checked.

e. LP&L Startup inspected for proper bolting torque on electrical busses and cable terminations. In addition to this, Ebasco QC under NCRs 7169, 7164 and 7186 verified the proper torque of over 1000 anchor bolts installed by F&M.

G. FISCHBACH AND MOORE (Continued)

f. LP&L Startup also performed insulation resistance/continuity testing of cable and equipment.

In addition to the above, LP&L Startup Phase I and II test programs required functional electrical testing and system testing of electrical equipment which have been performed.

On the basis of the above, sufficient assurance is provided that the hardware installed by Fischbach and Moore will adequately perform its intended functions.

ATTACHMENT 1

H. GEO (NDE)

1. On-Site Dates: May 1977 to Present

2. Scope of Work:

   a. Performance of Nondestructive examination of items and welds.
   b. Process and evaluate test results.
   c. Prepare reports.
   d. Identify defects.

3. Scope of Inspection:

   a. Nondestructive examination methods include but are not limited to: Radiography, Magnetic Particle, Ultrasonic, Liquid Penetrant, and Leak Detection.
   b. Client has final acceptance or rejection of welds.
   c. Although leak detection was included in GEO scope of work, GEO was not required to perform any tests.

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel except Auditors - No Procedural requirements for qualification.
   b. QA Auditors - GEO Procedure 5.2, "Qualification and Certification of Audit Personnel" which references ANSI N45.2.23.
   c. Nondestructive Examination Personnel - SNT-TC-1A and GEO Procedure GEO-2.3, "Qualification and Certification of NDE Personnel".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified five (5) GEO (NDE) personnel whose qualifications were initially determined as not meeting the requirements of SNT-TC-1A for radiographic testing. In addition, one of the five was determined as not meeting the requirements of SNT-TC-1A for magnetic particle testing and penetrant testing. This determination was based on being unable to verify their high school attendance or sufficient training. Corrective Action Request (CAR) EQA84-18 was initiated to track the disposition of this deficiency.

   Based on additional investigation regarding education and/or experience, as described in the basic response, it was determined that four (4) of the identified individuals did meet the requirements of ASNT SNT-TC-1A.

ATTACHMENT 1

H. GEO (NDE)

A review was conducted in order to determine the inspection functions performed by the remaining identified individual. This individual was only involved in field radiography work and the interpretation and acceptance of his radiography results were carried out by qualified Ebasco personnel. In addition, certain radiographs were reviewed by the ANI. Improper field technique would have been detected during the interpretation of the radiographs.

On these bases, there is sufficient assurance that the work performed by the identified individuals was satisfactorily performed.

ATTACHMENT 1

I. GULF ENGINEERING

1. On-Site Dates: January 1977 to November 1983

2. Scope of Work:

   a. Install ASME III Safety Class I, II, III, and Non-safety related (B31.1) equipment tank, pressure vessels, etc.
   b. Install ASME III Class III piping systems.
   c. Install Seismic Class I supports.
   d. Hydrostatic/Pneumatic testing on all systems erected.

3. Scope of Inspection:

   a. Material Receiving Inspection.
   b. Fit-Up and Final Visual for structural welds.
   c. Fit-Up and Final Visual for pipe welds.
   d. Insulation Resistance Testing Inspection - PR-9.2.
   e. Grouting Inspection PR-11.1.

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel with exception of Auditors - Gulf Engineering QA Manual Section 20, Indoctrination and Training, Gulf Procedures PR 17.0 and 20.0, "Indoctrination and Training".
   b. QA Auditors - ANSI N45.2.23 and Gulf Procedure PR 18.0, "Auditing".
   c. QC Inspectors - ANSI N45.2.6 and the Gulf Program requirements listed in (a).

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified ten (10) Gulf Engineering QC inspectors whose qualifications were initially determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Requests (CAR) EQA84-27, EQA84-30 and EQA84-33 were initiated to track the disposition of this deficiency.

   It was determined that:

   a. Based on additional investigation regarding education and/or experience, as described in the basic response, it was determined that three (3) of the identified individuals were qualified to perform their functions and did meet ANSI N45.2.6-1973.

   b. The review found that two (2) of the identified individuals did not perform safety-related inspections prior to acquiring proper qualifications and certifications.

I. GULF ENGINEERING (Continued)

A review was conducted in order to determine the inspection functions performed by the remaining five (5) individuals and such functions were found to be acceptable on the following bases:

a. One (1) identified individual who was certified as a Level I inspector only performed routine preventive maintenance inspections on installed mechanical equipment. This included checking for damage, heat on motors, nitrogen blankets, rotation of pumps and motors, and witnessing meggering of motors.

b. One (1) identified individual who was certified as a Level II inspector for installation of mechanical and electrical equipment performed inspections limited to setting, leveling, aligning, and grouting in-place mechanical equipment such as pumps, motors, heat exchangers, and tanks. Gulf did not make the electrical or mechanical connections to the equipment. This individual also performed routine preventive maintenance inspections per Ebasco Care and Maintenance Instructions (CMI).

c. Three (3) identified individuals were certified as Level III inspectors for installation of mechanical and electrical equipment. The actual scope of their inspections was limited to the same scope as for the Level II individual discussed above. One of these individuals also inspected a small amount of safety related piping in the dry cooling towers. That such piping is satisfactory is supported by the fact that the piping has subsequently been nondestructively examined, hydrostatic tested and accepted by the ANI.

Gulf management has, in the case of all of the identified individuals, attested that they received adequate training to perform the inspection functions described, the formal portions of which are documented.

Additionally, Gulf was required by contract (Paragraph MC-1) to submit their work and inspection packages (travelers) to Ebasco and LP&L. A primary purpose in this requirement was to ensure that both Ebasco and LP&L had the opportunity to review and ensure that the appropriate owner inspection hold points were specified. Once these were established LP&L QA was then notified when these hold points had been reached in order to overinspect the more sensitive equipment installation steps.

I. GULF ENGINEERING (Continued)

Added confidence in quality of the Gulf construction activities was gained during the LP&L Startup program as follows:

1. During prerequisite testing the motors were

   a. meggered and/or continuity checked to assure proper wiring

   b. electrically checked for proper rotation

2. During preoperational testing

   a. motors were run uncoupled and coupled (i.e. pumps, etc. were operated)

   b. often flanges were disconnected which necessitated re-aligning the pumps/motors

   c. component functions were tested during system and cold/hot functional tests

On the above bases, there is adequate assurance that the equipment installed by Gulf will perform satisfactorily in service.

ATTACHMENT 1

J. MERCURY COMPANY OF NORWOOD

1. On-Site Dates: September 1978 to November 1983

2. Scope of Work:

   a. Install ASME III P2 and P3 local instrument racks, cabinets, and tubing systems.
   b. Install seismic Class I supports and tubetrack.
   c. Install non-seismic/non-safety instrument air system.
   d. Install non-seismic supports.
   e. Hydrostatic or air test all tubing erected.

3. Scope of Inspection:

   a. Receiving Inspection
   b. Dimensional Inspection
   c. Structural Inspections
   d. Pressure Test Performance
   e. Welding Inspection
   f. Piping and Tubing Inspection
   g. Installed Equipment Inspection

4. QA Program Requirements/Contractual Commitments:

   a. QA Engineering Personnel - Mercury Procedure QCP-3070, "Personnel Indoctrination and Training".
   b. Quality Managers/Supervisors - Mercury Procedure QCP-3070, "Personnel Indoctrination and Training".
   c. Quality Assurance Auditors - Mercury Procedure QCP-3060, Qualification of "QA Program Audit Personnel" which satisfies the requirements of ANSI N-45.2.23.
   d. QA Records Reviewers - Mercury procedure QCP-3070, "Personnel Indoctrination and Training".
   e. Nondestructive Testing Personnel - Mercury employed no NDE personnel.
   f. QC Personnel - ANSI N45.2.6 and Mercury Procedure QCP-3050, "Qualification of Inspection, Examination and Test Personnel".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified 136 Mercury QC inspectors whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request (CAR) EQA84-15 was initiated to track the disposition of this deficiency.

Disposition of CAR EQA84-15 is based upon the extensive reinspections of Mercury work against established installation criteria and upon extensive testing and engineering evaluation of the as-built installations. Based on these factors, LP&L has a high degree of confidence in the ability of the installation within the scope of Mercury's responsibility to perform its intended safety functions and support safe plant operation. In light of the extensive verification, this conclusion is justified even if a substantial number of Mercury inspectors do not satisfy qualification requirements.

Attachment No. J-1 provides a matrix of inspection and NDE tests performed as part of the in-process installation activities in Mercury's work scope. The various reinspection, test and engineering verification activities are also tabulated in relation to the impacted Mercury installations.

Attachment No. J-2 is a description of several of the verification activities additionally considered in this assessment.

Attachment No. J-3 is an assessment of safety significance with respect to the findings identified in the N1 installation reinspections recently completed by LP&L.

The figure contained in Attachment J-4 represents Mercury's work scope pictorially for the categories of installations described above.

Mercury's construction activities which are affected by QC inspector qualifications have been categorized as follows:

A. N1 Installations

N1 installation include tubing, instrumentation and related hardware which perform a function required to mitigate the consequences of a design basis accident and allow the operator to safely shutdown the plant.

B. N2 Installation

N2 installations include tubing, instrumentation and related hardware required to maintain pressure boundary integrity that do not perform a direct plant safety function.

C. Seismic Category I Instrumentation Supports, Tube Track, and Instrumentation Stands

These installations are required to withstand a safe shutdown earthquake and thus assure the integrity of N1 and N2 installations.

D. Primary Sampling Piping and Related Supports/Restraints

These installations consist of Seismic Category 1 pipe supports and ASME Class 2 piping.

Verification activities independent of the initial in-process inspections are discussed in relation to each category of Mercury installation.

A. N1 Instrumentation

Due to its importance to safe plant operations, N1 instrumentation has undergone the most extensive re-verifications of any Mercury installation category. These verification activities are summarized as follows:

1. Reinspections

Reinspections performed in relation to N1 instrumentation include the following:

a. N1 Reinspection Program

As a result the LP&L Review of NRC Issue No. 1 regarding Mercury QC qualifications, LP&L deemed it prudent to undertake a further extensive reinspection of Mercury work. Accordingly, LP&L procedure QASP 19.15 was established to reinspect the sensing lines and associated hardware (e.g. tube track, support, etc.) for the N1 instrument installations, which perform a safety-related function and provide a pressure boundary. The reinspection is complete and no discrepancies impacting plant safety were found. This reinspection covered most of the installation attributes which are subject to in-process QC inspections.

Certain attributes such as anchor bolt torquing and weld fitup inspection were not included since reverification cannot be performed without destroying existing installations. Such attributes, however, were subjected to many in-process inspections and subsequent documentation reviews as is evidenced by the numerous NCRs which were dispositioned in these areas. The adequacy of Mercury anchor bolt installations was further later verified by Ebasco based on the corrective action required to close NCR 5864. This NCR required tension test verification of 108 Mercury installed anchor bolts.

J. MERCURY COMPANY OF NORWOOD (Continued)

An evaluation of the reinspection findings was performed for safety significance. The evaluation results and inspection findings are discussed in detail in Attachment J-3. It has been concluded that, while deviations from established installation criteria were identified, none were judged to be safety significant. Further, in relation to the quantity of items reinspected, the number of identified discrepancies is small.

b. LP&L QA Inspection of Redundant N1 Instrumentation Impulse Lines for Mechanical Separation

This reinspection was performed under direct LP&L supervision in accordance with LP&L Procedure QASP 19.9. The inspection required the reverification of mechanical separation requirements for redundant N1 instrumentation installations. As a result of this program, 2 out of 82 instrument installations inspected were reworked to assure proper mechanical separation.

c. SCD 57 Correction Action Program

This reinspection effort commenced in July, 1982, and subsequently involved the reinspection of all N1 and N2 instrumentation installed in full or in part prior to July 1982. Although these reinspections may have been performed by some of the QC inspectors whose credentials are currently suspect, this is mitigated by the fact that Ebasco Engineering participated in the tubing installation walkdowns. LP&L QA and Startup also participated in many of the walkdowns.

d. Selective Reinspection Programs Impacting N1 Installation

Various reinspection programs were initiated by LP&L and Ebasco QA in relation to established review programs in the 1982-1983 time frame. These reinspections impacted N1 Instrumentation, and are described as follows:

i) Ebasco QA Records Review Program Reinspections

During the records review process a limited number of reinspections were performed in order to reverify specific attributes related to tubing installations. Refer to Attachment No. J-2 for more detail.

J. MERCURY COMPANY OF NORWOOD (Continued)

ii) LP&L QA Turnover Status Review

A limited number of field verifications were conducted by LP&L QA as part of a system turnover status review. These field verifications established a satisfactory level of confidence that the as-installed conditions were reflective of the approved installation details. Refer to Attachment No. J-2 for more detail.

2. Testing

Various NDE and testing programs have been implemented which provide additional assurance with respect to the adequacy of N1 installations.

These programs are summarized as follows:

a. Pressure Boundary Tests

In general, N1 and ASME Class 2 and 3 tubing installations were integrity tested in accordance with code requirements. Certain N1 HVAC installations were exempted from integrity testing. In addition to Mercury QC inspectors, ASME integrity tests were witnessed by Ebasco, LP&L Startup and QC personnel, and in the case of Class 2 installation, the Mercury ANI representative.

b. Non-Destructive Testing

N1 ASME Class 2 installations welds were subjected to liquid penetrant tests which were performed by an independent contractor (GEO).

c. Hot Functional Preoperational Testing

During Pre-Core Hot Functional Testing, N1 instrumentation was placed in service under normal plant operating conditions. The integrity of these installations was verified under thermal growth and pressure conditions by LP&L. Instrumentation loop functionality under plant startup and normal process flow conditions was also verified. These same systems will again be tested during Post Core Hot Functional Testing, prior to initial criticality.

J. MERCURY COMPANY OF NORWOOD (Continued)

B. N2 Installations

N2 installations were subjected to many of the same reverification programs. The major LP&L programs which did not involve N2 installations are the N1 instrumentation reinspection conducted by LP&L (Item A.1.a) and the LP&L QA inspection of redundant N1 instrumentation for Mechanical Separation (Item A.1.b).

The most noteworthy reverification efforts with respect to N2 installations involve the SCD 57 corrective action programs and pre-core hot functional testing programs. The comprehensiveness of these two programs mitigate the consequences resulting from the QC inspection qualification concerns. Attachment No. J-3 discusses the justification for not extending the reinspection program conducted under QASP 19.15 (Item A.1.a) to include N2 installation.

C. Seismic Category I Supports, Tube Track and Instrumentation Stands

As has been the case with N1 and N2 installation, Seismic Category I supports, tubetrack and instrumentation stands have been subjected to various reinspections and verification programs. The most notable are discussed below.

1. The N1 reinspections conducted by LP&L under procedure QASP 19.15 included reinspections of Seismic Category I supports installed in N1 instrument loops. Attributes inspected included support location, weld size and workmanship, anchor bolt embedment, spacing, and correctness of hardware installations (i.e. nut, bolts, washer, etc.). Approximately 1600 supports were inspected under the program.

2. The Ebasco QA Records Review Program Reinspection

   The QC reinspection conducted by Ebasco in 1982-1983 involved approximately 35% of all Mercury installed instrumentation seismic supports. These reinspections verified support configuration, locations and weld size. Partial inspection for only certain attributes (i.e. support type or weld size, etc.) were also conducted. In addition to Seismic Category I supports, the QA Records review resulted in the full reinspection of 100% of the Seismic Category I instrument stands installed by Mercury and approximately 67% of the tube track installation including hardware and welds. Anchor bolt embedment and torque were reverified in 896 instances. More detail with respect to the impact of the Ebasco QA records review on Seismic Category I hardware is provided in Attachment No. J-2.

J. MERCURY COMPANY OF NORWOOD (Continued)

D. Primary Sampling Piping and Related Supports/Restraints

This portion of Mercury work has been reverified in several ways. These are summarized as follows:

1. Reinspection

a. Piping fillet welds were reinspected under SCD 62 which involved identification and repair of undersized fillet welds not meeting ASME Code requirements. Although reinspections may have been done by some of the same QC inspectors whose credentials are currently under question, the impact of their involvement is minimized since at least 2 inspectors looked at each weld.

b. All the Primary Sampling Supports/Restraints were reinspected by Ebasco QC during the QA records review process.

c. Both the piping and supports/restraints were verified by Ebasco ESSE as part of the 79-14 program.

d. Primary Sampling Supports/Restraint were reinspected by LP&L QA as part of the QASP-19.7 pipe hanger inspection program.

2. Testing

a. ASME Code Hydros of Primary Sampling Piping

ASME Code hydros were witnessed by the Mercury ANI, LP&L Startup and Ebasco Engineering.

b. Non-Destructive Testing

Since the primary sample tubing is ASME Class 2, all fillet welds were liquid penetrant tested by GEO.

c. Hot Functional Testing (HFT)

During Pre-Core HFT, the Primary Sampling System was subjected to normal operating pressure and temperature conditions. Formal verification of the adequacy of installation was documented under the thermal monitoring program conducted during HFT. Similar postcore testing will be performed.

The extent of reinspection testing and engineering verifications conducted in relation to the Mercury installed Primary Sampling System is so comprehensive that the impact of QC inspector qualifications is insignificant with respect to plant safety.

SUMMARY AND CONCLUSIONS

In each installation category, several reverification and testing activities have been performed which did not involve Mercury QC inspectors. When reinspection activities were performed by Mercury QC inspectors, credit is taken in this assessment due to either of two factors:

1. The Mercury QC inspector was accompanied by either an LP&L or Ebasco representative or both (eg. SCD 57 walkdowns, hydros, etc.)

2. The reinspection was a duplication of previous reinspections, and thus the impact of inspector qualification to ANSI N45.2.6-1973 is minimized.

In conclusion, the extent to which Mercury installations were reverified by either testing, reinspection or engineering verification, substantially independent of the Mercury QC inspection process, provides sufficient confidence that safety related instrumentation has been properly installed.

ATTACHMENT J-1

COMPONENT	I&C CLASS	QTY. INVOLVED	PRIMARY WELD CONFIGURATION	QC INSPECTION PERFORMED	ASME CODE INSPECTION	NDE	INTEG. TEST	DOCUMENT REVIEW MERC.	EBASCO	LPL	OTHER
Tubing	P2N1	51 Travelers (Approx.)	1/8" Socket Weld	1. Cleanliness 2. Component Verified 3. HT Component No. Verified 4. HT & Type Filler Metal 5. Fit-Up 6. Final 7. Welder ID 8. Weld No. 9. Mechanical Separation	Indep.exam. by Kemper Insurance Record Review (100%) Physical Inspection (Approx 2%)	Indep. Exam. By GEO Liq. Penet. (100%)	100%	100%	100%	15%	1) SCD 57 2) QASP-19.15 3) QASP-19.9
Tubing	P2N2	35 Travelers (Approx.)	1/8" Socket Weld	1. Cleanliness 2. Component Verified 3. HT Component No. Verified 4. HT & Type Filler Metal 5. Fit-Up 6. Final 7. Welder ID 8. Weld No.	Indep.exam. by Kemper Insurance Record Review (100%) Physical Inspection (Approx 2%)	Indep. Exam. By GEO Liq. Penet. (100%)	100%	100%	100%	15%	1) SCD 57
Tubing	P3N1	189 Travelers (Approx.)	1/8" Socket Weld	1. Cleanliness 2. Component Verified 3. HT Component No. Verified 4. HT & Type Filler Metal 5. Fit-Up 6. Final 7. Welder ID 8. Weld No. 9. Mechanical Separation			100% With Except of HVAC	100%	100%	15%	1) QASP-19.15 2) QASP-19.9 3) SCD 57

ATTACHMENT J-1

COMPONENT	I&C CLASS	QTY. INVOLVED	PRIMARY WELD CONFIGURATION	QC INSPECTION PERFORMED	ASME CODE INSPECTION	NDE	INTEG. TEST	DOCUMENT REVIEW MERC.	EBASCO	LPL	OTHER
Tubing	P3N2	95 Travelers (Approx.)	1/8" Socket Weld	1. Cleanliness 2. Component Verified 3. HT Component No. Verified 4. HT & Type Filler Metal 5. Fit-Up 6. Final 7. Welder ID 8. Weld No.			100% With Except of HVAC	100%	100%	15%	1) SCD 57
P2 Sample Pipe	P2	10 Drawings	1/4" Socket Weld	1. Cleanliness 2. Component Verified 3. HT Component No. Verified 4. HT & Type Filler Metal 5. Fit-Up 6. Final 7. Welder ID 8. Weld No.	Indep. Exam. By Kemper Insurance Record Review (100%) Physical Inspection (Approx 2%)	Indep. Exam By GEO Liq. Penet. (100%)	100%	100%	100%	15%	1) SCD 62 2) SCD 57
Strong Back Piping for Level Switches	P3N1	7 Tanks	1/4" Socket Weld	1. Cleanliness 2. Component Verified 3. HT Component No. Verified 4. HT & Type Filler Metal 5. Fit-Up 6. Final 7. Welder ID 8. Weld No. 9. Mechanical Separation			100%	100%	100%	15%	1) SCD 57 2) QASP-19.15 3) QASP-19.9
Tubetrack	Seismic CL 1	650 (Approx.)	Fillet					-	100%	10%	1) 67% Under QAI-23 2) QASP 19.15 (NI Only)

ATTACHMENT J-1

COMPONENT	I&C CLASS	QTY. INVOLVED	PRIMARY WELD CONFIGURATION	QC INSPECTION PERFORMED	ASME CODE INSPECTION	NDE	INTEG. TEST	DOCUMENT REVIEW MERC.	EBASCO	LPL	OTHER
Tubing & Tubetrack Supports	Seismic CL I	5100 (Approx.)	Fillet	1. Cleanliness 2. Component Verified 3. Heat No. Component Verified 4. HT & Type Fillet Metal 5. Fit-Up 6. Welder ID 7. Weld No. 8. Final				75%	100%	10%	1) 35% Under QAI-23 2) QASP-19/15 (N1 Only)
Bergen-Paterson Supports	Seismic CL I	310 (Approx.)	Fillet	1. Cleanliness 2. Component Verified 3. HT No. & Type Filler Metal 4. Welder ID 5. Weld No. 6. Fit-Up 7. Final				Not Comp.	100%	10%	1) Ebasco QC 100% reinspection 2) 79-14 Walkdown 3) QASP-19.7
Instrument Stands	Seismic CL I	200 (Approx.)	Fillet	1. Cleanliness 2. Component Verified 3. HT No. OF Component Verified 4. HT & Type Filler Metal 5. Welder ID 6. Weld No. 7. Fit-Up 8. Final				Not Comp.	100%	10%	1) 100% Under QAI-23 2) QASP-19.15 (N1 Only)

ATTACHMENT NO. J-2

VERIFICATION OF THE ACCEPTABILITY OF MERCURY INSTALLATIONS

Since the Stop Work Order on Mercury safety related activities was issued in July 1982, Mercury installed systems have been heavily scrutinized by LP&L and Ebasco. The Mercury installations have also been subjected to NRC field review. Additionally, Kemper Insurance participated in the ASME Section III N-Stamp application process and, as such, was required to witness hydrostatic testing of all ASME Safety Class 2 installations.

The following is a brief discussion of some of the significant LP&L and Ebasco verification activities with respect to Mercury installations.

1. A direct result of the Stop Work Order, was the initiation in July 1982 of joint Mercury and Ebasco walkdowns of instrumentation installations on a startup system basis. LP&L QA and Startup were involved in the initial phases of the program. Walkdown results were documented on punch lists and evaluated for nonconforming conditions and establishment of corrective action. The walkdowns were conducted in two phases. The first phase consisted primarily of tubing along with the associated tubetrack and clamps. The second phase, which commenced in January 1983, consisted of a walkdown of supports. The walkdowns resulted in the generation of a large number of NCRs and rework. Attachments 2, 3 and 3F of the response to NRC Issue 23 discuss the significance of the NCRs.

2. In addition to LP&L QA participation in the corrective action walkdowns discussed above, LP&L QA performed a status review at the time of system turnover in accordance with the requirements of LP&L Procedure QASP 17.5. This review consisted of a minimum 10% review of the documentation, and a random field sampling of hardware versus as-built drawings. Portions of the Mercury installation for the following startup systems were field verified:

   18-3, 25-9, 36-1, 36-3, 39, 43A, 43B, 43E, 43H, 43J, 46A, 46B, 46C, 46D, 46E, 46H, 52A-1, 52A-2, 52B, 52C, 53A, 55A,56A, 58, 59, 60A, 60B, 60C, 66, 71B, 73 and 76.

   As a result of these reviews, LP&L was able to conclude that the as-built conditions generally reflected the system drawings, and that no significant hardware deficiencies were encountered.

3. Ebasco conducted various other field verification activities relative to Mercury installations. These are summarized as follows:

a. As part of the closure of SCD 57, Ebasco QA initiated a corrective action supplement which consisted in part of a sample field inspection of various attributes related to Mercury installations. This inspection took place in February, 1984.

b. Ebasco Engineering conducted a plant walkdown in order to identify and correct miscellaneous hardware deficiencies which normally result from ongoing construction activities. This walkdown was conducted in accordance with Ebasco Procedure ASP-IV-141 and included all safety related areas of the plant. Deficiencies, along with QA/QC verification of corrective action on safety related items, were documented on punch lists. The program was established in support of the area closeout and transfer process, which took place in March, 1984 through May, 1984. This walkdown provided another level of assurance on the Mercury installations.

c. Since August 1982, the Ebasco QA Surveillance Group has conducted 48 documented surveillances of Mercury hardware and documentation. Any findings were resolved and, when necessary, NCRs were initiated to evaluate potentially significant discrepancies. The activities of the Ebasco QA Surveillance Group are discussed in greater detail in Attachment 3 to the response to NRC Issue 23. Generally, this in-process surveillance program provided another means of monitoring Mercury activities, thus ensuring the adequacy of the installations.

4. The most significant activity, aside from the corrective action walkdown discussed in Item 1, involved the Ebasco QA records review of Mercury documentation. This review was necessary due to the demobilization of Mercury in August of 1983 without the completion of the Mercury records review. The review commenced in November, 1983 and was completed in March, 1984. A group of 46 QA reviewers, inspectors, supervisors and clerical staff was assembled for this effort. The review was conducted in accordance with QA instruction QAI-23. As deficient or missing documents were identified, QC inspectors were dispatched to reverify the installations. As a result, approximately 67% of tube track installations were reinspected; approximately 35% of Seismic Category 1 supports were reinspected; and approximately 24% of the Mercury installed anchors were reverified for proper torque. Attachment 5A to the response to NRC Issue 23 provides a summary of the review and reinspection scope resulting from the Ebasco QA records review. Available records indicate that an insignificant amount of rework resulted from the reinspection process.

ATTACHMENT No. J-2

SUMMARY OF THE EBASCO QA RECORDS REVIEW (Continued)

I. The following is a summary of the work scope related to the Mercury documentation review conducted by Ebasco QA. Further, a summary of field QC verifications resulting from the review process is provided in Section II.

A. Tubing Installations Records Review

Review Scope	ASME Section III-Class 2	ASME Section III-Class 3	Total
Number of Systems	13	36	49
Number of Mercury Travelers (OCRs)	86	284	370
Number of Instruments	150	835	985

B. Seismic Category I Support, Tube Track, and Other Miscellaneous Hardware Installations

Review Scope	Quantity
Tube Track Supports	5142
Primary Sample Line Pipe Supports	314
Tube Track Installations	665
Instrument Stands	184
Bulk Fabricated Supports/Fittings/ Anchor Plates	7230 (Approx.)
Instrument Mounts	267

II. QA reinspections were initiated in order to resolve documentation deficiencies identified in the review process. A summary of reinspections is as follows:

A. Tubing Installations

Reinspections were initiated to verify the following:

Attribute	Quantity
Heat Number	30
Material Identification	15
Welder's I.D.	11
Tube Slope	4
Verify Repair of Damaged Tubing	7
Wall Thickness	2
Defective Weld	1
Instrument Installation	3
TOTAL	73 (Note 1)

ATTACHMENT NO. J-2

SUMMARY OF THE EBASCO QA RECORDS REVIEW (Continued)

B. Supports/Tube Track and other miscellaneous Seismic Category 1 installations.

Reinspections were initiated to verify the following:

Attribute	Quantity
Support Configuration, Location & Welds	2058
Tube Track	514
Instrument Stands	211
Torque Verification of Anchor Bolts Including Proper Embedment and Thread Engagement	896
Support Type Only	159
Final Visual of Support Weld Only	88
Pipe Support Configuration	77
Miscellaneous Attributes (Ht. No., Welder I.D., Etc.)	216
TOTAL	4219 (Note 1)

As a result of these reinspections, a total of 113 NCRs and 1035 Discrepancy Notices were dispositioned.

NOTE 1: Some duplication of reinspection or unsuccessful inspection is included in these numbers.

ATTACHMENT NO. J-3

SUMMARY OF MERCURY REINSPECTIONS RESULTING FROM NRC ISSUE NO. 1

As a result of the LP&L review of NRC Issue No. 1 regarding Mercury QC qualifications, LP&L deemed it prudent to undertake a further extensive reinspection of Mercury work. Accordingly, LP&L procedure QASP19.15 was established to reinspect the sensing lines and associated hardware (e.g. tube track, support, etc.) for the N1 instrument installations, which perform a safety-related function and provide a pressure boundary. The reinspection was performed by qualified inspectors, and no discrepancies impacting plant safety were found.

The discrepancies were sorted into the following nine categories for evaluation:

A. Overspan on tubing
B. Missing hardware (e.g. missing nuts, bolts, lockwashers, tube clamps)
C. Incorrect tubeclamp type (2D,3D)
D. Insufficient weld on support
E. Incorrectly assembled hardware, track, support, etc.
F. Undersized tubing weld
G. Anchor bolt embedment
H. Anchor bolt spacing
I. Arc strike/grind mark on weld

Table 1 summarizes the number of findings in each category.

The purpose of this attachment is to discuss the ramifications of the identified conditions with respect to plant safety and to discuss the need for further reinspections.

Category A - Overspan on Tubing

The most significant overspanned conditions found during the reinspection were analyzed under design loading conditions and determined to be within ASME code allowable stresses. The 15 cases identified as rework items involved minor relocation of clamps and were reworked rather than submitted for complete engineering evaluation. It was judged, however, that there was no safety significance with the respect to the as found conditions in this category.

Category B - Missing Hardware

Missing hardware was further broken down into two categories:

a) Missing lockwashers

b) Missing tube clamps, missing nut or bolt for tube clamp assemblies, and tube track support or track splice connections.

Missing lockwashers pose a concern in that the nut is more likely to loosen under seismic conditions. Since the nuts were found to be tight in these instances, the bolts should not loosen under short term seismic conditions.

Induced vibration in tubetrack/tubing installations due to plant normal operating conditions is minimal, and should not cause loosening of the connection.

With respect to the missing tube clamp hardware, such cases were treated as an overspan condition for evaluation. Stress analysis evaluation of the identified discrepancies concluded that the as-found condition would not result in overstressing the tubing under design loading conditions.

Missing tubetrack hardware likewise results in an overspanned condition. The resultant deflections would not result in failure of the tubing pressure boundary under design loading conditions.

In summary, none of the missing hardware items degrade the overall system integrity and thus do not preclude the system from performing its intended safety function. However, missing hardware items were reworked in accordance with installation requirements.

Category C - Incorrect Tube Clamp (2D & 3D)

The as-found conditions can be broken down further as follows:

1. Two dimensional (2D) clamps used in lieu of a three dimensional (3D) clamp.

2. Three dimensional clamp used in lieu of a two dimensional clamp.

The first condition represents no safety significance in that a 3D clamp simply provides axial restraint as well as lateral and vertical restraint. Axial restraint is also achieved by clamps installed on the tubing as it changes direction. (That is, tube clamps in a tube run on a perpendicular plane of direction to the run to be restrained will provide restraint to that run).

The condition in which a 3D clamp is used in lieu of a 2D clamp may pose a concern in that axial thermal growth would be restricted. The only case where this condition may pose a problem is when there is a straight run of tubing between two 3D clamps coupled with high maximum operating system temperatures. Only two such cases were noted out of the 68 total clamp discrepancies. Approximately 2600 tube clamps were inspected.

The probability that these lines would fail is low, since restricted growth due to cyclical thermal loading of the tube in itself would not cause a pressure boundary failure. Frequent cyclical thermal loading is not anticipated on Waterford since it is LP&L's policy to backfill instrumentation legs rather than blowdown the line. In the unlikely event of a tube failure for the two identified instrument loops (had the cases not been corrected), the failure would not have been of safety significance.

SUMMARY OF MERCURY REINSPECTIONS RESULTING FROM NRC ISSUE NO. 1 (Continued)

Category D - Insufficient Weld On Support

The two identified conditions in this category were evaluated and found to be acceptable as installed, under design loading conditions. Thus, no item of safety significance was identified in this category.

Category E - Incorrectly Assembled Hardware

The 49 identified conditions consisted primarily of loose bolts. Many instances involved one loose nut in a four bolt tube track splice assembly. In such instances one bolt alone would be sufficient.

In instances of loose tube track to support bolts or tube clamp bolts, the loose nut and bolt assembly provided some clamping action, ensuring no overspan condition existed that would degrade the overall system integrity under design conditions. The instances of this condition occurring are isolated throughout all the reinspected installations, which further reduces the impact on individual system integrity.

Category F - Undersize Tubing Welds

Twenty-Five undersized welds were identified. Thirteen were acceptable based on a previous analysis (refer to NCR-W3-5850). The remaining 12 welds were repaired to meet ASME code requirements. However, in LP&L's judgement, had these undersized conditions gone undetected, the structural integrity of the weld to perform under design loading conditions would not have been compromised. Also, hydrotests performed on non-atmospheric installations provide further evidence relative to the adequacy of the weld. Given that only 12 out of the approximately 4800 welds reinspected were found to be undersized, LP&L believes that additional reinspection is not justified. None of these conditions represent an item of safety significance even though repairs were required based on ASME code requirements.

Category G - Anchor Bolt Embedments

Three of the identified conditions in this category were reworked to be consistent with installation criteria required. These were later analyzed and it was found that rework was not required and none of these conditions posed a concern relative to safety significance.

Category H - Anchor Bolt Spacing Violations

The as-found conditions in this category were evaluated and determined to be acceptable as-is under design loading conditions. Therefore, no item of safety significance was noted.

SUMMARY OF MERCURY REINSPECTIONS RESULTING FROM NRC ISSUE NO. 1 (Continued)

Category I - Arc Strikes & Grind Marks

Arc strikes or grind marks were identified on base metal pressure boundaries or at a weld. When buffed and measured, the as-found conditions were determined not to exceed established minimum wall thickness criteria or minimum weld size requirements. Thus no condition of safety significance was noted nor were any repairs required.

SUMMARY AND CONCLUSIONS

Conditions that have been designated for rework were done so generally to meet code requirements and to satisfy specific installation criteria. Had these conditions been left uncorrected, in LP&L's judgement, they would not have impacted the overall ability of the system to function under design loading conditions. Further, the limited number of discrepancies found in each category as compared to the total number of items inspected does not justify further reinspection of Mercury installations. This is further substantiated by the fact that most of the rework performed involved minor hardware discrepancies (i.e. categories B, C and E).

All Mercury N1 instrument tubing installations were reinspected and no safety significant deficiencies were found. N1 instrumentation accounts for a large percentage of the Mercury safety related work and Mercury N2 installation was accomplished using the same personnel, procedures and techniques as were used in N1 installation. Therefore, it is concluded that reinspection of N2 instrumentation, which is only safety related with respect to its pressure boundary integrity function, is not warranted. As noted, significant pressure boundary concerns were not identified in the N1 instrumentation reinspection. Only 12 out of 4,800 welds were repaired, and these repairs were due to code requirements, and not as a result of a degraded pressure boundary integrity condition.

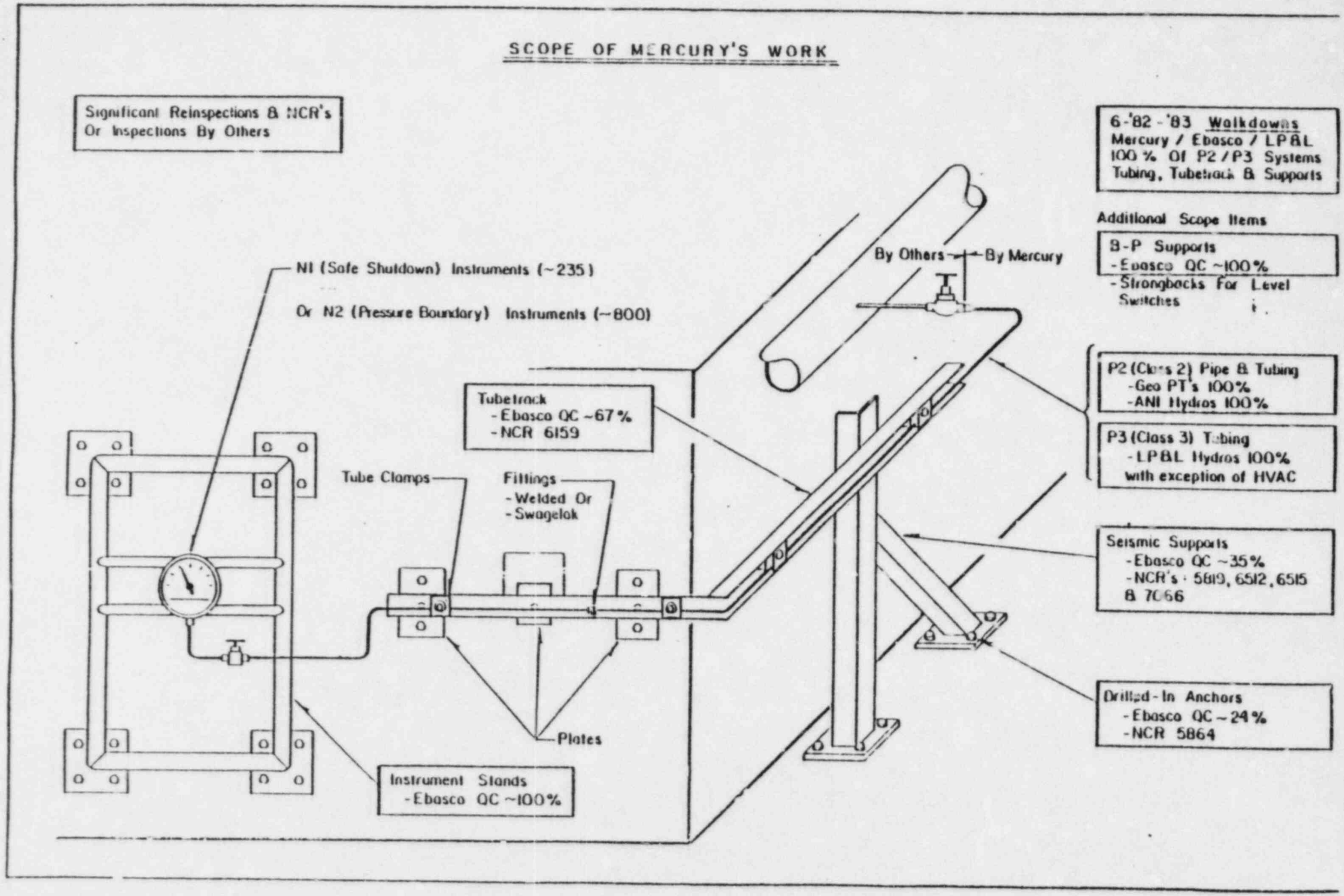
TABLE 1

SUMMARY BY DISCREPANCY TYPE

VIOLATION CODE	APPROXIMATE TOTAL ITEMS INSPECTED**	TOTAL DISCREPANCIES IDENTIFIED* CITED	ACTUAL	TOTAL NUMBER OF REWORK ITEMS	ACCEPTED AS IS
A	10,500 ft.	55	21	15	6
B	5,500	75	67	67	0
C	2,600	68	68	68	0
D	3,700	15	2	0	2
E	5,500	60	49	49	0
F	4,800	25	12	12	0
G	3,600	40	3	3	0
H	3,600	88	42	0	42
I	10,500 ft.	7	7	0	7
TOTAL		430	274	221	53

* QASP19.15 contained basic design criteria that had to be inspected against. This procedure did not account for previous analysis, unique installation details or certain criteria identified in the installation details notes section. The actual number of discrepancies reflect the valid violations from the specified detailed design criteria.

** Estimate based on typical installation of 10,500 linear ft. of tubing with accessories.


SCOPE OF MERCURY'S WORK
Significant Reinspections & NCR's Or Inspections By Others
6-'82 - '83 Walkdowns
Mercury / Ebasco / LP&L
100 % Of P2 / P3 Systems
Tubing, Tubetrack & Supports
Additional Scope Items
B-P Supports
- Ebasco QC ~100 %
- Strongbacks For Level Switches
By Others
By Mercury
N1 (Safe Shutdown) Instruments (~235)
Or N2 (Pressure Boundary) Instruments (~800)
P2 (Class 2) Pipe & Tubing
-Geo PT's 100%
-ANI Hydros 100%
P3 (Class 3) Tubing
- LP&L Hydros 100%
with exception of HVAC
Tubetrack
- Ebasco QC ~67 %
- NCR 6159
Tube Clamps
Fittings
- Welded Or
- Swagelok
Seismic Supports
- Ebasco QC ~35 %
- NCR's : 5819, 6512, 6515 & 7066
Plates
Drilled-In Anchors
- Ebasco QC ~24 %
- NCR 5864
Instrument Stands
- Ebasco QC ~100 %

ATTACHMENT 1

K. NISCO

1. On-Site Dates: August 1978 to October 1983

2. Scope of Work:

   a. Installation of Reactor Coolant Pumps.
   b. Installation and final setting of reactor vessel and (2) steam generators.
   c. Installation of Reactor Vessel head.
   d. Installation and assembly of fuel handling system.
   e. Fabrication and installation of seismic Class I supports.
   f. Installation of pool seal ring/rolling missile shield.
   g. Perform hydrostatic testing on all systems installed.
   h. Perform insulation resistance testing on electrical equipment.
   i. Assembly and installation of CEDM system magnetic jack assemblies.

3. Scope of Inspection:

   a. Material Receiving Inspection.
   b. Inspection of fit-up and final welds.
   c. Inspection of Proper Bolting (Torque and Tension).
   d. Installed Equipment Inspection.
   e. Hydrostatic Testing Inspection.
   f. Insulation Resistance Testing Inspection.

4. QA Program Requirements/Contractual Commitments:

   a. Quality Personnel (including Auditors, QC Inspectors, and QA Surveillance Personnel) - Nisco's contract required all personnel to receive indoctrination and technical training.
   b. QA Auditors - Nisco Procedure ES-116-3, "Qualification Certification of Audit Personnel" required completion of self study courses, on-the-job training, and oral or written examinations.
   c. QC Inspectors/QA Surveillance Personnel - ANSI N45.2.6, Nisco Procedure ES-116-2, "Qualification and Certification of Inspection Personnel", and Nisco Procedure ES-117, "Inspection, Testing, and Examination Personnel Training Procedure".

5. Inspector Qualification and Dispositioning of Deficiencies:

The Verification Program identified five (5) Nisco QC inspectors whose qualifications were initially determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Requests (CAR) EQA84-4 and EQA84-19 were initiated to track the disposition of this deficiency.

K. NISCO (Continued)

Based on additional investigation of background, education, and specific job functions, it was determined that the identified individuals were qualified to perform their functions. Subsequent evaluation and background verification effort determined that:

a. One (1) identified individual's qualifications to ASNT SNT-TC1A as a Level III Examiner was questioned based on the lack of supporting documentation in his personnel file. NISCO's scope of work at Waterford 3 did not include Non-Destructive Examination (NDE). Therefore, this individual was not required to function in the capacity of a Level III (NDE) Examiner at Waterford 3.

b. One (1) identified individual's prior work history could not be adequately verified to permit a firm conclusion that he was certifiable as a Level II inspector. However, his inspections were generally part of the installation process which received multiple inspections or was followed by satisfactory PT or RT inspections by an independent subcontractor or overinspections by a qualified inspector. On that basis, his inspection activities are deemed satisfactory.

c. One (1) identified individual could not be qualified for his Level II Mechanical and Receiving Inspection qualifications prior to July 1980, but performed no Level II Mechanical inspections prior to that date and records reviewed indicated he did not perform receiving inspections while at Waterford 3. Based on experience through June 1980, and the fact that he successfully passed (90%) a mechanical inspection proficiency evaluation, this individual was deemed qualified to perform Level II inspections after that date.

d. One (1) identified individual was certified as a Level II inspector on February 2, 1980 and performed in this capacity for about three months until May 7, 1980. As a result of LP&L Audit 80-25 (May 2-23, 1980), a Stop Work Order was issued contending that he was not qualified to be certified as a Level II inspector. NISCO promptly reclassified him as a Level I and reviewed the weld inspections performed by him during the period in question. They were visual weld inspections which were backed up by independent subcontractor NDE reports. On that basis the work inspected prior to May 7, 1980 is concluded to be satisfactory. On August 24, 1981, the identified individual was determined to be properly qualified and was recertified as a Level II.

K. NISCO (Continued)

e. One (1) identified individual was certified as a Level II inspector, and performed in this capacity at Waterford from June 4, 1979 to May 7, 1980. As a result of LP&L Audit No. 80-25 (May 2-23, 1980) a Stop Work Order was issued contending that he was not qualified to be certified as a Level II inspector. His qualification records were reviewed and, considering the experience he gained during the period in question, he was properly recertified as a Level II inspector. The inspections performed by this individual between June 4, 1979 and May 7, 1980 have been identified. They were visual weld or fit-up inspections, which were backed up by independent subcontractor NDE Reports. This individual's work performance is therefore considered satisfactory both before and after his recertification.

On these bases, the work performed by NISCO is deemed satisfactory.

ATTACHMENT 1

L. NOOTER

1. On-Site Dates: July 1976 to December 1981

2. Scope of Work:

Fabricate and Erect

a. Refueling Water Pool Liner
b. Condensate Storage Pool Liner
c. Reactor Building Canal Liner including Floor Embedments, Floor and Wall Embedments, and Refueling Cavity Seal Bed Plate
d. Spent Fuel Storage Pool Liner
e. Spent Fuel Cask Storage Pool Liner
f. Refueling Canal Liner
g. Spent Fuel Cask Decontamination Area Liner
h. Decontamination Room Liner

3. Scope of Inspection:

a. Receiving Inspection
b. Radiographic
c. Magnetic Particle
d. Ultrasonic
e. Liquid Penetrant
f. Leak Detection (Vacuum Box Testing)
g. Calibration of Test Equipment
h. Final Visual Weld Inspection

4. QA Program Requirements/Contractual Commitments:

a. Quality Assurance Engineer (includes Auditors) - No requirements for qualification.
b. Quality Assurance Technicians (includes Record Reviewers) - No requirements for qualification.
c. Quality Assurance Management/Supervisors - No requirements for qualification.
d. Field Inspectors - Nooter Procedure SP-18, "Qualification of Inspectors", field requirements are High School education and/or prior experience in manufacturing and construction. Natural or corrected near distance visual acuity such that individuals are capable of reading the J-1 letters on the standard Jueger test chart. Color vision evaluated for personnel performing color sensitive evaluations. In addition, prior to performing inspection, the inspectors are briefed on job requirements.
e. Nondestructive Examination Personnel - SNT-TC-1A and Nooter Procedure NDE-10, "Nondestructive Examination Personnel Qualification and Certification".

5. Inspector Qualification and Dispositioning of Deficiencies:

The Verification Program identified three (3) Nooter individuals whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request EQA84-2 was initiated to track the disposition of this deficiency. Review of inspection files revealed that two of those personnel acted as administrative supervisors and performed no inspections or examinations at Waterford.

The remaining individual although qualified Level II for visual and NDE testing, was determined not qualified for LT (vacuum box testing). Inspection documentation revealed he was involved with visual, NDE, soap solution and vacuum box examination. The majority of his work concerned the inspection of 177 - 3/4" non-structural plugs and cover plate welds in the liners of the Refueling Water Storage Pool (RWSP) and Condensate Storage Pool (CSP). (These plugs were installed after grouting beneath the liners.) Documentation revealed he performed the following examinations in a seven day time frame.

a. Visual inspection of cover plate fillet welds, root pass and filler welds on plugs. (Qualified)
b. PT of plate fillet welds and plug filler welds. (Qualified)
c. LT (vacuum box) of cover plates. (Not qualified)

Because of the non-structural nature of the work in question and the individuals visual and PT qualifications the portion of the work on these pools inspected by him is deemed acceptable except for concerns over leakage.

Subsequently some repair work was done on both pools. This repair work was completed, inspected, and documented. Additionally a highly sensitive helium pressure test was performed beneath the RWSP liner. The test indicated minor leakage. Leakage points were repaired, inspected and documented. Presently both pools are filled and no leakage is evident.

Based on the aforementioned facts, LP&L is confident that both pools are structurally sound and able to properly carry out their intended safety functions.

The review also indicated some inspections in the Fuel Handling Building on the Spent Fuel Cask Storage Pool Gate housing plates were visually examined by the individual in question. Again it is noted that he was qualified for this type of inspection. Additionally Ebasco QA reinspected these welds under NCR-W3-5804 EBFA/MECH (NB-1;TP-1). On these bases the work involved in those inspections is considered acceptable.

L. NOOTER (Continued)

The final task where records show that the individual in question also performed leak testing is on a liner plate weld in the Spent Fuel Cask Storage Pool. The weld in question was successfully tested by visual and liquid penetrant inspections. The weld also passed the system standing water leak rate test upon completion of all Fuel Handling Building pool liner welding. The local leak rate test that he performed was merely a precursor to the final standing water test. Liquid penetrant testing combined with the standing water leak rate test would show any leak defects in the weld.

Based on the above, the work inspected by the identified individual is judged acceptable.

ATTACHMENT 1

M. SLINE

1. On-Site Dates: December 1977 to August 1984

2. Scope of Work:

   a. Application of Service Level I, Service Level II and Balance of Plant Equipment and Structure coatings.

3. Scope of Inspection:

   a. Surface Preparation Inspection
   b. Product Selection Inspection
   c. Paint and Protective Coating Application Inspection
   d. Workmanship Inspection
   e. Receiving and Issuing Material Inspections
   f. Calibration Inspections

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel except QA Manager - No procedural requirements for qualification.
   b. QA Manager - Sline Procedure W3-1, "Certification and Qualification of Inspectors", which requires QA Manager to be a Level III.
   c. Inspector Personnel - Sline Procedure W3-1, "Certification and Qualification of Inspectors".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified twenty (20) Sline QC inspectors whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request EQA84-26 was initiated to track the disposition of this deficiency.

   Disposition was primarily on the basis that the Sline QA program requirements were sufficient for the particular tasks being performed and well documented records confirm the identified individuals met these requirements.

   While it is important to closely follow specifications related to the application of nuclear coatings, the inspections associated therewith are relatively simple and can be competently performed with little or no previous experience following minimal training and testing on specification requirements, inspection procedures, and the use of relatively simple tools.

   The Sline Quality Assurance Program requirements included documented on-the-job training, classroom instructions, and review of education credentials. A review was conducted of the records of the identified Sline personnel. This review of the well documented Sline program

supports a conclusion that the identified individuals met the Sline program requirements. This conclusion, coupled with the simplicity of the required inspection tasks, provides reasonable assurance that the identified Sline individuals were competent to perform their inspection functions.

Further confidence in the quality of the Sline work is provided by the following additional considerations:

a. Prior to and during the initial start of work, representatives from the coating manufacturers were on site to review the program and application methods. On site coating manufacturer representation occurred periodically during the construction process. The purpose of the manufacturer representation was to confirm compliance with recommendations and provide further technical direction as necessary. Visual examinations of various applications (i.e., steel, concrete, etc.) were performed by the representatives to assure proper surface preparation, application and curing. Coating manufacturer representation provides added confidence in the quality of the finished product

b. Over 1000 individual tests (adhesion, Tooke Gage, Textex Tape, etc.) were performed by Sline and/or the paint supplier and Ebasco, many of which were discretionary. Results were satisfactory.

c. Over 35 field surveillances were also conducted by Ebasco covering either specific or random inspection points such that over a period of time all technical attributes of Sline performance were reviewed for adequacy. Results were satisfactory.

d. Dry Film Thickness (DFT) readings and visual examinations have been performed by Ebasco, both randomly and for specific purposes. Only minor deficiencies were identified.

e. During recent weld inspections throughout the plant, significant difficulty was encountered in the removal of paint to facilitate inspection, reflecting the quality of the coating application.

f. An Ebasco NY Lead Corrosion Engineer made frequent site inspection visits to provide additional overview of quality.

On the above bases, there is adequate assurance that the coatings installed at Waterford 3 will perform satisfactorily in service.

ATTACHMENT 1

N. TOMPKINS - BECKWITH (T-B)

1. On-Site Dates: June 1977 to June 1984

2. Scope of Work:

   a. PIPING
      1. Installation of ASME III Safety Class I, II, III, and Non-Safety related (B31.1) Process Piping Systems.
      2. Installation of Pipe Flange Bolts.
      3. System Hydrostatic Testing.

   b. HANGERS
      1. Installation of associated Seismic and Non-Seismic Pipe Hangers/Supports (ASME Section NF, AISC(Fabrication) or AWS D1.1).
      2. Installation of Pipe Rupture and Whip Restraints including structural steel, U-bolts, restraining plates, spacers and shims for piping systems installed by T-B.
      3. Installation of expansion anchor bolts for systems installed by T-B.

3. Scope of Inspection:

   a. PIPING
      1. Fit-up and final visual inspection.
      2. Inspection of pipe flange bolts.
      3. Hydrostatic testing.

   b. HANGERS/RESTRAINTS
      1. Fit-up and final visual inspection.
      2. Inspection of high strength bolting.
      3. Inspection of expansion anchor bolts.

   c. GENERAL
      1. Material Receiving inspection.

4. QA Program Requirements/Contractual Commitments:

   a. Quality Assurance Auditors - T-B Procedure TBP-8, "Quality Assurance Audits", requirements shall have or be given appropriate training or orientation to develop their competence for performing required audits.
   b. Quality Control Inspector/QA Surveillance - ANSI N45.2.6 and T-B Procedure TBP-4, "Indoctrination, Training, and Certification of QA/QC Personnel".

5. Inspector Qualification and Dispositioning of Deficiencies:

The Verification Program identified 38 T&B QC inspectors whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Requests EQA84-12 and EQA84-23 were initiated to track the disposition of these deficiencies.

ATTACHMENT 1

N. TOMPKINS - BECKWITH (T-B) (Continued)

There has been a significant amount of required and elective overinspections, reinspections, tests and reviews conducted by T&B, Ebasco, LP&L and others. Personnel performing overinspections and reinspections were qualified to carry out their stated activities. These are displayed on the attached Tables I & II. Brief explanations, keyed to the tables, are:

PIPING AND PENETRATIONS

(1) T-B contracted Hartford Steam Boiler, Inc., to provide third party Authorized Nuclear Inspection services. The Authorized Nuclear Inspectors (ANI) inspected in-process and completed work on a sample basis to independently assure compliance to the ASME Code. These inspections were performed on items and processes that were also inspected by T-B QC personnel.

(2) T-B inspectors only performed visual examinations of welds. All other Non-Destructive Examination (NDE) was independently performed by Peabody/GEO Testing. GEO NDE included radiography, liquid penetrant, magnetic particle and ultrasonic testing.

(3) All radiographs were independently reviewed by a qualified Ebasco Examiner.

(4) Independent Preservice Inspection (PSI) of piping, pipe welds, and pipe supports per ASME Section XI requirements was performed by Virginia Corporation under contract to LP&L. This inspection consisted of both visual examination and ultrasonic testing of critical safety related installations previously installed and inspected by T-B personnel.

(5) All safety-related piping systems were hydrostatically tested to assure system integrity. In addition to T-B QC personnel, these tests were witnessed by the T-B ANI (Hartford), Ebasco Start-Up personnel, LP&L Start-Up personnel, and the LP&L ANI (Factory Mutual - witnessed Class 3).

(6) All piping documentation was reviewed by T-B and Ebasco QA personnel. On a sampling basis, LP&L QA personnel reviewed a minimum of 10% of this documentation. The LP&L QA documentation review included field verification of approximately 3% of the installed hardware of small bore piping.

(7) The Pre-Core Hot Functional Test has been performed and this test verified the integrity of the pipe welds under pressure and thermal loading based on simulated actual plant conditions.

(8) Verification of piping configuration was accomplished as part of Ebasco Engineering IE Bulletin 79-14 program. The Pre-Core Hot Functional thermal monitoring program further established the adequacy of the as-built piping configuration to function as designed.

SEISMIC PIPE SUPPORTS

(9) Ebasco Engineering has performed a field verification of Seismic Category I support/restraints which consisted of the following:

a. Support/restraint location and functionality (IE Bulletin 79-14).
b. Completeness of hardware installation

(10) Support/Restraint functionality was verified during the Pre-Core Hot Functional Thermal Monitoring Test program.

(11) As a result of Significant Construction Deficiency No. 60 (NCR 4010), T-B QC inspectors reinspected over 4500 safety-related pipe supports.

(12) Ebasco QA has performed a detailed as-built inspection of over 200 highly stressed hangers.

(13) LP&L QA has inspected 3500 hangers in accordance with procedure QASP 19.7.

(14) LP&L contracted Helmut Thielsch, a noted metallurgist, to independently review the support/restraint assembly structural welds. In his report he concluded that even those welds that were considered marginal in appearance, exceeded load carry requirements by a considerable amount. Further, he judged the structural welds to be comparable to other nuclear power plants.

(15) The LP&L Piping Verification Group is responsible for the following activities to be performed during Phase III testing program:

a. Monitor mechanical snubbers for cold/hot settings

b. Monitor spring hangers (except 2" & under non-seismic/non-safety) for cold/hot settings.

c. To clear the deficiencies found during the pre-core hot functional testing, a portion of safety class (high energy) piping will be monitored for thermal expansion.

(16) All hanger documentation was reviewed by T-B and Ebasco QA personnel. On a sampling basis, LP&L QA personnel reviewed a minimum of 10% of this documentation. The LP&L QA documentation review included a field verification of approximately 3% of the installed hardware.

N. TOMPKINS - BECKWITH (T-B) (Continued)

The above reviews and inspections confirm the overall acceptability of the work performed by Tompkins-Beckwith. Therefore, there is adequate assurance that the safety related piping and supports will satisfactorily perform their intended functions and no further construction-related inspections or tests are warranted.

Tompkins-Beckwith T-B Scope of Work

PIPING

Inspections, Reinspections and Walkdowns

COMPONENT	CODE CLASS	QUANTITY INVOLVED	PRIMARY WELD CONFIGURATION	CODE REQ'D EXM.	QC INSPECTION PERFORMED BY T-B	ASME CODE INSPECTION	GEO	RADIOGRAPH REVIEW	PRESERVICE INSPECTION	HYDROSTATIC TESTS	DOCUMENTATION REVIEW T-B	DOCUMENTATION REVIEW EBASCO	DOCUMENTATION REVIEW TPI	OTHER
Piping Large Bore	ASME III Class 1	50 Isos	Circumferential Welds	VT, RT, MT or LP	1. Dimensional Verification 2. Component & Weld No. Verified 3. Cleanliness 4. Fit-Up 5. Purge (1% O_2) 6. Preheat 7. Interpass 8. Purge Dam Removed 9. Intern. Root Pass Insp. 10. Welder Stamp, Weld & Iso No. 11. Final Visual 12. PURT Acceptance	(1) Third Party - Hartford Steam Boiler	(2) Independent examination by GEO Testing RT, MT, LP	(3) Ebasco 100%	(4) Independent Inspection by Virginia Corp.	(5) 100% Inspected by: 1) T-B Inspectors 2) T-B ANI-Hartford 3) Ebasco Start-Up 4) EPRI Start-Up	(6) 100%	(6) 100%	(6) 10% (Min.)	(7) Hot Functional Tests (8) IE Bulletin 79-14 Program
	ASME III Class 2	285 Isos	Circumferential Welds	VT RT	Same as above	(1) Same as above	(2) GEO Testing RT	(3) Ebasco 100%	(4) Same as above	(5) Same as above	(6) 100%	(6) 100%	(6) 10% (Min.)	
	ASME III Class 3	472 Isos	Circumferential Welds	VT and MT or LP	Same as above	N. A.	(2) GEO Testing MT, LP	N. A.	N. A.	(5) Same as above (except no T-B ANI)	(6) 100%	(6) 100%	(6) 10% (Min.)	
Piping Small Bore	ASME III Class 1	2 Isos	Circumferential Welds	VT RT	1. Dimensional Verification 2. Component & Weld No. 3. Cleanliness 4. Fit-Up 5. Preheat 6. Interpass 7. Welder Stamp, Weld & Iso No. 8. Final Visual	(1) Same as above	(2) GEO Testing RT	(3) Ebasco 100%	(4) 1st and above Same as above Independent Inspection by Virginia Corp.	(5) Same as above	(6) 100%	(6) 100%	(6) 10% (Min.) 7% Field Verified	(9) 2600 socket welds reinspected under SCD-28 (Sch-160)
	ASME III Class 2	14 Isos	Socket Welds	VT and MT or LP	Same as above	(1) Same as above	(2) GEO Testing MT, LP	N. A.	N. A.	(5) Same as above	(6) 100%	(6) 100%	(6) 10% (Min.) 7% Field Verified	
	ASME III Class 3	47 Isos	Socket Welds	VT	Same as above	N. A.	N. A.	N. A.	N. A.	(5) Same as above (except no T-B ANI)	(6) 100%	(6) 100%	(6) 10% (Min.) 7% Field Verified	
Component Pene.'s	ASME III Subsec. NC	150 Isos	Circumferential Welds Large bore piping ASME III Class 2	VT RT	Essentially same as piping ASME III, Class 2	(1) Third Party - Hartford Steam Boiler	(2) GEO Testing RT	(3) Ebasco 100%	(4) Independent Inspection by Virginia Corp.	(5) Overpressurization tests	(6) 100%	(6) 100%	(6) 10% (Min.)	

SEISMIC PIPE SUPPORTS

Tompkins-Beckwith Scope of Work

Overinspections, Reinspections, and Reviews

COMPONENT	CODE CLASS	QUANTITY INVOLVED	PRIMARY WELD CONFIGURATION	CODE REQ'D NDE	QC INSPECTION PERFORMED T-B	NDE T-B	OTHER INSPECTION(S)/REVIEWS (9)	DOCUMENTATION REVIEW T-B (16)	EBASCO (16)	TPEC (16)	OTHER
Seismic Hangers	ANS B1.1 ASME III NF (Chilled Water Only)	6800	Fillet Welding	VT	1. Dimensional Verification 2. Fit-Up and Final of Welds 3. Material Traceability	VT	- Ebasco Engineering Field Verification (10) - Thermal Monitoring Test Program (11) - NCR 4010 Inspections (SCD No. 60) (12) - Ebasco As-built Inspections of over 300 Highly Stressed Hangers (QAI No. 20) (13) - LP&L QA Inspection of 3500 hangers (QASP 19.7) (14) - Weld Study by Metallurgist Helmut Thielsch (15) - LP&L Piping Verification Group	100%	100%	10% (Min.) 3% Field Verification	

ATTACHMENT 1

O. WALDINGER

1. On-Site Dates: April 1977 to June 1979

2. Scope of Work:

   a. Install HVAC duct, duct accessories, and supports.
   b. Install HVAC equipment.
   c. Perform pre-operation, balancing, and functional testing of HVAC systems.
   d. Install plant stack.
   e. Install duct insulation.
   f. NDE by others.
   g. Waldinger's contract calls for furnishing and fabrication of ductwork, accessories, and supports; as well as installation.
   h. Includes safety-related and/or seismic and non-safety related/non-seismic.
   i. Leak and pressure testing of HVAC systems performed by Coastal Air Balance (W3-FB-19) with TWC QC witness.

3. Scope of Inspection:

   a. Receiving Inspection.
   b. Inspection of on-site fabrication.
   c. Inspection of installed concrete expansion anchors.
   d. Inspection of duct-duct connections.
   e. Fit-up and final visual inspection of structural welds.
   f. Inspection of equipment setting (including bolt torquing).
   g. Witness leak and pressure tests.

4. QA Program Requirements/Contractual Commitments:

   a. QA Personnel - ANSI N45.2.6 paragraph 3.1 per Waldinger's QA Manual.
   b. QA Auditors - Waldinger Procedure SQCP 18.1-1, "Audit" which is compatible with ANSI N45.2.23.
   c. QC Inspectors - ANSI N45.2.6 and Waldinger Procedure SQCP-2.1-1, "Qualification of Inspection, Examination, and Testing Personnel."

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified thirteen (13) Waldinger inspectors whose qualifications were initially determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Requests (CAR) EQA84-01 and EQA84-25 were initiated to track the disposition of these deficiencies.

   One of the identified individuals was determined to have performed no safety related inspections.

   One identified individual's work was reinspected by a qualified inspector.

Two identified individuals achieved qualification and certification for Level I while employed at Waterford 3. Records show that they performed no quality inspections prior to proper certification.

For the remaining nine (9) identified individuals, the construction feature of predominant concern involved structural welding on duct supports because of the lack of subsequent proof testing or significant overinspection and the importance of satisfactory workmanship thereon. Therefore a sample reinspection of structural welds was performed by qualified personnel. This reinspection was performed under LP&L Procedure QASP 19.19. Approximately 25 joints for each of the nine inspectors (a total of 220 welds) were reinspected and evaluated. Sixty-five welds were reinspected with paint removed to better ascertain the quality of welds. All reinspected welds were found to be acceptable without rework.

The remaining inspection tasks did not require reinspection on the following bases:

- Receipt Inspection and On-site Fabrication

  Safety related and special HVAC duct sections were prefabricated (welded) in the shop by Waldinger and shipped to the site.

  All material was receipt inspected upon arrival at the site. If any rework was required the rework was then reinspected by Waldinger field inspectors. The majority of these inspections were performed as part of the erection process which involved multiple inspections and considering subsequent satisfactory system testing the ducting is judged to be adequate to perform as intended.

- Inspection of Installed Concrete Expansion Anchors

  Hilti expansion anchors are conservatively designed and have considerable reserve capacity. In accordance with NRC IE Bulletin 79-02, they are designed for a nominal safety factor of 4 in tension. Therefore it is considered that an isolated defective bolt installation will not endanger the structural integrity of the system and for this reason such postulated situations are acceptable.

  In addition, the site anchor installation activity was addressed by Ebasco in December of 1981. Ebasco Corrective Action Report (C.A.R.) 82-3-2 was written against all companies installing safety related expansion anchors. Ebasco nonconformance report NCR-W3-3316 was written in conjunction with the C.A.R. 82-3-2.

The C.A.R. identified the fact that contractors installing expansion anchors did not fully comply with design specifications 1564-468 (seismic applications) and 1564-467 (non-seismic applications). The major specific violation noted in the C.A.R. was that the spacing distance of anchor bolts between adjacent plates was less than 10 bolt diameters and the distance of installed anchors to free edge was less than 5 bolt diameters.

As a result of this Corrective Action Report, Nonconformance Report (NCR-W3-3316) was initiated to evaluate all identified cases where the spacing criteria were not met. This NCR required a walkdown by Ebasco Quality Control to identify previous installations and required Ebasco Design Engineering to evaluate those cases identified as violations. This walkdown was completed, violations were evaluated and the NCR was closed after all identified items were resolved.

- Inspection of Duct-to-Duct Connections and Witnessing of Leak and Pressure Tests

  Duct-to-duct connections are inspected in process primarily to facilitate the efficient conduct of leak and pressure tests. The in-process inspections were limited to visual examination of bolted flange connections and presence of gaskets. No bolt torquing inspections were required or involved. Waldinger QC personnel witnessed a portion of the initial pressure and leak tests. The final pressure and leak tests were performed by the Startup Test Group and were witnessed by LP&L, Ebasco QC, Ebasco Construction Engineers and Ebasco Site Support Engineers. The test results ensure that the systems performed in accordance with specifications.

- Inspection of Equipment Setting

  Inspection of equipment setting included verification that bolts (and washers, if required) are in place and tight, and/or welds are completed. Since there are no torquing requirements for the setting of HVAC equipment, the inspection of equipment setting required only inspection for installation of bolts and washers which require a minimal level of knowledge and experience.

On these bases, there is adequate assurance that the Waldinger HVAC installations will perform satisfactorily in service.

RESPONSE

ITEM NO.: 10 (Revision 1)

TITLE: Inspector Qualification (J.A. Jones and Fegles)

NRC DESCRIPTION OF CONCERN:

The NRC staff reviewed the qualification and certifications of QC inspectors in the civil/structural area. The review included the qualifications of four Ebasco inspectors, five J.A. Jones inspectors, and eight Fegles inspectors. The inspector qualifications were compared against the requirements of ANSI N45.2.6 and the contractor's procedures.

The staff found that four of the five J.A. Jones inspectors and two of the eight Fegles inspectors failed to meet the applicable certification requirements related to relevant experience. Since these inspectors were involved in the inspection of safety-related activities, the fact that they may not have been qualified to perform such inspections, renders the quality of the inspected construction activities as indeterminant.

LP&L shall review all inspector qualifications and certifications for J.A. Jones and Fegles against the project requirements and provide the information in such a form that each requirement is clearly shown to have been met by each inspector. If an inspector is found to not meet the qualification requirements, the licensee shall then review the records to determine the inspections made by the unqualified individuals and provide a statement on the impact of the deficiencies noted on the safety of the project.

DISCUSSION:

A verification program was implemented to review the professional credentials of 100% of the site QA/QC personnel who may have performed safety-related functions at Waterford 3, including supervisors, managers and remaining QA/QC personnel. The responses to Issues No. 1 and 20 discuss inspector qualifications for Waterford 3 contractors other than J.A. Jones and Fegles.

The program, which is being performed under the overall direction of LP&L, consists of three major elements:

- Collection and verification of personnel data.
- Evaluation of qualifications against specified standards.
- Dispositioning of deficiencies resulting from cases where inspections and tests were conducted by personnel whose qualifications against the appropriate standards could not be confirmed.

Collection and Verification of Personnel Data

Personnel data were collected from various sources, including site files, contractor home office files, personal contact with individuals or supervisors and through a background verification program.

Efforts were made to verify the education and work experience of 100% of the J.A. Jones and Fegles QA/QC personnel by researching Waterford 3 contractor records and by contacting schools, former employers and others. The background verification effort for J.A. Jones and Fegles personnel was a joint LP&L/Ebasco effort. While the success rate of this effort was good, there were cases where confirmatory information was not obtainable. In such cases, the judgement of the LP&L Review Board, as described below, was used to rule on the reliability of the available information.

Evaluation of Qualifications to Specified Standards

QA/QC personnel data were evaluated in order to classify individuals as either having verified qualifications or not. Training, education and work experience were the qualifications of primary concern. These qualifications were verified against the following criteria:

(1) Inspectors - ANSI N45.2.6-1973

(2) Other QA/QC Personnel - QA Program requirements

Initial qualification determinations for J.A. Jones and Fegles QA/QC personnel were performed first by Ebasco and then separately by an LP&L review group. In order to control the consistency of these determinations, approved procedures were utilized. Determinations related primarily to balancing education, experience and training factors.

The LP&L review group qualification determinations were rendered in two categories: "qualified" and "potentially not qualified". "Potentially not qualified" determinations were referred to an LP&L Review Board assisted by contractor personnel and a consultant very familiar with inspector qualification and related standards. This process resulted in a final determination for all QA/QC personnel as either "qualified", or "unqualified".

The qualification review process is described in QASP 19.12 and QAI-32. The following points further clarify the process:

1. The meaning of the term "unqualified" must be amplified. In some cases determinations were made that, based on verified data, individuals' backgrounds did not warrant qualification to ANSI N45.2.6-1973. In other cases, however, individuals were considered "unqualified" as an expedient in reaching resolution to the concern. This occurred in cases in which:

a. Research of records, inquiries to past employers and employees, contact with schools and verification of training received was either not possible or could not be concluded in a reasonable period of time.

b. Apparent discrepancies existed between background information provided by some individuals and that obtained in the verification process, and resolution could not be achieved on a timely basis. Minor discrepancies were excused; however, significant discrepancies generally rendered any other significant but unverified data as suspect.

2. In the process used, being judged as "unqualified" to ANSI N45.2.6-1973 did not automatically render the individual's work as invalid. For example, an individual may not have the education and experience qualifications for all inspection work, yet be fully competent through specific training or other means to perform the particular tasks assigned to him, which might have been very simple and repetitive in nature. Such an individual potentially satisfies ANSI requirements, which ultimately require that an individual's qualifications be sufficient to provide reasonable assurance that the individual can competently perform a particular task. Whether or not the individual is technically qualified, the individual's work can be deemed valid.

3. During the construction period, some contractors made undocumented judgements with respect to the need for eye examinations for inspection personnel. Such judgements were based on the level of visual acuity or color perception required to achieve competent inspections. Such judgements were also made as part of the verification program and disposition process and will be documented. It is noted that such judgements are specifically suggested in ANSI N45.2.6-1978. This factor was not deemed disqualifying.

4. Some individuals were classified as inspectors but performed no safety related inspections.

Disposition of Deficiencies

For J.A. Jones and Fegles, the LP&L Review Board compiled a list of "unqualified" inspector personnel, and Corrective Action Requests (CAR) were written to formally track and disposition potential deficiencies. The manner in which the deficiencies were resolved is attached and is briefly summarized as follows:

J.A. Jones

For J.A. Jones, CAR EQA84-22S1 identified 28 QC personnel whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Twenty of

these were found to have performed safety related inspection functions on concrete placements. The construction activities inspected by the identified J.A. Jones inspection personnel with respect to the Common Foundation Basemat and Engineered Backfill were also inspected by qualified Ebasco inspectors and the inspected work was deemed acceptable on this basis.

J.A. Jones inspector qualification deficiencies in the balance of the Nuclear Plant Island Structure (NPIS) have also been evaluated. The evidence of competent Ebasco overinspections in this phase of concrete inspection activities, ranging from Level I inspections up to Level III, is the predominant factor in accepting the remaining work inspected by the identified J.A. Jones individuals who performed safety related inspection functions. This evidence served as a basis for accepting essentially all of J.A. Jones inspection activities up to the end of 1977 by which time the NPIS concrete construction was approximately 85% complete. Subsequent inspection activities of the identified J.A. Jones individuals is accepted based on their prior involvement with overinspected work, evidence of co-signature by qualified Jones inspectors, observation by qualified Jones supervisory personnel, and Ebasco field engineering endorsement for placements, all of which serve as part of guided on-the-job training to qualify the individuals to perform inspections.

On these bases, the work inspected by the identified J. A. Jones individuals is considered satisfactory.

Fegles

For Fegles, CAR EQA84-20S1 identified eight QC personnel whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Four of those individuals were found to have performed no safety related inspections. The remaining four individuals performed preplacement inspections on a limited scope of slip form operations. The construction activities inspected by the identified Fegles personnel were also inspected by qualified Ebasco QC inspectors. Accordingly, inspection by the Fegles personnel does not render the quality of the inspected construction activities as indeterminate. Adequacy of the inspected construction activities was independently confirmed by qualified inspectors.

CAUSE:

ANSI N45.2.6-1973 allows substitution for education and experience levels by noting that "... education and experience requirements specified for the various levels should not be treated as absolute when other factors provide reasonable assurance that a person can competently perform a particular task." J.A. Jones and Fegles, to varying degrees, employed such substitutions in certifying the qualifications of their QA/QC personnel. However, the verification program revealed that verification of background data was not adequate or documented, documentation of the justification for substitution was sometimes not provided or lacked depth, and/or was not always totally in accord with J.A. Jones/Fegles procedures or the ANSI standards, as currently interpreted.

GENERIC IMPLICATIONS:

This issue has been treated generically. In response to this Issue and Issues 1 and 20, the verification program included 100% of the QA/QC personnel of all site contractors who performed safety related work.

With regard to future work, qualification and certification of inspectors (including NDE personnel) will be administered through strict compliance with LP&L Nuclear Operations Procedures which meet the requirements of Regulatory Guide 1.58 Rev. 1 (ANSI N45.2.6-1978) and SNT-TC-1A-1975, as applicable.

SAFETY SIGNIFICANCE:

Satisfactory disposition of CAR EQA84-22S1 (J.A. Jones) and CAR EQA84-20S1 (Fegles) provide adequate assurance that the installations by J.A. Jones and Fegles will perform satisfactorily in service and poses no constraint to fuel load or power operation.

CORRECTIVE ACTION PLAN/SCHEDULE:

Corrective actions required to disposition CAR EQA84-22S1 (J.A. Jones) and CAR EQA84-20S1 (Fegles) have been satisfactorily completed as described in Attachment 1. The review of non-inspector personnel qualifications is complete. No significant concerns have been identified.

ATTACHMENTS:

1. Results of Verification Program for J.A. Jones and Fegles.

REFERENCES:

1. QASP 19.12, Review of Contractor QA/QC Personnel Qualification Verification

2. QAI-32, Instructions for Verification of QA/QC Personnel Qualifications

ATTACHMENT 1

A. J.A. JONES

1. On-Site Dates: October 1975 to March 1981

2. Scope of Work:

   a. Concrete Construction
   b. Concrete Masonry
   c. Concrete Reinforcing Steel
   d. Dewatering and Excavation
   e. Waterproofing
   f. Waterstops
   g. Mechanical Splicing of Reinforcing Steel
   h. Filter and Backfill
   i. Structural Steel

3. Scope of Inspections:

   a. Material Receiving Inspection
   b. Site Fabrication Assembly & Installation Inspections
   c. Structural Inspections
   d. Civil Inspections

4. QA Program Requirements/Contractual Commitment:

   a. QA/QC Personnel, except Auditors, ANSI N45.2.6 and Manual TR-1, "Training/Certification Program", Procedure POP-N-505, "Qualification/Certification of Personnel" and Procedure POP-N-702, "Personnel Training/Qualification/Certification".

   b. Q.A. Auditors - ANSI N-45.2.23 and Manual TR-1, "Training/Certification Program", and Procedure POP-N-505, "Qualification/Certification of Personnel" and Procedure POP-N-702, "Personnel Training/Qualification/Certification".

5. Inspector Qualification and Dispositioning of Deficiencies:

   The Verification Program identified 28 J.A. Jones personnel whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request EQA84-22S1 was initiated to track the disposition of this deficiency. Eight of the 28 identified individuals were found to have not performed any safety related inspection functions.

COMMON FOUNDATION BASEMAT

The Common Foundation Basemat was inspected by both J. A. Jones and Ebasco inspectors. Where an inspection activity was performed by the identified J.A. Jones individuals, the qualifications of the Ebasco inspector who performed the overinspection of the same activity were checked. In this manner it was demonstrated that each of the Common Foundation Basemat placements were inspected by one or more qualified inspectors. Therefore the adequacy of the inspected work is confirmed.

OTHER REMAINING JONES ACTIVITIES

The quality of reinforcing bar cadwelds which was inspected by J.A. Jones has been addressed in the response to NRC Item No. 11 for the entire NPIS and was resolved satisfactorily therein.

The structural backfill inspections performed by J.A. Jones were also overinspected by qualified Ebasco inspectors. In addition, stacistical studies were performed which demonstrate the consistency of the work.

See the Response to NRC Item No. 7. The clam shell filter blanket quality was addressed in NCR-W3-5997, including consideration of the identified J.A. Jones individuals and was resolved satisfactorily.

The limited welding performed by J.A. Jones was addressed in the response to NRC Item No. 9. J.A. Jones welding was resolved satisfactorily therein.

REMAINING J.A. JONES CONCRETE ACTIVITIES

The review of concrete inspections determined that, in other than the Common Foundation Basemat and soils areas, inspections were performed by 18 of the 20 identified J.A. Jones individuals who performed safety related inspections. Concrete placement packages were reviewed and the inspection activities performed by the J.A. Jones 18 individuals were identified.

This review and evaluation was time phased and the 18 identified J.A. Jones individuals were divided into the following five (5) groups:

Group 1 - Pre-1978 Level I Inspectors and Trainees
(3 Individuals)

These individuals performed concrete inspections before the end of 1977 when Ebasco QC was conducting overinspection on site.

Essentially all inspection activities by these individuals were either overinspected by qualified Ebasco inspectors or cosigned by other qualified J.A. Jones inspectors. It is considered that on-the-job training in a particular inspection activity for a minimum of two (2) placement packages following the classroom courses and tests is sufficient to perform that inspection competently. These individuals received such training.

On this basis, inspections performed by the individuals in this group, coupled with the qualified overinspections, have been evaluated to conclude that the inspected work is satisfactory.

Group 2 - Pre-1978 Level II Inspectors (6 Individuals)

The review of the concrete inspection records showed that the Level II function was limited to providing approval of preplacement inspections for subsequent concrete placement. The identified individuals routinely performed Level I concrete inspections, for which they were qualified, in addition to the approval function, and can be expected to have had sufficient knowledge regarding acceptability of the preplacement inspections. Furthermore, each Level II approval provided by these individuals was endorsed by a qualified Ebasco QC inspector.

An added level of confidence is provided by the fact that all phases of preplacement inspections were overinspected by qualified Ebasco inspectors before the preplacement status was presented for approval.

Thus, there is adequate assurance that the work inspected by individuals in this group is was satisfactory.

Group 3 -Post 1978 Level I Inspectors and Trainees
(3 Individuals)

These individuals performed concrete inspections without Ebasco QC overinspection.

In this review, emphasis was placed on identifying and evaluating these individuals' initial inspection involvement. As before, specific on-job-training for a minimum of two (2) placement packages following the classroom courses and tests was considered sufficient training to perform the assigned inspection competently.

It was found that preplacement inspections were conducted under the surveillance of competent J.A. Jones supervisors who approved and cosigned these inspections for subsequent concrete placement. Added confidence is provided by the pre-placement review by Ebasco Engineering representatives who also provided approval prior to placements.

With rare exceptions, other qualified inspectors participated in concrete curing inspections during the required 7-day period, so that deficiencies would have been identified and corrected if required. Moreover, the curing inspection is accompanied by records of concrete temperatures which have met the specification requirements.

Based on the foregoing, there exists adequate assurance that the work inspected by individuals in this group is satisfactory.

Group 4 -Post 1978 Level II Inspectors (3 Individuals)

One individual, determined as not meeting Level II requirements, actually performed no Level II functions. This individual did perform Level I inspections for which he was determined to have been qualified.

The remaining two individuals provided approval for concrete placement without Ebasco QC overinspection. A review of personnel files and inspection records revealed that both individuals had performed all phases of concrete inspections in the Level I capacity (for which they were qualified) quite extensively prior to being authorized to approve preplacement inspections. Based on their specific inspection experience on the job, there is a reasonable assurance that their Level II function was performed competently.

Where these individuals provided an approval for placing concrete, there was also an endorsement by an Ebasco Field Engineering representative who performed surveillances prior to releasing placement areas for concrete placement, and who also confirmed that Ebasco Engineering forces had completed their extensive check-out programs. This served to provide an added level of confidence to the approval given by the identified Level II individuals.

Based on the above observations, the work inspected by individuals in this group is satisfactory.

Group 5 - Level III Inspectors (3 Individuals)

The evaluation of these individuals is provided in Appendix C of the response to CAR EQA84-22S1. Inspections performed by these individuals were Level II type inspections and are considered acceptable based on the fact that these individuals are considered qualified at that level.

CONCLUSION

The evidence of competent Ebasco overinspections in all phases of concrete inspections at all levels, ranging from Level I inspections up to Level III approval of procedures, plays an important part in accepting the work performed by J.A. Jones individuals who performed safety related inspection functions and whose qualifications are in question. This acceptance criterion served to clear practically all J.A. Jones inspection activities up to the end of 1977 by which time the Nuclear Plant Island Structure (NPIS) concrete placements had progressed to approximately 85% completion.

In the review of J.A. Jones inspection activities not overinspected by Ebasco QC inspectors, emphasis is given to identifying evidence of cosignature by other qualified J.A. Jones supervisory surveillances and Ebasco Field Engineering endorsement for concrete placement. This evidence, in turn, is used to qualify the work covered by their inspection activities in the following period.

On these bases, there is adequate assurance that the J.A. Jones installations will perform satisfactorily in service.

ATTACHMENT 1

B. FEGLES

1. On-Site Dates: December 1975 to August 1976 (Shield Wall)
February 1979 to February 1980 (Dome)

2. Scope of Work:

a. Designing, furnishing, fabricating, erecting and dismantling slip forms for shield wall construction and conventional formwork and supports for dome construction.
b. Handling, placing and fastening reinforcing steel.
c. Detail reinforcing steel for shield wall slip form construction.
d. Handling, placing and setting to line and grade all items to be embedded in the shield wall and in the dome.
e. Forming for blockouts in shield wall, installing waterstop, removing forms and patching voids or honeycomb areas.
f. Placing, finishing and curing concrete by the slip form method for the shield wall and the dome by conventional 2 stage construction.

3. Scope of Inspections:

a. Material receiving inspection
b. Form erection inspection
c. Placement area preparation inspection
d. Concrete placement inspection
e. Concrete finishing and curing inspection
f. Concrete repair inspection
g. Dome form decentering inspection
h. Reinforcing steel placement inspection

4. QA Program Requirements/Contractual Commitments:

Fegles - Shield Wall Construction: December 1975 to August 1976

a. QA/QC Personnel except Auditors - ANSI N45.2.6 and Fegles Procedure QAP-303, "Quality Assurance Plan" and QAP-303 Supplement #2, "Personnel Qualifications".
b. QA Auditors - QA auditor must be a Corporate QA Manager.

Fegles - Dome Construction: February 1979 to February 1980

a. QA/QC Personnel except Auditors - ANSI N45.2.6 and Fegles Procedure QAP-303.21, "Qualification of Inspection Personnel".
b. QA Auditors - QA Auditor must be a Corporate QA Manager (Level III).

5. Inspector Qualification and Dispositioning of Deficiencies:

The Review program identified eight (8) Fegles QC personnel whose qualifications were determined as not meeting the requirements of ANSI N45.2.6-1973. Corrective Action Request EQA84-20S1 was initiated to track the disposition of this deficiency. Four of the eight identified individuals were found to have not performed any safety related inspection functions.

The remaining four identified inspectors performed quality inspections as shown in the Concrete Preplacement Checklist Form QCIP-6.1. The quality inspections performed by these inspectors were duplicated by five qualified Ebasco QC inspectors using an expanded Concrete Preplacement Checklist Form QCIP-6.2.

One of the Ebasco Inspectors who performed the overinspection was qualified as a Level III Electrical Inspector and was not a qualified Civil Inspector. Upon review of the QCIP-6.2 Forms, it was verified that this individual inspected only the electrical aspects of the QCIP-6.2 forms, for which he is qualified.

Accordingly, adequacy of the inspected construction activities was independently confirmed by qualified inspectors.